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UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

CRITICAL THINKING:

IMPLICATIONS FOR ARGUMENTATIVENESS, VERBAL AGGRESSION AND ORGANIZATIONAL LEADERSHIP

A Dissertation

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

Doctor of Philosophy

By

Peggy J. Lerner
Norman, Oklahoma
2000

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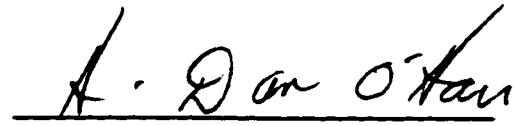
BY



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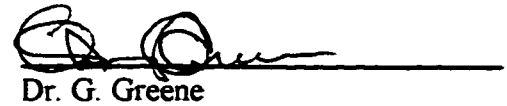

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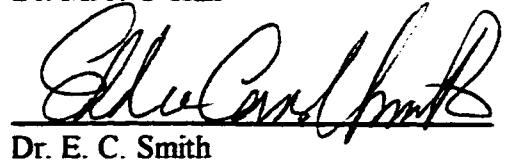

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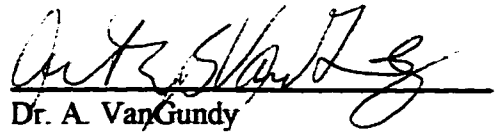

Dr. A. VanGundy

ACKNOWLEDGMENTS

An unexamined life is not worth living.
Aristotle

In order to write this section a bit of examination was necessary and it was very rewarding to discover that the space allowed for thanks and acknowledgement seemed short in comparison to the thanks I have to offer. Specifically, the greatest thanks for coming to this stage of this study goes to Dr. Dan O'Hair for his guidance and assistance. Thanks go also to the members of my committee who provided suggestions and sources of information: Drs. G. Greene, M. J. O'Hair, E.C. Smith and A. VanGundy.

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ABSTRACT

This study was conducted to determine the relationships among critical thinking, the composite of critical thinking disposition and skill; argumentativeness, the tendency to approach or avoid controversial communication; and verbal aggression, focusing the locus of verbal attack on the self-esteem of others in contrast to on the issue (Infante and Rancer, 1982, 1986,1996). According to Infante, Riddle, Horvath & Tumlin (1992), verbally aggressive communication causes a loss of self-esteem in the recipient of such messages and verbal aggression often precedes violence (p. 116). One of the causes of verbal aggression is argumentative skill deficiency (Infante, 1992, p.118-119). It was expected within this study to identify a positive relationship between critical thinking (which contains a skill component) and argumentativeness and a negative one between critical thinking and verbal aggression. Ten hypotheses were advanced: five in conjunction with argumentativeness and five in conjunction with verbal aggression. The results revealed a positive relationship between critical thinking disposition and skill and argumentativeness, and a negative relationship between critical thinking disposition and skill and verbal aggression. This result supports Infante's (1992) assertion that "one of the causes of verbal aggression is argumentative skill deficiency (pp. 118-9)." That is, critical thinking disposition and skills, espoused by the Faciones, Paul, King and Kitchener, are positively correlated with argumentativeness, and produced significant results in regard to negatively affecting verbal aggression. Implications for future research were noted.

CHAPTER ONE

Introduction

Goals of the Study

Much research is currently conducted in the disciplines of philosophy, education and especially nursing to develop models for, and to discover the link between, the possession of dispositions to think critically and the development of critical thinking skills. This study is being conducted to determine the relationships among the disposition to think critically, critical thinking skills and the traits of argumentativeness and verbal aggression (Infante and Rancer, 1982 & 1986), which have been identified and defined within the communication and other social science disciplines. Identifying a positive relationship between critical thinking and trait argumentativeness and a negative one between critical thinking and verbal aggression would add new knowledge to the communication literature in regard to those dispositions and skills that support the tendency toward argumentativeness and away from verbal aggression. It would also strengthen the case for continued research into critical thinking skills development.

A review of the argumentativeness and verbal aggression literature undertaken by Infante and Rancer (1996) provides a clear direction for continued research into this area of communication. They give four reasons for undertaking the review, two of which pertain directly to this research:

> ...the rather unequivocal conclusion that the effects of argumentativeness are constructive and those of verbal aggressiveness are destructive... indicates a need for research on how to foster the former trait and control

> the latter....because of its destructiveness, we need to understand verbal aggressiveness in order to learn how to control it....The communication discipline is in a unique position to display leadership in this area because of communication scholars' expertise in message behavior and experience in the study of verbal aggression (Infante & Rancer ,1996 p. 345-6).

According to the literature review, Infante and Rancer (1996) have developed some techniques that they believe should be used within the communication curriculum to control verbal aggressiveness. A study, conducted by Sanders, Wiseman & Gass (1994), attempted to establish a relationship between argumentation instruction and both argumentativeness and verbal aggression. Argumentation instruction, as defined in that study, consisted mainly of training students to recognize strong versus weak arguments (e.g., arguments that are supported vs. unsupported by evidence). While this training is an element of critical thinking, it is only one element that resides purely within the skill component of critical thinking. As will be discussed in detail below, the second element of critical thinking, disposition, must also be nurtured in order that true critical thinking can be achieved. In the study mentioned above, argumentation training was found to reduce the self-reported incidence of verbal aggression, but was not found to increase the incidence of argumentativeness among the participants in the study (Sanders, Wiseman & Gass, 1994). The limitations of including only the skill component in the training may account for this effect. But this limitation does not detract from the fact that limited skills training contributed to the reduction of verbal aggression. It may seem counterintuitive that argumentation training would not affect the trait argumentativeness, but the fact that

this one element did not affect the trait speaks to the relative stability of the argumentativeness trait, in that it is not easily affected by elementary skills training. The stability of the argumentativeness trait supports the comprehensive training of critical thinking of which skills is only one element of the more encompassing concept of critical thinking that also includes the disposition element. It was assumed within the current study that the verbal aggression trait is as stable as the argumentativeness trait.

Establishing the Relationship

It is expected, that the interaction of these two critical thinking components, skill *and* disposition, would affect argumentativeness and verbal aggression in opposite ways. The main purpose of this study on critical thinking was to discover whether the current emphasis within other disciplines (philosophy, education and social studies, etc.) on the development of critical thinking could control the propensity to be verbally aggressive and encourage argumentative behavior. Once these relationships were established, one way to achieve this goal would be to teach a comprehensive set of critical thinking skills, similar to what was done in the Sanders, et. al argumentation study, while at the same time, fostering the development of dispositions or habits of mind that aid both the tendency to learn and the propensity to use those skills.

