Towards an Operational Definition of Critical Thinking

Parviz Birjandi[1]*, Mohammad Bagher Bagheri [2], Parviz Maftoon[3]

1, 2,3. Department of English, Science and Research Branch. Islamic Azad University, Tehran. Iran
*Corresponding author: birjandi@srbiau.ac.ir

Abstract

This paper offers a state-of-the-art working definition for the concept of Critical Thinking (CT hereafter) in an attempt to provide a framework for the development of an operational definition for this complex concept. Having studied various definitions and models, proposed for CT by major figures in the field, the key defining features of this rich concept were identified and classified. Based on these key descriptors, a working definition consisting of three main components namely *Mind Analysis*, *Data Evaluation*, and *Thinking in Education* has been proposed and then each dimension of this definition is defined and elaborated further so that the complexity of the concept could be framed in an extended model. The elaborated conception of CT proposed in this paper seeks to include the core elements of CT so that it can be expandable into an operational definition with measurable items. There are two main reasons for conducting this research: Firstly, CT has evolved into a multifaceted construct with a broad range of cognitive abilities and intellectual dispositions. Secondly, although CT has been recognized as a significant concept in education, its full potential has not been achieved yet.

Keywords: critical thinking, cognitive skills, mental dispositions

Introduction

Several decades have passed since Critical Thinking (CT) was practically conceived of as an educational ideal, however, the sad fact still remains that it has failed to become an educational reality. Many educators including Paul (2012b) have explicitly complained that lecture, rote memorization, and short-term study habits are still the norm in mainstream education.

What has truly happened, as a result of widespread attention to the role of CT in daily life and education, is the proposition of multiple definitions and models. Experts from a variety of fields and disciplines have presented their own conceptualizations for this abstract concept, and the proliferation of definitions has led to the richness and multidimensionality of CT to the extent that sometimes it causes ambiguity and confusions especially for those who are new to the field.

Today, CT embraces a diverse range of domains and issues. In its strong sense, it includes not only the thinking skills but the intellectual dispositions (Paul, 2012a). Also, the challenges which intrinsic and extrinsic barriers pose to thinking critically have given a new dimension to the discussion. How various modes of thinking such as logical thinking, creative thinking, strategic thinking and reflective thinking interact in decision making and problem solving has added another dimension to the field of CT as well. Last but not least, the potentiality of CT to advance education is yet another major component of CT these days.

The multidimensionality of the concept of CT deserves close attention. CT would not be placed properly at the heart of education, unless its complexity is taken care of. As Jonson (1992) mentioned many years ago, 'the network problem' would create complications because of the fuzzy relations that exist among certain more or less interchangeable terms, including *metacognition, higher order thinking skills, problem solving, rationality,* and *reasoning*, that are used when talking about critical thinking. It necessitates the proposition of a model which would include various aspects and dimensions of CT. The model which has been proposed in this paper is an attempt to fill this gap. It seeks to present an inclusive and coherent picture of CT.

Literature Review

In this literature review we discuss in a chronological order the development of the concept of Critical Thinking (CT) since its inception as an educational paradigm. This review will point out how new dimensions were added to this concept which led to the complexity of this abstract term. Taking the various conceptualizations of the term allowed the identification of major descriptors of the concept of CT.

Dewey (1933), the founder of progressive education, named this ability 'reflective thinking' and defined it as active, persistent and careful consideration of a belief or supposed form of knowledge. In a similar manner, Glaser (1941) conceptualized CT as persistent effort to examine any belief or supposed form of knowledge. These two definitions emphasize the element of careful examination of ideas before accepting or refuting them. Ennis (1991), in his second conceptualization, defined CT as reasonable, reflective thinking focused on what to believe and do. Ennis' definition is obviously result oriented. In the major debate about the generalizability of CT across the disciplines, Ennis took the position that CT is generalizable though the transfer of skills from one discipline to another. He argues that this transfer is possible provided the required instruction is provided. Opposed to this point of view, McPeck (1981) represents the extreme view that CT is domain specific and defines CT as skills and dispositions to appropriately use Reflective Skepticism. Beyer (1985) conceptualized CT as the process of determining the authenticity, accuracy and worth of information or knowledge claims. As we notice, this definition is similar to Glaser's definition as the focus is on careful examination of beliefs and ideas. For Lipman (1988a), CT is responsible thinking that facilitates judgment because it relies on criteria, is rectifying and is sensitive to context. The importance of employing criteria to reach well-reasoned judgment is the hallmark of Lipman's definition. Siegel (1988) who defined CT as thinking appropriately moved by reasons asserts that critical thinking is the educational cognate of rationality. In a very different light, Atkinson (1997) equated critical thinking with cultural thinking, and claimed it to be a social practice which cannot be learned through instruction. In line with the majority of CT theorists, Fisher and Scriven (1997) noted skilled and active