It cannot be overstated, as will be discussed later, that the critical thinking conception discussed within this study is the inseparable combination of the two components of skills and disposition. For discussion purposes the two are divided out, but the critical thinking itself functions through their interaction.

There could be some identifiable barriers to the development of both skills and

perhaps particularly to dispositions (e.g. fundamental religious or philosophical beliefs or extremely authoritative world views) that must be acknowledged, but that is not the focus of this study and will not be addressed here.

Critical Thinking as an Educational Ideal

In addition to the primary goal of discovering the relationships between critical thinking and argumentativeness and verbal aggression traits, critical thinking can also be looked at from a global educational perspective. If, in fact, critical thinking supports argumentativeness which is closely linked to positive and constructive behavioral outcomes and discourages the use of verbal aggression, the argument for establishing the development of critical thinking as the most important educational ideal is strengthened. According to Harvey Siegel (1988):

> ... it is not the case that critical thinking is in fact universally accepted as an educational ideal... (p. 48). To justify critical thinking as an educational ideal is to offer a positive account of the desirability and worthiness of educational efforts which have as their aim the fostering of critical thinking in students (pg.50).

Infante undoubtedly considers the control of verbal aggression as both "desirable" and "worthy." This study is a first step in examining critical thinking as a vehicle of behavioral self-development.

This research study will investigate the existence of critical thinking disposition and skill as the are related to self-reported, relevant and measurable behavioral outcomes. Curran and Mariotto (1980) in explain a need for behaviorally oriented research.

> One generally accepted requirement of any definition of social skills inherent in a functional analysis of skills is the necessity for employing the consequence of a behavior, or a set of behaviors, as part of the ultimate criterion (p. 9).

I will use the approach that relies on distinct behaviors as the measure of the effectiveness of teaching critical thinking disposition and skills; both will be examined here as they relate to self-reports of argumentative and verbally aggressive behavior. Succinctly stated, this study will attempt to support the teaching of critical thinking dispositions and skills by establishing a direct and positive relationship between the possession of those skills and argumentativeness, and an inverse relationship link between critical thinking and verbal aggression.

Importance of Critical Thinking Education for Leadership

Teaching of critical thinking should take place at all levels of education and may also have implications for organizational leaders who, according to Sirotnic and Kimball, have a "significant and responsible influence" on followers (Sirotnic and Kimball, 1996, p. 183). Leaders should support positive communications through supporting argumentativeness and prohibiting verbal aggression by its organizational members. As will be discussed in more detail elsewhere in this study, job satisfaction is negatively affected by verbal aggression in the workplace. It may follow that the next logical step beyond merely prohibiting unacceptable behavior, would be to provide in-service training to foster dispositions and skills in order to eliminate such behavior. Leadership theory suggests that leaders can use position and other legitimate sources of influence and power

to control much of the official organizational behavior, including communications (Yukl, 1994, Chap. 7). In fact, leadership as defined by Sirotnic and Kimball would make the support of positive and constructive communication and the elimination of negative communication an organizational imperative and the leader's ultimate responsibility (Sirotnic and Kimball, 1996, p. 183).

This study also has implications for the relationship between critical thinking and leadership preparation. The following definition of leadership is provided by Yukl (1994): "[t]he essence of leadership is influence over followers" (p. 193). As mentioned above, Sirotnic and Kimball believe (1996), "[l]eadership is the exercise of significant and responsible influence on followers"(p. 183). The difference between the two is the emphasis on responsible leadership offered in the latter definition. In this instance, Sirotnic and Kimball are referring to the teacher/pupil relationship, but followers can be anyone for whom the leader is directly responsible. Sirotnic and Kimball emphasize three aspects of their definition that greatly enhance general leadership definitions. First, the exercise of leadership is intended to convey a "deliberate, decision oriented, action-taking concept of leadership"; secondly, significant " implies that leadership is not without substance, not without a content of importance; "and finally responsible leadership contains "moral imperatives (when) profoundly influencing" the lives of others (Sirotnic and Kimball, 1996, p. 183).

The aspect of responsible leadership is pivotal in relating this study on critical thinking to leadership development. To lead responsibly in democratic societies, Sirotnic and Kimball believe that

> [f]ormal education for leadership ought to begin at the beginning. How to exercise significant and responsible influence -- how to think critically, develop and justify moral arguments, work persuasively and collaboratively with others toward common goals, and so forth -- ought to be an integrating curricular theme through K-12 and higher education. It ought to be a theme that can be recognized and built upon deliberately in professional preparation programs... (p. 187).

This does not mean that everyone will emerge a leader through participation in such a curriculum, but it does mean that those who do aspire to such positions will have been given the foundations for responsible leadership. Those who depend on leaders for guidance, will develop the expectation that leaders perform responsibly and that they will possess the tools of critical deliberation and inquiry and the appropriate skills to communicate with followers and other leaders.

Unfortunately, this has not consistently been the way professionals have been educated, according to Sirotnik and Kimball (1996). In preparing leaders (in this case, teachers) in the past, more emphasis has been put on teaching them how to complete the task at hand, i.e. creating lesson plans or managing overcrowded classrooms than aiding them in developing themselves in order that they might better aid development in others (p. 188). In fact, the type of preparation in critical inquiry that would best develop capable leaders is difficult because it is more abstract and global in nature; although such preparation may be more important in the long run, short-term needs may distract professionals from it. The emphasis on developing critical inquiry that Sirotnik and

Kimball describe is consistent with the definition of critical thinking used in this study. Sirotnik and Kimball support the development of certain skills among professionals, such as in risk-taking, political and human relations, but they go beyond this to urge the importance of attending to "moral matters [which] essentially revolve around competing values, beliefs, and interests" (p.187). Leaders, in their view, must also be disposed to "engage in and facilitate critical and constructive inquiry" in order to attend to these moral matters within their personal lives, as well as across disciplines within their professional lives (p. 187). Unless leaders are able to examine and perhaps question their own beliefs and values, they will not be effective in encouraging their followers to question theirs. In a society where this kind of self-examination is imperative to the preservation of democratic tension, the absence of leadership preparation that includes critical thinking instruction could have very unfortunate long-term effects (p. 187).

CHAPTER TWO

Literature Review, Rational and Hypotheses

Defining the Concepts

The concepts that will be used within this study will be defined below in order that the following literature review will be more readily understandable. Preliminary definitions will be given first; the concepts will be more thoroughly operationalized in a subsequent section. First critical thinking will be defined and examined as consisting of two distinct parts: disposition and skills. Following this, argumentativeness and then verbal aggression will be defined as they relate to two distinct dimensions of an individual's personality: extroversion and neuroticism, respectively. A thorough conceptualization of critical thinking will follow, built upon the interdisciplinary findings of the research on this topic over the last ten years.

Critical Thinking

The result of on-going discourse among critical thinking advocates and their opponents provides some lucid, though not totally agreed upon, definitions. Some, like Roth, warn against critical thinking in the extreme while at the same time lauding critical thinking at its best. Roth (1996) apparently understands extreme of critical thinking as one of being "in a position to ask tough questions, to show a critical superiority to whatever it was [one] were examining" (p. 86). What he describes as the opposite of being an extremely critical thinker, "to try to find the position from which [one] could learn from what [one] were reading," is more likely a goal of critical thinking and not the opposite of it (Roth, 1996, p. 86). Roth has apparently confused being tough and closed-minded and

employing unfounded criticism with being a critical thinker, which actually requires open-mindedness and the ability to examine one's own "position" as one evaluates the positions of others. Roth may be confusing disagreement with a position with a failure to understand a position. Failure to agree with someone else's position does not preclude learning from it. Here, as in many areas of discourse, some good definitions result from attempts to counter criticisms and clarify misunderstanding.

John Dewey, in How We Think, provides a definition of the process of "reflective" thought. Based on philosophical theories of enlightened thinkers such as Bacon and Locke, Dewey believed that goal-oriented thought was a "union of attitude and skilled method" (Dewey, 1933, p. 29); that is, to produce reflective thought, one must filter "experience and information" through well-formed "habits" of "the principles of logical reasoning." In addition, one must be in possession of attitudes that make one "disposed" to such reasoning processes. The attitudes he deemed necessary were "open-mindedness," "whole-heartedness" and "responsibility" (Dewey, 1933, p. 30-34).

More contemporary definitions elaborate on Dewey's thoughts and vary in their emphasis, but do not change the underlying element of the unity of knowledge (subject-related or epistemological), skills and disposition. Keeping in mind that one must first of all possess the disposition to address such issues, a clear model of critical thinking as a cognitive process is provided by J. Kurfiss (1988):

> ...confronted with a complex issue, the learner constructs a representation or mental model of the situation; the model is organized around a claim or thesis and supported by reasoning and evidence. Three kinds of knowledge

> interact in developing a model: (1) declarative knowledge, knowing the facts and concepts in the discipline; (2) procedural knowledge, knowing how to reason, inquire, and present knowledge in the discipline; and (3) meta-cognition, cognitive control strategies, such as setting goals, determining when additional information is needed, and assessing the fruitfulness of a line of inquiry (p.6).

Together, Dewey's definition and Kurfiss' model provide a basis for understanding most other definitions. Paul (1993), who with other colleagues had produced a definition along the same lines as those discussed above, would expand the meta-cognitive area to include self-assessment, in addition to the assessment of declarative and procedural knowledge (p. 22). In fact, Elder and Paul (1996) provide a "working definition" of critical thinking within their "stage theory of critical thinking," that emphasizes that element. According to Edler and Paul (1996),

> Critical thinking is the ability and disposition to improve one's thinking by systematically subjecting it to rigorous self-assessment. Persons are critical thinkers, in the fullest sense of the term only if they display this ability and disposition in all, or most, of the dimensions of their lives (p. 34).

As an important part of self-assessment one must become aware of one's own biases. According to Paul (1993)

> *because of one's point of view, one notices some things rather than others, emphasizes some points rather than others,* and thinks in one direction rather than others. This is not in itself a criticism because *thinking within a*

point of view is unavoidable. Fairminded critical thinkers try to be aware of their bias... (p. 459) (Emphasis in the original).

The definition that will be used within this research is taken from the American Psychological Association (APA) sponsored Delphi research project on critical thinking concluded in 1990. The report on the project, titled Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction concerned itself mainly with the conceptualization and definition of critical thinking. There are several reasons this definition is preferred.

First, the Delphi report on critical thinking is a comprehensive, multi-contributor review. The forty-six contributors, many of them experts in their respective areas, as well as in the field of critical thinking, came from a variety of disciplines, including philosophy, education, social science and physical science. The "delphi method" of decision making was developed by the Rand corporation and calls for submission of information from experts who are geographically separated from a group of scholars who synthesize the material. The ensuing report is then sent back to those who originally submitted ideas for review and clarification. The process continues through several iterations, until no more changes are made to the report (Harris, 1993, p. 347-8). The use of the "delphi method" of coming to a consensus regarding the definition of critical thinking enabled scholars who would typically not work together to collaborate on the project.

Secondly, the two critical thinking instruments used for this study (to be discussed in Chapter 3) were both designed by Peter Facione, the director of that project, and are based on the results of the report. In addition, the definition put forth by the project

members was reached by consensus and is offered as an ideal to be sought after, and not a set of criteria to which each person must measure up. The definition reads in part as follows:

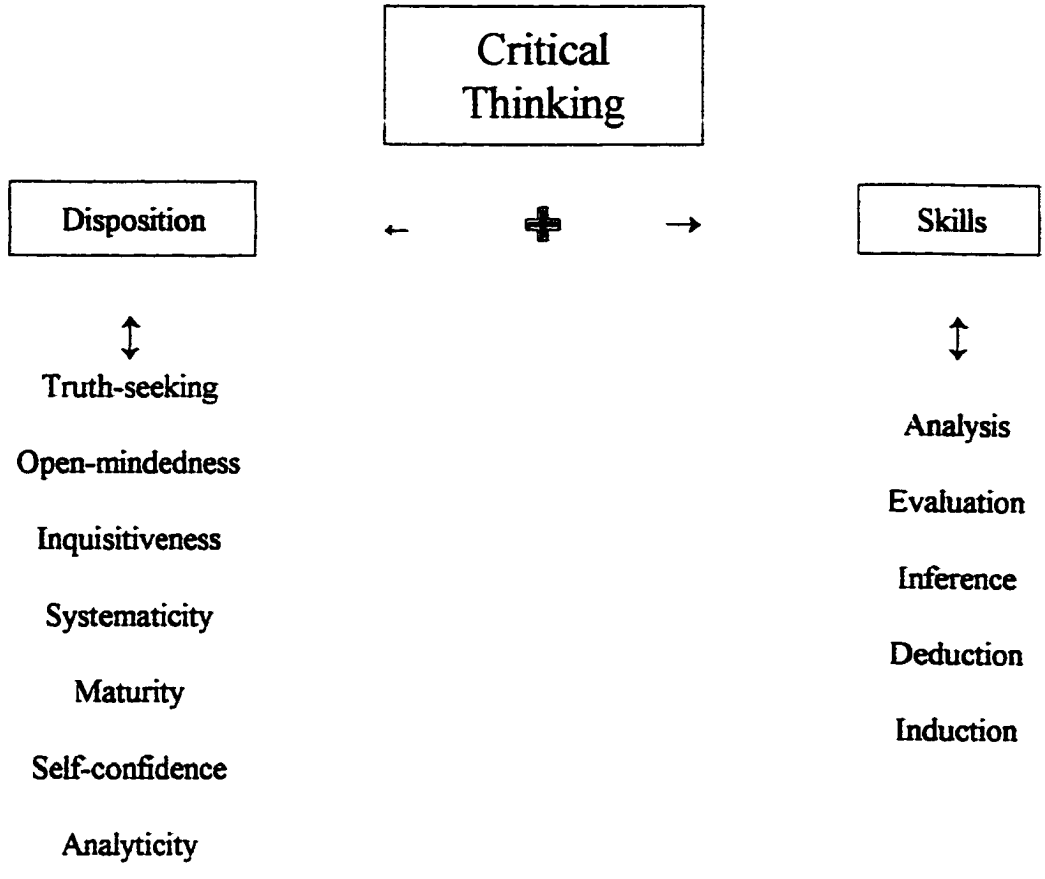
> We understand critical thinking (CT) to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberation force in education and a powerful resource in one's personal and civic life.... 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. Thus, educating good critical thinkers means working toward this ideal...(Facione, 1990, p. 3)