interpretation and evaluation of observations, communications, information and argumentation as CT. Facione (2011) described CT as the ability to interpret, analyze, evaluate and infer. In his definition some major CT skills have been emphasized. In the view of Paul & Elder (1999) critical thinking is the art of analyzing and evaluating thinking with a view to improving it. In 1990 the critical thinking experts agreed to define CT as purposeful self-regulatory judgment. They viewed CT in terms of cognitive skills in interpretation, analysis, evaluation, inference, explanation and self-regulation (Delphi Report). Fisher (2001) conceptualized CT as a kind of evaluated thinking which involves both criticism and creative thinking. The importance of this definition is that Fisher considered creative thought as an aspect of critical thinking while for many CT scholars creative and critical thinking are two modes of thinking. In 2003, Halpern defined CT as directed thinking focused on a desired outcome. For her making a good decision, reaching a sound conclusion, and successfully solving a problem are examples of a desired outcome. Her conceptualization, like what we noticed in Ennis' conception, is result oriented. Scriven and Paul (2003) suggested that CT was the process of conceptualizing, applying, analyzing and evaluating information generated by observation, experience, reflection, reasoning or communication. Menkes in 2005 interpreted CT as cognitive skills that determine how well someone gathers, processes and applies information. Chaffee (2006) conceived of critical thinking as a purposeful, organized cognitive process which is used to understand the world and make informed decisions and Doughty (2006) argued that critical thinking meant thinking open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences. Elder and Paul (2013) defined critical thinking as self-guided, disciplined thought that attempts to reason at the highest level of quality in a fair-minded way.

Proposing A Working Definition to Develop a Framework for CT Operational Definition

An appraisal of the glut of definitions which have been proposed for CT, reveals some illuminating facts. It becomes evident that *careful analysis and evaluation of an idea in order to arrive at a well-reasoned judgment* is the common denominator of the majority of definitions. Another feature which

is dominant in CT definitions is the meta-cognitive aspect of critical thinking. Some scholars such as Paul and Elder (1999), Nosich (2012), Moore and Parker (2012) and Paul (2012b) emphasize that CT is thinking about thinking. Yet another component that has been frequently accentuated is the role of CT in education (Lipman, 2003; Paul, 2012a; Paul, 2012b). Lipman (1988a, 1988b, 2003), as a major proponent of teaching thinking in schools and colleges, conceptualizes education in terms of two major roles: the transmission of knowledge and cultivation of wisdom.

Having appraised the main definitions proposed for CT, we came up with a list of 28 CT descriptors. Table 1 includes this list.

Table 1
Critical Thinking Descriptors

Critical Thinking Descriptors
Careful consideration of beliefs (Dewey, 1933)
Examination of ideas & beliefs (Glaser, 1944; Bayer, 1985)
Reflective thinking (Dewey, 1933; Ennis, 1991)
Reflective skepticism (McPeck, 1981)
Reasonable thinking (Ennis, 1991)
Responsible thinking (Lipman, 1988b)
Employing criteria to reach well-reasoned judgment (Lipman, 1988b)
Well-reasoned judgment (Lipman, 1988b)
Educational cognate of rationality (Siegel, 1988)
Social practice (Atkinson, 1997)
Cultural thinking (Atkinson, 1997)
Rational approach to life (Atkinson, 1997)
Active interpretation & evaluation of data (Fisher & Scriven, 1997)
Ability to interpret, analyze, evaluate and infer (Facione, 2011)
Art of analyzing and evaluating thinking (Paul & Elder, 1999)
Purposeful self-regulatory judgment (Delphi Report, 1990)
Evaluated thinking (Fisher, 2001)
Creative thinking (Fisher, 2001)
Analyzing information (Scriven & Paul, 2003)
Evaluating information (Scriven & Paul, 2003)
Gathering, processing & applying information (Menkes, 2005)
Informed decision making (Chaffee, 2006)
Open-minded thinking (Doughty, 2006)
Thinking about thinking (Paul, 2012b)
Higher-order thinking (Paul, 2012b)
Fair minded reasoning (Elder & Paul, 2013)
Desired outcome of education (Halpern, 1999)
Detecting bias or prejudices (Lipman, 2003)

The current state of CT brought us to this realization that it would be so reductionist to restrict CT to Reasoned Judgment (which is the epitome of most conceptions of CT) and consider it a mode of thinking along with other modes of thought such as Creative Thinking and Ethical Thinking. The term Reflective Thinking (as Dewey used it) serves this purpose pretty well and can be used technically for reasoned and discerning judgment. In what follows we propose a working definition for CT which has its own special characteristics.

Critical Thinking

Critical thinking consists of (1) the art of analyzing how the human mind is engaged in thinking, (2) the ability to analyze and evaluate the data the mind receives, and (3) the capability to use thinking for educational purposes.
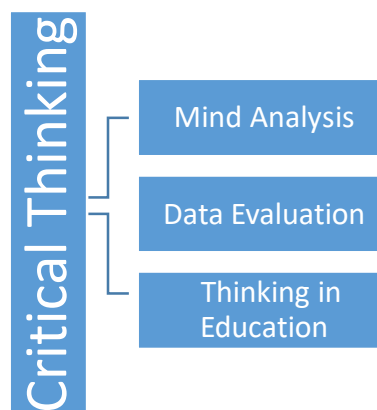

Figure 1. Three essential components of Critical Thinking

The hallmark of the above definition which has three essential components is that a distinction has been made between the mind as the apparatus of thinking and the data which arrive at the mind to be processed and interpreted. A thorough analysis of the mind reveals some enlightening facts about human's thinking apparatus. If we are to realize how human mind is engaged in thinking, we should identify its various constituent parts and conditions. Mind Analysis is an attempt to unpack the human mind in order to recognize the elements that constitute thinking. Some CT scholars

such as Nosich (2012), Moore and Parker (2012), and Paul (2012b) believe critical thinking starts once we reflect on our thinking.