This definition will not only guide the research, but provides a framework for critical thinking. The concept of critical thinking includes both an individual's personal disposition toward critical thinking and critical thinking skills as indicated in the definition above. See Figure 1 for a graphical description of the critical thinking composite.

Argumentativeness and Verbal Aggression

Although they are independent concepts, argumentativeness and verbal aggression are so closely related within this study that it makes sense to define them using juxtaposition. It is as important, in this case, to know both what each of these concepts are and also what they are not. Infante, along with several colleagues, has identified and conceptualized argumentativeness and verbal aggressiveness. Argumentativeness and verbal aggressiveness are actually two of four traits contained in a model of communication developed by Infante (1987); each is a sub-trait of the more encompassing assertiveness and hostility, respectively. As already mentioned elsewhere, argumentativeness is considered constructive, whereas verbal aggression is considered destructive; the same is true for their more encompassing related traits. In order to understand argumentativeness and verbal aggression as separate and independent components of an individual's personality, Infante & Wigley (1986) have nested these traits within Costa's and McCrae's (1980) model of personality (Infante & Wigley, 1986, p. 63). According to Infante and Wigley (1986), Costa and McCrae divide the personality into three areas: neuroticism, extroversion and openness (p. 63). Infante and Wigley place and nonverbal emblems" (Infante & Wigley, 1986, p. 61). The destructiveness of these

Figure 1. Model of critical thinking based on the definition by Facione (1990).

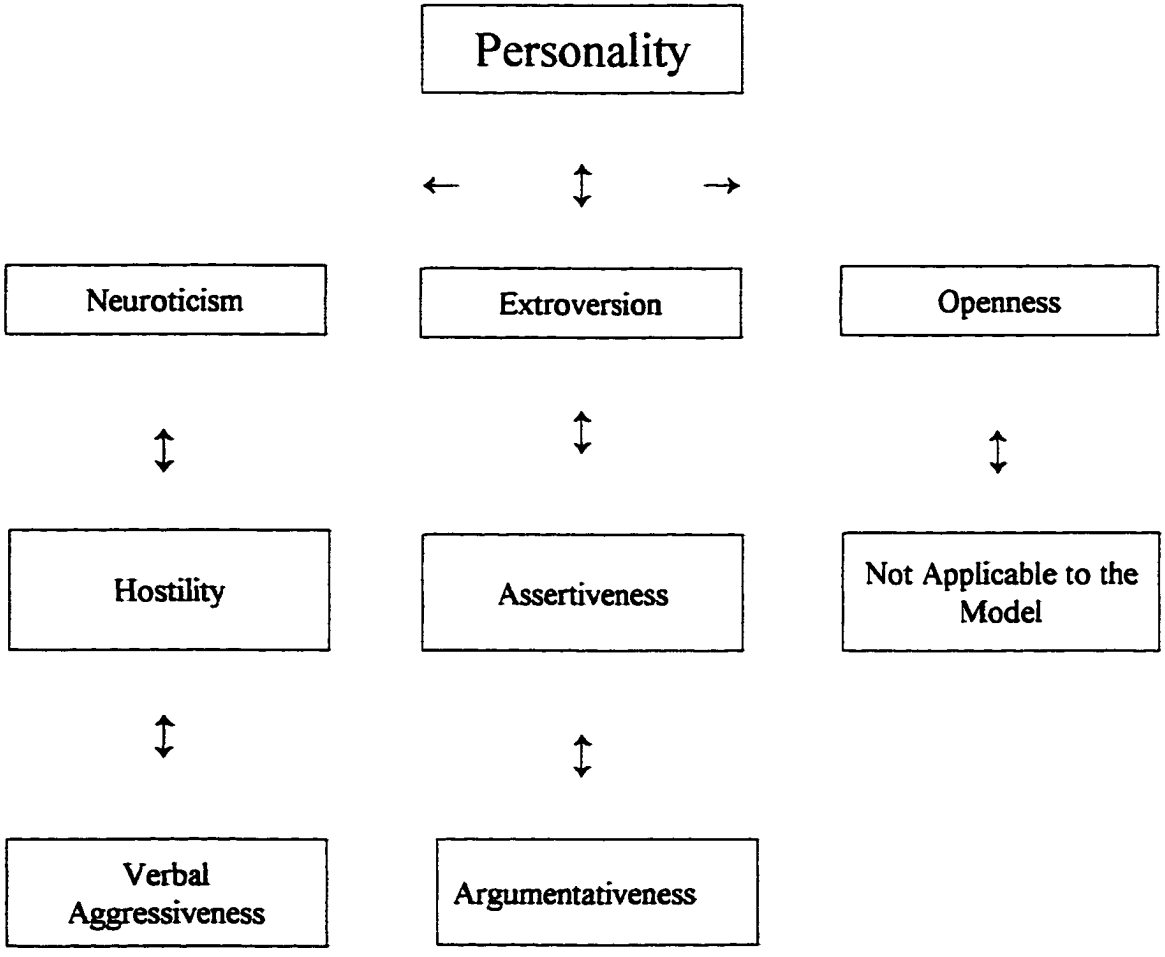


assertiveness and argumentativeness into the area of extroversion and hostility and verbal aggressiveness into neuroticism. This placement makes the initial differentiation between the two traits quite clear. See Figure 2 for a graphical depiction of where argumentativeness and verbal aggression reside within personality.

Infante & Rancer (1982) suggest that argumentativeness can be described as a behavior resulting from a combination of a tendency to approach and avoid communication (p. 72). How these tendencies combine to explain the argumentativeness trait will be discussed in a model of argumentativeness below. Individuals who tend to approach communication are usually more confident in their ability to do so and "perceive(s) this activity as an exciting intellectual challenge, a competitive situation which entails defending a position and 'winning points'" (Infante & Rancer, 1982 p. 72). Those who avoid communication are less confident in their abilities to engage in argument and have "unpleasant feelings before, during, and after the argument" (Infante & Rancer, 1982 p. 72). Those who are high in trait argumentativeness actively pursue the opportunity to argue controversial issues, but limit their verbal attack to the subject and the arguments of others that take part in the event.

In addition to its being located in a separate dimension of personality, verbal aggressiveness is qualitatively distinguished from argumentativeness in its locus of attack; that is, the verbally aggressive individual tends to attack the self-esteem of the person and not the issue involved in the argument. Examples of verbally aggressive messages are "character attacks, competence attacks, insults, maledictions, teasing, ridicule, profanity, kinds of messages calls for the control of verbal aggressiveness. Advocating critical

Figure 2. Model of Argumentativeness and Verbal Aggression based on the models of personality by Costa and McCrae (1980) and of communication by Infante (1987).



thinking by developing an individual's critical thinking disposition and teaching them the necessary skills may be one way of controlling this trait.

Conceptualizing Critical Thinking

The on-going dialogue among critical thinking philosophers, researchers and educators across disciplinary boundaries is producing an ever more precise conceptualization of critical thinking. Critical thinking made up of two prime elements, disposition and skills (to be discussed separately below). Its conceptualization addresses the questions of how best to affect these elements and, once developed, whether they can be taught and in what manner and also whether critical thinking is transferable to other domains. Intimately involved in the dialog and debate are those who would elevate critical thinking to "the educational ideal" of our times. This section will offer insight into these developments.

The critical thinking movement of the 1980s and 1990s has its origins in the discipline of philosophy, mainly among proponents of the informal-logic approach to reasoning and problem-solving, although some critics of informal logic have also contributed to the dialogue surrounding the movement. For the purposes of this discussion, it suffices to define the difference between formal and informal logic approaches to problem analysis and solution as related to the differences involved in solving well- versus ill-structured problems. Problem structure "is defined as the degree to which a problem can be described completely and the certainty with which a solution can be identified as true or correct" (King & Kitchener, 1994, p.10). According to King & Kitchener (1994), well-structured problems "can be described with a high degree of

completeness,...solved with a high degree of certainty,"... and the correctness of the solution can be agreed upon by experts. The opposite is true in regard to ill-structured problems (pp. 10-11). In order not to over-simplify the case of ill- versus well-structured problems, King and Kitchener, explain that structure actually lies on a continuum; the determination of how ill- or well-structured a problem is for the problem solver depends on the amount of knowledge of and experience with the issue at hand (King & Kitchener, 1994, p.11).

Paul (1993) refers to well- and ill-structured problem-solving as using monological and multilogical thinking perspectives, respectively. Monological thinkers can limit themselves to a "field-specific conceptual framework without reference to major personal or social bias...[and] multilogical thinking [is] the ability to think accurately and fairmindedly within opposing points of view and contradictory frames of reference" (p. 205).

In solving well-structured problems, the problem-solver can apply an algorithm and may choose a deductive analysis; that is, s\he can expect a true outcome or solution based on the truth of the premises. The problem-solver may fail to find a solution, but ultimately a correct solution to the problem does exist. Ill-structured problems, on the other hand, do not, ultimately, have correct solutions (King & Kitchener, 1994, pp. 10-11). In this case, the problem-solver relies on techniques proven successful through past experience (a heuristic model) and must be able to choose the best possible action, or behavior while "considering alternative arguments, seeking out new evidence, or evaluating the reliability of data and sources of information" (King & Kitchener, 1994, p.

10). According to the proponents of the informal logic movement, ill-structured problems are more common in "real life" and it is in the solution of these types of problems that students should be schooled (Siegel, 1988, pp. 1-2).

The current trend to emphasize the development of critical thinking as the ultimate educational goal is seen as a re-emergence due to its direct ties with the early twentieth-century writings of John Dewey (1933) in, How We Think. In this classic work, Dewey stresses the difference between the ruminations of "silly folk and dullards," and the goal oriented "reflective" thought of those who make invention and discovery possible. He believes it is necessary to understand the difference in order to develop sound teaching practices designed to encourage the formation and practice of reflective thought (Dewey, 1933, pp.4-20).

As a critical thinking advocate, Siegel (1988), is in agreement with those wishing to espouse critical thinking as an educational ideal, and makes a good argument in support of grounding critical thinking in educational philosophy in his book, entitled Educating Reason. The grounding of the critical thinking movement in the educational reform movement established critical thinking skill as one of the national education goals. The passage of the "Goals 2000: Educate America Act in 1994," was the result of the first decade of education reform. It was brought about by calls for educational "transformation" in writings such as the Carnegie Report, A Nation at Risk, a report sponsored by the Department of Education and chaired by David P. Gardner, and the Delphi research project. In fact, the U.S. government during the late 1980's funded a series of reports on educational and instructional reform. One such report, "The

Secretary's Commission on Achieving Necessary Skills...explained how schools must prepare students with the skills and competencies necessary to be successful in a world-class work force" (The N.Y. State Framework, 1997). Another report, this one on "Critical thinking: theory, research, practice and possibilities," in 1988 determined that "critical thinking is an essential capacity of citizens in a healthy democratic society (Kurfiss, 1988).

There are aspects of critical thinking that continue to be questioned and addressed. These concepts aid in an ever more defined understanding of what critical thinking is, especially the questions of its generalizability (the ability to teach general critical thinking skills that can be applied to various, different situations) (Norris, 1992), (Simon, 1993), versus its grounding within subject-related knowledge (McPeck, 1992) and its transferability (King and Kitchener, 1994), (Anderson, Reder & Simon, 1996) from one discipline to another. These areas are closely interrelated.

Generalizable versus subject-related knowledge. The generalizability argument is based on whether one believes that critical thinking can be taught as a course in its own right or whether critical thinking must be taught within specific subject matter. The argument is complicated by how one defines critical thinking (Is critical thinking primarily skills training or does one accept the disposition plus skills definition?) Some, such as John McPeck (1992) (who does not claim membership in the critical thinking movement), believe as follows:

> My own view has been that one's ability to think critically, or to apply the rules of logic in real-life situations, is a direct function of one's familiarity

> with the kind of subject matter under discussion. Thus I have argued for a view of critical thinking which can be called "subject specific" (p. 198).