The second and the third components of this definition take into consideration two important applications of CT. The second component in this definition namely Data Analysis and Evaluation comprises the application of CT in the analysis and evaluation of data. As mentioned above, the analysis and evaluation of ideas are essential facets of CT which have been emphasized by CT experts (APA Delphi Report, 1990; Beyer, 1985; Ennis, 1991; Fisher & Scriven 1997; Glaser, 1941; McPeck, 1981; Scriven & Paul, 2003). These scholars emphasize that CT involves managing the information presented rather than receiving it passively. Critical thinkers analyze and assess the data their minds receive.

The final component of this definition concerns the role of thinking in education. Dewey (1933), Scriven (1985), Lipman (1988a, 1988b, 2003), Arend (2009), Ennis (2011b), and Paul (2012b) argue that learning to think is the central purpose of education. Based on this paradigm of education, learners are expected to use critical thinking for the analysis and evaluation of the academic materials. This allows them to make reasonable interpretations of texts on the one hand, and to construct their own knowledge rather than merely memorize the content.

I. Mind Analysis

Human mind is potentially capable of performing a variety of skills and abilities. Analyzing the human mind for the purpose of better understanding how it operates has produced a variety of models. Bloom (1956), Ennis (1991, 2011a), Nickerson (1987), APA Delphi Report (1990), Facione (2011), and Paul (2012a) are some examples. In this paper, the researchers propose a model with six mental components namely: 1 Mental Constructs, 2 Mental Operations (macro-skills), 3 Mental Abilities (micro-skills), 4 Mental Dispositions (habits of the mind), 5 Mental Conditions (barriers), and 6 Mental Activities (thinking types).
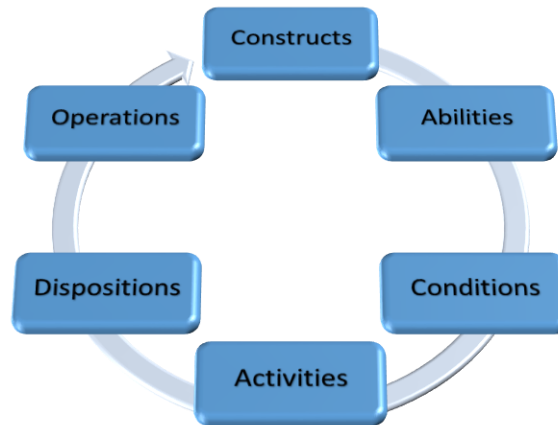
Figure 2. Six mental components which determine how the mind operates

Mental constructs are the *concepts* which are generated within the mind via the process of Conceptualization. Human mind recreates real phenomena and entities in the form of mental concepts. This provides the opportunity to think and talk about them. In fact, concepts are mental representations of external phenomena. According to Nosich, (2012) we think in terms of concepts and they inevitably shape our lives to a considerable degree. Each concept is embedded with some ideas. Humans think about the world through the concepts they construct in their minds and each concept accommodates three types of ideas: Facts, Assumptions and Inferences.

Mental operations constitute the five Macro-skills of the mind: Interpretation, Explication, Analysis, Synthesis, and Evaluation. For each of the macro-skills there are some *Mental Abilities* or micro-skills. In what follows, thirty three micro-skills related to CT have been outlined under five main macro-skills.

INTERPRETATION
- Identifying the Main Idea or Purpose
- Identifying the Position/Recognizing the Point of view
- Reading between the lines (What is Implicit)
- Recognizing unstated Assumptions

EXPLICATION

- Recalling & retelling the memorized details
- Organizing thoughts and articulating them concisely and coherently
- Defining the terms/ Doing concept clarification/ Dealing with equivocation
- Explaining or elaborating on ideas
- Providing detailed descriptions
- Paraphrasing
- Summarizing
- Reasoning from premises with which one disagrees (Suppositional Thinking)

ANALYSIS
- Detecting stated assumptions
- Distinguishing facts from opinions & judgments
- Distinguishing relevant from irrelevant data
- Classifying/ Categorizing/ Outlining
- Identifying similarities and differences

SYNTHESIS (Creating)
- Formulating hypotheses/Seeing other possibilities
- Raising vital questions/ Socratic questioning
- Making arguments/Providing reasons
- Exemplifying/ Providing examples
- Illustrating by making insightful analogies and metaphors
- Developing criteria for evaluation
- Generating solutions to problems
- Generating interconnections
- Drawing valid conclusions /Making plausible inferences
- Exploring implications and consequences

EVALUATION
- Recognizing contradictions
- Finding ambiguity (lack of clarity)
- Recognizing biases & prejudices
- Recognizing fallacies

- Judging deductions
- Judging inductions

Mental Dispositions: In addition to these core reasoning skills, CT has a dispositional aspect too. One must be disposed to think critically as well as have the skills to do so. Being a fair-minded critical thinker is much more than being equipped with the thinking skills enumerated above. It has been emphasized by CT scholars that CT is not limited to a set of cognitive skills. Some dispositions which create a critical spirit are necessary (APA Delphi Report, 1990; Cottrell, 2005; Ennis, 2011b; Paul & Elder, 2014). According to Paul (2012a) there are thinkers who strive to advance their thinking skills of argumentation and persuasion not with the intent to see things as they are, but to gain advantage over others. Critical thinking in its strong sense encompasses those traits of the mind, called Intellectual Virtues, which accompany fair-mindedness. In spite of the assumptions that CT skills and CT dispositions correlate, later studies indicated that strengthening CT skills would not automatically generate thinkers disposed to think critically (Facione, Facione, & Giancaro, 2000). Fair-minded critical thinkers use thinking in an ethical and responsible manner. Effective fair-minded critical thinkers are expected to display the following characteristics:

- *Intellectual Curiosity*: Eagerness to acquire sound knowledge
- *Well-informed Mind*: Willingness to gather and marshal relevant information and pertinent evidence
- *Confidence in Reason*: Disposition to trust reasoning and distrust blind faith
- *Fair-mindedness*: Disposition to treat all viewpoints alike
- *Open-mindedness*: Willingness to consider divergent points of view seriously
- *Disciplined Mind*: Having an organized mind which organizes thoughts and articulates them coherently
- *Intellectual Humility*: Knowledge of one's ignorance
- *Intellectual Autonomy*: Not allowing other to think for you and not following the crowd mindlessly
- *Intellectual Integrity*: Behaving in accordance with one's professed beliefs

- *Intellectual Courage*: Readiness to speak up for what one thinks is right even if it is not popular with people
- *Intellectual Responsibility*: Sensitiveness to implications inherent in thinking and consequences that follow thinking
- *Intellectual Perseverance*: Willingness to stick to challenging tasks
- *Intellectual Empathy*: Disposition to consider how other people think and feel
- *Intellectual Civility*: Commitment to take others seriously as thinkers
- *Ambiguity Tolerance*: Staying in uncertainty despite the discomfort of not knowing the answer
- *Criticism Tolerance*: Being receptive to criticism and open to feedback
- *Holistic Vision*: Taking into account the total situation
- *Emotion Management*: Awareness of the role of uncontrolled emotions in stopping a person from acting logically
- *Skepticism*: Holding open the possibility that what one knows might be part of the picture

Mental Conditions: In addition to mental skills and mental dispositions, some mental conditions or the states of the mind play a substantial role in the quality of thinking. In critical thinking literature they have been identified and classified as intrinsic barriers to fair-minded critical thinking. In fact, there are modes of thinking such as assimilation (Piaget, 1952), egocentric and sociocentric thinking (Paul & Elder, 2014), and black and white thinking (Elder & Paul, 2013) which block reasonable thinking. In addition to these modes of thinking, *cultural conditioning* (Hofstede, 1980), *logical fallacies, defense mechanisms of the mind* (Elder & Paul, 2013) and *some mental dispositions,* which are the polar opposites of intellectual virtues, operate as main barriers to critical thinking.

Mental Activities: Human mind is capable of performing a variety of activities or tasks that share the essence of thinking and reasoning. In fact, the plethora of thinking activities allows humans to make the best use of their thinking in various situations. Some attempts have been made to

classify problem solving items according to the kind of thinking required for successful completion of tasks (Knight, 2005). In each of these thinking activities, one feature is dominant and overriding. For example, in logical thinking the dominant feature is to use *logic* and in skeptical thinking the key feature is the use of *doubt*. However, it is worth noting that a given task might well involve more than one kind of thinking (Knight, 2005). Sometimes, the results of thinking depend very much on the type of thinking one uses. A critical thinker knows these different types of thinking and is able to use them appropriately. Below we briefly discuss the main thinking types which we have named them thinking activities:

- **Logical Thinking:** In this type of thinking, reasoning is mainly based on the principles of logic. It relies on correct forms of reasoning that use logic in a proper manner. The thinker moves from one related thought to another. In logical thinking, premises are reliable and conclusions follow logically. *Illogical thinking*, on the other hand, is characterized by fallacious reasoning, false analogies and unreliable premises.

- **Empirical (Scientific) Thinking:** This mental activity relies on objective sensory experience which is repeatable, measureable, and testable by others. The thinker looks for the variable or variables which could be truly responsible for an effect. The polar opposite of this type of thinking is *Intuitive Thinking* which is based on superiority of the mind's powers. It claims that knowledge of reality can be obtained by subjective experience and intuition. In Intuitive Thinking, evidence is ephemeral, intuitive, sporadic, and subjective.

- **Pragmatic Thinking:** This kind of thinking is based on the recognition that wishes and hopes do not make a belief true or even worth holding. Pragmatic thinkers base their thoughts on the realities and make decisions or offer solutions which are applicable. The opposite of pragmatic thinking is *Wishful/Hopeful Thinking*. Visionary or wishful thinkers escape into a world of fantasy. They appeal to wishes and desires rather than evidence and rationality.

- **Skeptical Thinking:** In his definition for CT, MecPeck (1981) emphasizes on appropriate use of reflective skepticism. On the whole, raising doubts has been recognized as one of the main

thinking skills. Skeptical Thinking relies on the element of doubt and asking questions to remove doubts. Of course, being skeptical does not mean being cynical. In this type of thinking, Doubting that something is true leads the thinking process. On another side of the continuum is *Dogmatic* or *Authoritarian Thinking* which is uncritical belief in some doctrine (dogma) or authority. Dogmatic thinking relies on unquestioning acceptance of knowledge claims by an authority figure or institution. Dogmatic thinkers are stubborn and narrow-minded and believe only they have the answers and others are totally wrong.