In direct refutation of this view, Ennis (1992) writes,

> ...(McPeck's argument) makes the inference--from the proposition that critical thinking is about something, to the conclusion that general critical thinking instruction is impossible.... Why should the fact that critical thinking is always about something imply that we cannot have general critical thinking dispositions and abilities (and instruction of them) that can be applied to particular cases (p. 33)?

Ennis (1992) takes what he describes as a "mixed approach" and supports the teaching of critical thinking skills generally as well as instruction in those skills within subject areas (p. 33). The "mixed approach" also appears to be the direction that "a second wave" of theory surrounding critical thinking has adopted (Walters, 1994, p. 2). Walters (1994) has brought together a collection of essays with the purpose of going "beyond logicism in critical thinking" (p. 1). Walters (1994) criticizes both the formal and informal logic movement while supporting the "contextual approach" to teaching critical thinking. The contextual approach combines the skill of applying logic with "non-analytic ones such as imagination and intuition" (page. 2). Walters believes "the good thinker knows how to utilize both types" (page. 2).

Transferability. Related to the discussion surrounding the question of whether critical thinking is grounded in subject matter is the transferability argument. Transferability is the concept that suggests that those critical thinking dispositions and

skills that are developed within one discipline (referred to below as domain) will be applicable to other disciplines. That is that critical thinking is not related to the disciplines in such a way that it must be re-learned within each, individually, using skills or terminology specific to only that discipline.

Anderson, Simon and Reder contribute to this discussion. In a recent article, Anderson, et. al refute many of the claims made by proponents of "situated learning" (Anderson, et. al, p. 5). "Situated learning emphasizes the idea that much of what is learned is specific to the situation in which it is learned" (Anderson, et. al, p. 5). Anderson and colleagues believe much of what people learn is general and can be applied to differing situations, thereby refuting many of the conclusions reached by proponents of this thinking. They believe the "claims from the situated learning camp are often inaccurate...[and] the educational implications taken from these claims...are often mistaken" (Anderson, et. al, p. 5). These authors believe that there is a genuine advantage to teaching generalizable skills in contrast to teaching as though certain skills can only be taught within a specific subject matter, wasting valuable instruction time. But they also believe that certain procedures must be developed to perpetuate the learning of these skills and stress the need for "research on the feasibility of increasing the application and transfer of knowlege by including ability to transfer as a specific goal in instruction, a skill that is given little attention in most current instruction" (Anderson, et. al, p. 6).

King and Kitchener (1994) have developed a conception of thinking that purports to go beyond the concept of critical thinking while encompassing many of the same goals of the critical thinking movement. Within their conception of "reflective judgment", they

have been able to identify the ability to transfer reasoning ability. They have found that

> [t]he consistency with which people reason across domains is quite remarkable, even when the domains are as different as nutrition and ancient history. These types of consistencies lead us to conclude that there is a cognitive structure within which people reason at any particular point in time (p.42).

It must be stressed that there appears to be no actual differentiation between critical thinking and reflective judgment that affects the question of transferability. Within the critical thinking movement one is referring to the transferability of skills, backed by a disposition to develop and use those skills. According to Elder and Paul (1996), those people, schooled in critical thinking, who fail to employ those skills in all areas of thinking simply cannot be considered critical thinkers (p. 34). Critical thinking skills do not form in a vacuum; they are developed on a base of underlying beliefs and world-view assumptions. As will be developed in detail below, Facioni, et.al refer to this base as the "disposition" to think critically.

King and Kitchener (1994) refer to people's "epistemic assumptions" or general beliefs about knowledge, which they contend, guide and form judgments made across all domains. In their words, solving ill-structured problems

> ...moves beyond simple knowledge of alternatives or skill in applying critical thinking principles....[I]t involves an understanding of knowledge itself, or what we have called epistemic cognition...It includes a person's knowledge about the limits of knowing, the certainty of knowing, and the

criteria of knowing (p. 12).

King and Kitchener have identified seven stages through which those learning to reason move. Not all learners move through all stages, though. They have developed seven statements that they believe typify each of the stages:

1) I know what I have seen.

2) If it is on the news, it has to be true.

3) When there is evidence that people can give to convince everybody one way or another, then it will be knowledge; until then, it's just a guess.

4) I'd be more inclined to believe evolution if they had proof. It's just like the pyramids: I don't think we'll ever know. Who are you going to ask? No one was there.

5) People think differently and so they attack the problem differently. Other theories could be as true as my own, but based on different evidence.

6) It's very difficult in this life to be sure. There are degrees of sureness. You come to a point at which you are sure enough for a personal stance on the issue.

7) One can judge an argument by how well thought-out the positions are, what kinds of reasoning and evidence are used to support it, and how consistent the way one argues on this topic is as compared with other topics. (pp. 14-16).

According to King and Kitchener (1994), stages 1-3 as represented by the statements above can be described as pre-reflective thinking; stages 4-5 are described as quasi-

reflective thinking; and stages 6-7 as reflective thinking (pp. 14-15).

Although King and Kitchener believe that their stage model of reflective judgment actually goes beyond the conceptualization of critical thinking, this could be a slight exaggeration. True, their explanation regarding knowledge may be better developed than similar discussions regarding the relationship between knowledge and thinking skills, but Paul and others include the world view or frame of reference of the critical thinker as an integral part of the act of critical thinking. According to Paul 1993),

> [a]ll human action takes place within a way of looking at and interpreting the world....[V]ery little is done to help students to grasp how they are viewing the world and how those views determine the character of their experience, their interpretations, their conclusions about events and persons... (p. 488).

Summary. A juxtaposition of Paul's and King and Kitchener's theoretical concepts is helpful in summmarizing the conceptualization of critical thinking as it has been discussed within this section. A real world example of how these concepts can be actualized is presented following that discussion.

If Paul's world view and King and Kitchener's epistemic assumptions are taken as equivalent terms, then, it would be the case that both are saying that people do approach problem-solving consistently across domains based on a disposition to do so, i.e. based on developed world-views and assumptions. This also strongly suggests that it is at the level of epistemology that the attempt to improve people's problem solving abilities should begin.

Even though it is important to begin with determining how people acquire their knowledge, much more must be done in order to improve their thinking and decision-making, according to Anderson, Reder and Simon (1996). Their research has shown, as the example below will outline, that "abstract instruction combined with concrete examples can be a powerful method. This method is especially important when learning must be applied to a wide variety of frequently unpredictable future tasks" (Anderson, et. al, p. 9). It may be that people learn critical thinking within subject matter and generally and that they are able to transfer both to other situations with practice.