- **Reflective Thinking:** In this mental activity, the thinker actively reflects on beliefs, principles, methods, decisions, and events and is willing to temporarily suspend belief and reflects on the sufficiency of the belief's premises or logic. This type of thinking is both abstract and conceptual. A reflective thinker has a chance to evaluate his or her thinking which could elevate the quality of thinking in general.

- **Consequential Thinking:** This happens the time a responsible thinker actively thinks about the possible implications and consequences of believing or acting on some beliefs. *Irresponsible thinking* occurs the time the thinker does not take into consideration what might follow his or her thinking and actions.

- **Statistical Thinking:** Recognition that many empirical phenomena are understood and known only in statistical terms or in a sense that deals with probabilities not certainties.

- **Strategic Thinking:** This mode of thinking relies on generating and executing strategies. A strategy is a bridge that takes us from where we are to the place we desire to be. Strategic thinking requires a great capacity for both analysis (finding the dots) and synthesis (connecting the dots). Mintzberg (1994) considers strategic thinking a distinct way of thinking which utilizes creativity and intuition.

- **Creative Thinking:** In creative thinking the thinker tries to think in new and innovative ways and in doing so, open-mindedly entertains new ideas and strategies. This mental activity leads to the creation of

new ideas. In this type of thinking a productive imagination and a desire to test new ways of doing things guides thinking. *Close-minded Thinking*, on the other hand, relies on old and traditional ways of thinking in which there is no willingness to entertain new facts and ideas.

- **Reasonable Thinking:** The central characteristic of this type of thinking is reliance on reason to discover reliable knowledge. It is based on the premise that emotions are not evidence and feelings are not facts. In *Emotional Thinking*, emotions and feelings take the precedence and influence the thinking process. What one feels in a situation is much more important than what reasons and evidence provide. It is important to know sometimes irrational feelings keep you from seeing facts. A critical thinker avoids being blinded by emotions.

- **Analytical Thinking:** In this mental activity, the thinker tries to comprehend different phenomena via conscious and reasoned process of analysis, clarification, comparison, inference, and evaluation. In Ordinary Thinking understanding is based on an unexamined thought process without concern for its accuracy.

- **Realistic Thinking:** In this mental activity, phenomena or objects of sense perception exist independently of the mind, and they provide an objective reality that can be known. *Idealistic Thinking*, on the hand, is based on the premise that true knowledge of reality lies only in the consciousness.

- **Ethical Thinking:** It relies on ethical principles as have been conceptualized in the mind through cultural conditioning or conscious learning efforts. The thinker relies mostly on the ethical principles which have been explicitly or explicitly internalized. Sometimes it could emerge as dogmatic thinking if the thinking process is overshadowed by ethical dogma.

- **Suppositional Thinking:** As Ennis (1998) argues, critical thinkers consider and reason from premises, reasons, and assumptions with which they disagree or about which they are in doubt without allowing their disagreement or doubt interfere with their thinking.

- **Spiritual Thinking:** In this type of thinking, the thinker relies on religious beliefs and principles to make decisions or come to conclusions. The driving force in spiritual thinking is religion. It makes the thinker heavenly minded. Spiritually minded people are controlled by the spirit and submit to what they consider to be God's law. This mode of thinking could be realized as a type of dogmatic thinking.

- **Occupational/Academic Thinking:** A person's job or field of study is expected to create a mode of thinking relevant to it. Law students are expected to leave college the time they learn how to think like a lawyer. In fact, lawyers, doctors, engineers, mechanics, and farmers think and act in their own certain distinctive ways. Paul (2012b) emphasizes that the main mission of education is to create such thinkers. According to him, those who study biology should learn biological thinking and history students should develop historical thinking.

II. Data Analysis and Evaluation:

The first component of CT, discussed above, investigated how human mind is engaged in thinking. It was a look inside the black box. It is important to know how concepts are shaped in the mind, how assumptions might interfere in reasoning, what constitutes higher order thinking skills, what intellectual virtues stop the thinker to use thinking skills for vested interests, and what kind of thinking is appropriate in any given situation. Now, it is time to take into consideration the ideas which enter the mind to be interpreted and decided about.

Data analysis and evaluation as the second component of the definition proposed for CT in this paper, deals with *analyzing* and *assessing* the data the mind receives. According to Moore and Parker (2012), critical thinking is the careful application of reason to determine if a claim is true or not. Living in the era of information and misinformation necessitates the development of knowledge, skills, and traits which allow a thinker to distinguish rationalizing from logical reasoning and manipulation from persuasion. The opposite of thinking critically in this sense is the 'gullible

acceptance of claims'. Critical thinkers manage the information that is presented to them rather than receive and accept it passively.

Taking a critical approach in the face of the information requires the critical thinker to develop specific criteria for evaluation. Nobody accepts everything that is presented to them. Here the criteria for accepting or rejecting various ideas are essential.

Uncritical thinkers accept things that are in line with their frame of reference. They have shaped a frame of reference through being culturally conditioned. Their minds have already been programmed by their culture and environment, so they don't need to think things through. They have no reason to entertain new ideas. On the other hand, critical thinkers use their thinking skills to analyze and assess something before accepting or rejecting it. Critical thinkers are people who analyze and evaluate the information which is presented to them.

Elder and Paul (2009) propose a robust and flexible model for the *analysis* and *evaluation* of any form of thinking whether it is a paper, a book, or a discipline. They argue that eight universal elements constitute every thought; i.e. "whenever we think, we think for a *purpose* within a *point of view* based on *assumptions* leading to *implications* and *consequences*. We use *data* and *experiences* to make *inferences* based on *concepts* and *theories* in attempting to *answer a question* or *solve a problem*". In the model provided by them, these eight elements are used for the analysis of any form of thought.

In addition to the tools we need to critically analyze any form of thought, we need some specific criteria or standards to *evaluate* our thoughts and the thoughts of others as well. Elder and Paul (2008, 2013), propose nine Intellectual Standards (Clarity, Accuracy, Precision, Relevance, Depth, Breadth, Logic, Significance, and Fairness) for the evaluation of thinking:

- *Clarity* as a gateway standard determines how much a statement is free from ambiguity and vagueness and is understandable.
- *Accuracy* tells us if a statement is free from errors, mistakes or distortions. A statement might be clear but wrong.
- *Precision* as the third standard, is the exactness of a statement to the necessary level. A statement might be clear and accurate but not precise.

- ***Relevance*** is the standard that allows us to measure if a statement bears on the issue at hand or not.
- ***Depth*** is the standard that delves into the complexity of an issue. It allows us to see complexities and multiple interrelationships.
- ***Breadth*** requires the thinker to reason insightfully within more than one point of view or frame of reference.
- ***Logicalness*** is the criterion by which we can see if the parts make sense together. When we think, we bring a variety of thoughts together into some order. When the combination of thoughts is mutually supporting and makes sense in combination the thinking is logical.
- ***Significance*** is the standard which helps the thinker to focus on what is most substantive.
- ***Fairness*** determines if an idea is distorted to achieve self-serving ends.

III. Thinking in Education

The third component of the definition presented in this paper deals with the prominent role of **CT in Education**. This role was emphasized when scholars announced that *learning to think* was the central purpose of education (Arend, 2009; Dewey, 1933; Ennis, 2011b, Paul, 2012b; Scriven, 1985) and teaching children to become effective thinkers was increasingly recognized as an immediate goal of education (Lipman, 1988a). There are a number of reasons that the role of CT in advancing education was highlighted and it became an educational ideal:

- **Education as Learning How to Think**

The realization that humans naturally and innately do not think and reason well and one should learn how to think properly. The capacity of humans for good reasoning can and should be nurtured and developed by an educational process aimed directly at that end (Ennis, 2011a; Lipman, 2003; Paul & Elder, 2012). So the educational system has a responsibility to teach students how to think and reason properly. Lipman (2003) emphasizes that education should not be confined to teaching for knowledge, and teaching for judgment should be at the heart of all educational efforts.

- **Education as the Use of Thinking for Learning**

The realization that rote memorization is not genuine learning and knowledge should be constructed by the learner via thinking processes. Thinking processes have the potentiality to help the learners internalize knowledge. So, educational efforts should include the use of thinking for the acquisition of knowledge. As Paul (2012b) maintains, the educated person is not a repository of information analogous to an encyclopedia or a data bank. A person can be considered educated the time he or she can use thinking to interpret, analyze, and evaluate the content, can use thinking to raise fundamental questions, and can use thinking to generate new ideas within a discipline. True knowledge, understanding and insight cannot be transmitted to the learner through lecturing and active participation on the part of learner is necessary. The learner should process the content, think through the content and construct knowledge in the mind and the teacher's role is to facilitate this procedure (Nosich, 2012).

- **Education as Acquiring Intellectual Virtues**

The realization that learners need to improve their dispositional aspect of their character (Ennis, 2011a; Facione, 2011). Thinking skills by themselves bring about the possibility of using such skills for vested interests. Some thinkers are likely to take advantage of their own skills to manipulate others. In addition to thinking skills, Intellectual Virtues should be internalized. So the educational efforts should include this aspect of education (Paul 2012b).

- **Education as Learning how to Make Decisions**

The realization that educating a person does not simply mean finding ways to teach learners the content in a way not to forget the details. Learners are expected to make informed and sound decisions in real life situations in their personal, civic, and vocational lives. For example, a doctor should decide about the best medical procedure. Critical thinking accompanies the thinker after one is graduated and through the real life situations to make the best decisions and solve the potential problems (Paul, 2012b).

- **Education as Learning How to Think within a Discipline or Career**

The realization that each career or discipline is expected to equip the thinkers with a mode of thinking in line with that career or discipline. Knowing some random facts about a discipline does not mean that the

learner has achieved the thinking mode appropriate for that discipline. For example, a biologist is expected to be equipped with biological thinking and a historian with historical thinking (Paul, 2012b).

- **Education as Critical Analysis of Ideas**

The realization that knowledge changes so rapidly, so it serves no purpose in memorizing a great deal of facts which may be soon obsolete. Living in the era of information and misinformation requires learners to be equipped with 'Information Literacy'. This allows them to use critical thinking in the analysis and evaluation of materials so that they can construct ideas which are reliable and well-reasoned. According to Paul (2012b), critical reflection is an essential precondition of knowledge for any learner. In any field of knowledge there are dissenting ideas and theories proposed by prominent scholars. Young scholars are expected to decide which approach to adopt as their own and develop their own unique perspective. This necessitates the development of the ability to think critically about ideas they come across in their fields of study. Instead of memorizing some unlinked facts to be reproduced in a test or exam, learners are expected to be involved in critical analysis of ideas.