A group of educators at the Central Park East Secondary School (CPESS) have put the theories of critical thinking scholars such as Paul and Kitchener into practical use. They believe in the universality of "habits of mind" and have created an environment where these can be learned and applied across the curriculum. At CPESS, high school graduation is "based on each student's clear demonstration of achievement through the presention of 14 portfolios to a committee"...rather than "on time spent in class or Carnegie units" (Meier & Schwarz, 1995, p. 27). A successful graduate is one who can demonstrate within the various disciplines that are represented by the fouteen portfolios that s/he "was in the habit of tackling the following five questions:"

* How do you know what you know? (Evidence)
* From whose viewpoint is this being presented? (Perspective)
* How is this event or work connected to others? (Connections)
* What if things were different? (Supposition)
* Why is this important? (Relevance)

Teachers at the CPESS, have "organized curriculum and...assessment around the idea that a person in the habit of looking for answers to these five questions when presented with a novel situation is using his or her mind well" (Meier & Schwarz, 1995, p. 30). The "fundamental aim" in teaching students to use their minds well, is to assure them "a well-lived life that is productive, socially useful, and personally satisfying (Meier & Schwarz, 1995, p. 26) and they are achieving this goal; 97.3 percent of their students graduate from high school and 90 percent of those attend college. The theoretical argument continues, but the practical application of critical thinking supports both generalizability and transferability of the related skills.

Components of Critical Thinking

As has already been mentioned, the construct, critical thinking, actually consists of two separate components: skill and disposition. The model below illustrates the combination of these elements.

$$CT = (f)(CT_S + CT_D)$$

As Dewey has written, reflective thought is a "union of attitude and skilled method" (Dewey, 1933, p. 29). This same union applies to the contemporary equivalent of reflective thought which is critical thinking. Before moving on to a definition of each component, it should be emphasized that critical thinking is not something that one possesses, but a process in which one consistently and constantly partakes. The meta-skill of self-regulation (discussed below) or reflection guides this process. It has at its core, first the analysis of one's own thinking and then the critical analysis of the thinking of others.

Critical thinking skills. Schooling students in the solution of ill-structured problems, as defined above, involves more than the application of formal logic methods, represented by mathematical type theorems and hypotheses in an "if-then" fashion. For those who support informal logic approaches there exists a set of related skills that are necessary to the analysis of ill-structured problems. Robert Ennis (1962) developed one of the first theories to explain the skills needed (p. 82). Ennis' "pure skills" approach, according to Siegel (1988),

> ...focuses entirely on a person's ability correctly to assess or evaluate certain sorts of statements. A person is a critical thinker, on this view, if she has the skills, abilities or proficiencies necessary for the proper evaluation of statements (Siegel, 1988, p. 6).

The skills that are considered necessary to critical thinking and that will be tested for within this study are taken from the California Critical Thinking Skills Test (CCTST): 1) analysis, 2) inference, 3) evaluation (and subskills:explanation, interpretation, and self-regulation) 4)deductive and inductive reasoning (Facione, P., Facione, N. & Giancarlo, C., 1996). The skills are not listed in any specific order, and can be employed in any order. In fact, the inclusion of self-regulation in this model suggests meta-cognition, in that the critical thinker should be constantly regulating which skill is called for at any time or whether some of the skills should actually be applied to one another. That is, it is sometimes necessary to analyze one's explanation or interpret ones inference, etc. It is the strength of this conception of critical thinking, that it is a reflexive process.

Siegel's major criticism of the approach Ennis takes is that it "under-values...the

tendency to think critically" (Siegel, p. 9, emphasis added). He believes it is not enough to have the skills; one must be able to put the skills into use *and* value the act of doing so.

Ennis (1962), as mentoned above, was one of the first to theorize about critical thinking and conceptualized it as "the correct assessing of statements" (p.82). Recently, he has elaborated on and further developed his conceptualization as he countered criticisms of his "pure skills" approach. Ennis (1992) now supports a mixed approach to teaching "critical thinking abilities and dispositions." A mixed approach, according to Ennis is the teaching of critical thinking both within subject-matter and/or separate from it and by complementing both with infusion (teaching that relies on explicit techniques) and immersion (teaching that relies on implicit techniques) techniques (p.22-23). Long before Ennis, Dewey (1933) also believed that there was a relationship between the "habits" or skill of thought and the appropriate attitude toward employing them. According to his writings, a goal of teaching should be to "cultivate those attitudes that are favorable to the use of the best methods of inquiry and testing. Knowledge of the methods alone will not suffice; there must be the desire, the will, to employ them. This desire is an affair of personal disposition" (Dewey, 1933, p. 29-30; emphasis in the original). Facione et al. (1996), make this case: "A person may value being objective, but not be able to achieve objectivity. A person may be disposed toward approaching problems analytically and systematically, but not be adept at the CT skills required to do so (p. 6)." The necessity of combining skills with a disposition to use those skills is now a widely accepted concept within the critical thinking movement.

Critical thinking disposition. The concept of the disposition to think critically that

will be tested within this study comes from the definition derived from the Delphi report, directed by Facione (1996), as is the definition of critical thinking skills discussed above. The definition of the ideal critical thinker that was described using "nineteen descriptive phases" is represented within the California Critical Thinking Disposition Inventory (CCTDI) by seven nondiscrete factors. In an attempt to create a more parsimonious model, Facione, et al. (1996), combined several factors into one conceptualization. Those factors are 1) truth-seeking, 2) open-mindedness, 3) analyticity, 4) systematicity, 5) critical thinking self-confidence, 6) inquisitiveness and 7) maturity (Facione, P., Facione, N. & Giancarlo, C.). According to its developers and authors, "the CCTDI is not intended to be a measure of the person's CT (critical thinking) ability or skill (p. 6)." As was discussed elsewhere, it is possible for communicators to be disposed or motivated to communicate in a positive manner, but simply lack the skills to do so. This definition of disposition is the attempt to test for its existence separate from the skill factor, to discover whether it is skills that are lacking in those who do not think critically, or a deeper lack of a critical thinking disposition that prohibits the thinking as well as a development of skills.

This study assumes that it is necessary for an individual to combine both critical thinking skills and disposition to actually *think critically*. Facione, et al., (1996) invoke Lewin's (1935) motivation theory to explain the relationship between the disposition and skills necessary to critical thinking development. According to Facione, Lewin's theory of motivation would predict that if one were to have a strong disposition to think critically that one would pursue the attainment of skills to support that disposition and close the gap of knowledge between the two (Facione, 1996, p.6).