Discussion

The proliferation of definitions and models proposed for critical thinking has resulted in the complexity of this abstract concept. If critical thinking is to become an educational reality it should be defined in a way to be taught and assessed methodically. The main purpose of this study was to propose a model which would include various aspects of this multidimensional term. In order to achieve this goal, major definitions and models were studied thoroughly and their basic features were gleaned. As a result, three main strands of CT were identified: (1) critical thinking as the study of thinking, (2) critical thinking as analyzing and evaluating ideas before accepting or refuting them, and (3) critical thinking as a new paradigm in education. A working definition, expandable into a model based on these three strands, was proposed. This model allows observers to identify various aspects and components of this construct. Such a conceptualization would provide a basis for developing a table of specifications and the preparation of

assessment rubrics (Ennis, 2013). Compared with other models which have been proposed for CT such as Bloom (1956), Ennis (2011a), Nickerson (1987), APA Delphi Report (1990), Facione (2011), and Paul (2012a) this model strives to be more comprehensive. While Bloom's taxonomy (1964) discusses only six complex cognitive domains and APA Delphi Report (1990), Facione (2011), and Paul (2012a) enumerate a limited number of thinking skills and intellectual dispositions, this model provides a more comprehensive and detailed list of thinking skills and intellectual traits. What differentiates this modelfrom other conceptualizations, is the inclusion of the role of various intrinsic and extrinsic barriers to thinking critically. Another characteristic of this model which makes it special, is using CT as an umbrella term for various types of thinking such as creative thinking and reflective thinking.

In the twentieth century, critical thinking became an educational ideal across the world and many educational institutions mentioned it as a major goal in their mission statements. Having become an educational idea, critical thinking strives to take another step and emerge as an educational reality. Attention to CT during the past decades has led to the proposition of various definitions and models to the extent that it can no longer be confined to any single one line definition. The need to conceptualize CT in a way as to include its various facets encouraged the researchers to propose a working definition and expand it into a model so that this multidimensional construct be operationally defined for research purposes. The working definition proposed in this paper contains three main aspects namely Mind Analysis, Data Evaluation, and Thinking in Education. Various aspects of CT such as thinking skills, mental dispositions, potential barriers, and modes of thinking have been incorporated into a model.

In spite of the efforts made to bring CT into the heart of education, this paradigm of education still lacks an operational definition and uniform evaluation criteria. In this paper various aspects of this multidimensional construct have been identified and classified. Further research needs to be conducted to operationally define this concept for research purposes. Questionnaires, tests, and inventories, which are being currently used in research studies deal with some few aspects of CT. This is obviously a reductionist approach to CT and the need for a comprehensive measuring

device encouraged the researchers to redefine CT and enumerate various aspects of this construct.

References

APA (American Philosophical Association), (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. *The Delphi Report*, committee on pre-college philosophy, ERIC Doc. No. ED 315 423.

Arend, B. (2009). Encouraging critical thinking in online threaded discussions. *Journal of Educators Online*, *6*(1), 1-23. Retrieved from http://www.files.eric.ed.gov/fulltext/EJ904064

Atkinson, D. (1997). A critical approach to critical thinking in TESOL. *TESOL Quarterly*, 31, 72-95.

Beyer, B. (1985). Critical thinking: what is it? *Social Education,* 49, 270-276.

Bloom, B. S. (1956). Taxonomy of educational objectives: The classification of educational goals. New York: David McKay.

Chaffee, J. (1992). Teaching critical thinking across the curriculum. *New Directions for Community Colleges*, 77, 25-35. doi:10.1002/cc.36819927704

Cotton, K. (1991). Teaching thinking skills. Retrieved from: http://hppa.spps.org/uploads/teaching_thinking_skills.pdf

Cottrell, S. (2005). *Critical thinking skills: Developing effective analysis and argument*. New York: Palgrave Macmillan.

Dewey, J. (1910). *How we think.* Boston, MA: Heath.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process.* Boston: D.C. Heath and Company.

Doughty, H.A. (2006). Critical thinking vs. critical consciousness, *College Quarterly,* 9, 1-54.

Elder, L., & Paul, R. (2008).*The thinker's guide to intellectual standards: The words that name them and the criteria that define them.* Dillon Beach: Foundation for Critical Thinking.

Elder, L., & Paul, R. (2009).*A glossary of critical thinking terms and concepts: The critical analytic vocabulary of the English language.* Dillon Beach: Foundation for Critical Thinking.

Elder, L. & Paul, R. (2013). *30 days to better thinking and better living through critical thinking*. New Jersey: Pearson Education.

Ennis, R. H. (1981). Eight fallacies in Bloom's taxonomy. In C.J.B. Macmillan (Ed.), *Philosophy of education 1980*. Bloomington, IL: Philosophy of Education Society, (pp.269-273).

Ennis, R. H. (1991). Critical thinking: A streamlined conception. *Teaching Philosophy*, 14 (1), 5-25.

Ennis, R.H. (1993). Critical thinking assessment. *Theory into Practice*, 32, 179-186.

Ennis, R. H. (2011a). Critical thinking: Reflection and perspective Part I. *Inquiry: Critical Thinking across the Disciplines*, 26, 1, 4-18.

Ennis, R. H. (2011b). Critical thinking: Reflection and perspective Part II. *Inquiry: Critical Thinking across the Disciplines*, 26, 2, 5-19.

Ennis, R. H. (2013). *The nature of critical thinking*. Retrieved from: http://criticalthinking.net, under "What is critical thinking?"

Facione, P. A. (2011). Critical thinking: What is it and why it counts. Retrievedfromhttp://www.insightassessment.com/content/download/.../what&why2010.pdf

Facione, P.A., Facione, N.C., & Giancarlo, C.A. (2000). The disposition toward critical thinking: Its character, measurement, and relationship to critical thinking skill. *Informal Logic,* 20, 61-84.

Fisher, A. (2001). *Critical thinking: An introduction*. Cambridge: Cambridge University Press.

Fisher, A., & Scriven, M. (1997). *Critical thinking: Its definition and assessment*. California: Edge Press.

Freire, P. (1970). *Pedagogy of the Oppressed*. New York: Seabury Press.

Glaser, E. (1941). *An experiment in the development of critical thinking*. New York: J. J. Little and Ives Company.

Halpern, D. F. (1999). Teaching for critical thinking: Helping college students develop the skills and dispositions of a critical thinker. *New Directions for Teaching & Learning*, 80, 69-74. doi:10.1002/tl.8005

Halpern, D. F. (2003). Thought and knowledge: An introduction to critical thinking (4[th]ed.). Mahwah, NJ: Lawrence Erlbaum Associate.

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. London: Sage Publications.

Johnson, R. H. (1992). The problem of defining critical thinking. In S. P. Norris (Ed.), *The generalizability of critical thinking* (pp. 21–37). New York:Teachers College Press.

Knight, G. (2005). *Critical, creative, reflective, and logical thinking in the NEMP assessments: A national education monitoring project probe studyreport*.Retrievedfrom:http://nemp.otago.ac.nz/otherstd/probe_studies/studies/41knight/media/Knight_CCRL.pdf

Lipman, M. (1988a). Critical thinking: What can it be? Educational Leadership, 46(1), 38-43. Retrieved from http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_198809_lipman.pdf

Lipman, M. (1988b). *Philosophy goes to school*. Philadelphia: Temple University Press.

Lipman, M. (2003). *Thinking in education* (2nd ed.). Cambridge: Cambridge University Press.

McPeck, J.E. (1981). *Critical thinking and education.* Oxford: Martin Robertson.

Menkes, J. (2005). Hiring for smarts. *Harvard Business Review*, 83, 100-109.

Mintzberg, H. (1994). *The rise and fall of strategic planning*. New York: Free Press.

Moore, B. & Parker, R. (2012). *Critical thinking*. New York: McGraw-Hill

Nickerson, R. S. (1987). Why teach thinking? In J. B. Baron, & R. J. Stenberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 27-37). New York: W. H. Freeman & Company.

Nosich, G. (2012). *Learning to think things through: A guide to critical thinking across the curriculum* (4thed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Paul, R. (2012a). Reflections on the nature of critical thinking, its history, politics, and barriers, and on its status across the college/university curriculum part II. *Inquiry: Critical Thinking cross the Disciplines,* 27, (1), 5-30.

Paul, R. (2012b). *Critical thinking: What every person needs to survive in a rapidly changing world*. Dillon Beach: The Foundation for Critical Thinking.

Paul, R., & Elder, L. (1999).*Critical thinking: Basic theory & instructional structures.* Dillon Beach: Foundation for Critical Thinking.

Paul, R., & Elder, L. (2007).*Critical thinking competency standards.* Dillon Beach: Foundation for Critical Thinking.

Paul, R., & Elder, L. (2012). Critical thinking: Tools for taking charge of your learning and your life (3rded.). Boston: Pearson Education.

Paul, R., & Elder, L. (2014). *Critical thinking: Tools for taking charge of your professional and personal life* (2nded.). Upper Saddle River, NJ: Pearson Prentice Hall.

Scriven, M. (1985). Critical for survival. *National Forum*, 65, 9-12.

Scriven, M., & Paul, R. (2003). *Defining critical thinking*. National council for excellence in critical thinking instruction. Retrieved from: http://www.criticalthinking.org/university/univclass/Defining.htmi

Siegel, H. (1988). *Educating reason: Rationality, critical thinking, and education.* New York: Routledge.

Biodata

Parviz Birjandi is a Professor of Applied Linguistics. He got his MA from Colorado State University in Fort Collins in 1974, and his PhD from University of Colorado in Boulder, in 1978. He was a faculty member at Allameh Tabataba'I University from 1979 to 2006. Then he joined Islamic Azad University, Science and Research Branch as a full-time professor and became the head of the English Department. He has published several textbooks related to ELT in Iran and has been the author of numerous articles in local and international academic journals. His area of interest includes language testing, research and syllabus design.

Mohammad Bagher Bagheri is a PhD candidate in TEFL at Islamic Azad University, Science and Research Branch, Tehran, Iran. He holds an MA in TEFL and another MA in General Linguistics. He has been lecturing at Iranian universities for over 20 years. His main interest is Critical Thinking and he was a presenter at International Conference on Critical Thinking and Educational Reform in California, USA in 2013 and 2015. He has several publications in national and international journals.

Parviz Maftoon is associate professor of teaching English at Islamic Azad University, Science and Research Branch, Tehran, Iran. He received his Ph.D. degree from New York University in Teaching English to Speakers of Other Languages (TESOL). His primary research interests concern second language acquisition, SL/FL language teaching methodology, and language curriculum development. He has published nationally and internationally and written and edited a number of English books. He is currently on the editorial board of several language journals in Iran.