Summary

Critical thinking, as a composite of the two components of skill and disposition is one of the constructs that will be examined within this study. Critical thinking is not a new concept, but one that recently has re-emerged and is considered by many a necessary element of education across the disciplines and by some "the educational ideal" overall. There are many definitions of critical thinking, but one of the most comprehensive and agreed upon is the one contained in the Delphi Report on critical thinking that was reached by expert consensus of a forty-six member panel. The report's conceptualization calls for critical thinking to be defined not as a loosely related list of attributes and abilities, but as a process of thought that begins with a critical disposition that allows for the development of critical thinking skill and is regulated through self-reflection. The conceptualization goes beyond a mere definition and those who are involved in critical thinking discourse continue to explore and question the sub-concepts of the generalization and transferabilty of critical thinking. The answers to these questions have implications for teaching the requisite skills and nurturing the development of a critical disposition. The critical thinking process, once developed in individuals, should work to advance positive communication practices such as argumentativeness and help eliminate the negative consequences of verbally aggressive communication.

Argumentativeness Model

The argumentativeness model measures the competing approach and avoidance tendencies of people toward arguing controversial issues. In addition, the model takes into account factors in the environment which could affect the tendency to be argumentative:

"inhibitors and disinhibitors (e.g. penalties for certain aggressive behaviors...[and] alcohol consumption)" as well as "the probability and importance of success and failure" (Infante & Rancer 1996, pp.322-3). High argumentatives enjoy the act of arguing a controversial issue; they feel "excited" in advance and "satisfied and invigorated" afterward (Infante and Rancer, 1982, p. 72). A low argumentative will try "to keep arguments from happening, [and] feels relieved when arguments are avoided (Infante and Rancer, 1982, p. 72). Most important for the purposes of this study is the amount of confidence perceived by each of these communicators: "the highly argumentative individual has a good deal of confidence in his or her ability to argue, the low argumentative has very little such confidence" (Infante and Rancer, 1982, p. 72).

The relationship of argumentativeness and self-perceived communication competence has been examined and it was found that argumentativeness was significantly related to a total self-perceived competence score and to scores on competence in public speaking and communication with others whether strangers, acquaintances, or friends (Infante & Rancer, 1996, p. 19). This suggests that as low argumentatives become more skilled, they will show both an improved skill in argumentation and gain more confidence in their overall communication competence. Infante and Rancer (1996) tell us, verbal aggression is closely related to both skill deficiencies and lack of confidence in communication. The development, then, of critical thinking through the development of both the dispositions and skills needed to carry out the act of critical thinking is given credibility and strength in this relationship.

The Verbal Aggressiveness Model

The verbal aggressiveness model describes this trait as attacking the self-concepts of others in order to inflict psychological pain, such as humiliation, embarrassment, depression, and other negative feelings about self (Infante & Wigley, 1986). As was mentioned in defining verbal aggressiveness, there are several different message types involved in verbal aggressiveness, and several reasons these attacks are used. According to Infante & Wigley (1986), reasons that have been suggested range from frustration, psychopathology, social learning, and, important for the purposes of this study, argumentative skill deficiency (Infante & Wigley 1986, p.62). This suggests that becoming a critical thinker, which includes developing critical thinking skills, would alleviate the skill deficiency and eradicate at least one cause of verbal aggression.

It cannot be over stated that verbal aggression has negative effects on its recipients. Kinney (1994), refers to verbal aggression as "verbal violence." In his research, he attempts to bring the two different approaches to studying verbal aggression together. The first approach studies the verbal aggressive messages themselves. It "consists of scaling studies that have arrayed aggressive messages or harmful words in terms of their perceived severity...and classifies aggressive messages based on their nature" (p. 184). The second approach concentrates on the "consequences of receiving verbal aggression" (p. 184). Results found that verbal aggression caused the receiver to feel threatened and in need of protecting him or herself though different means, including physical ones. Research has found that verbal aggression is "both psychologically and physiologically disturbing" (p. 184).

Constructive and Destructive Outcomes of Communications

If critical thinking dispositions and skills are found to be positively and significantly related to argumentativeness and negatively to verbal aggressiveness, then it may be that there is a qualitative difference in potential behaviors that exist in those who possess critical thinking skills, in contrast to those who do not. According to Infante and Rancer, (1996) argumentativeness is closely associated with positive or constructive communication outcomes, whereas verbal aggression is associated with negative or destructive outcomes. Within Infante's and Rancer's (1996) literature review on these traits, the following studies are cited. The studies list outcomes of argumentativeness and verbal aggression as follow.

Argumentatives are perceived as more credibile than low argumentatives (Infante, 1981, 1985; Onyekwere, Rubin & Infante, 1991), and verbal aggression produces lower credibility scores (Infante, Hartley, et al., 1992). Spouses who are more argumentative, as opposed to verbally aggressive, are higher in marital satisfaction (Sabourin, Infante, & Rudd, 1993), and violence in a marriage is more probable when spouses are high verbal aggressives (Infante, et al, 1989). Argumentatives are more likely than low argumentatives to be seen as leaders in group problem-solving discussions (Schultz, 1982). Verbal aggression stimulates reciprocity that can disrupt influence situations (Infante, 1989). Argumentative supervisors are perceived favorably by their subordinates (Gordon, Infante, & Graham, 1988), whereas verbally aggressive superiors are particularly disliked (Infante & Gorden, 1991) (Infante & Rancer, p. 327).

Considering the results of the studies above, it seems that skills, such as critical

thinking skills, that are strongly related to the propensity to act assertively in an argumentative manner, i.e. lead to positive communication outcomes, would be seen as worthy skills. These skills, then, might be strengthened and taught within all levels of educational institutions and encouraged within the workplace. It also follows that verbal aggression which injures the self-esteem of other, should be controlled, if not thoroughly eliminated through critical thinking disposition development and skills acquisition.

Rationale and Hypotheses

The present literature suggests there may be a significant, positive relationship between the possession of critical thinking dispositions and skills and argumentative behavior. Likewise, one may expect to find an inverse relationship between critical thinking disposition and skills and verbal aggression. However, direct empirical support for these relationships is missing. The justification for teaching critical thinking, as mentioned elsewhere, could lie in its support of argumentative behavior, which has been determined by Infante (1982), to be constructive and its prevention of verbal aggressive behavior, which has been determined to be destructive. Infante (1982) has suggested that verbal aggression may, at least in some cases, be caused by a lack of argumentative skills (Infante, et al. 1992). Empirical evidence that supports the relationships among critical thinking, argumentativeness and verbal aggression would strengthen the case for establishing critical thinking as an educational ideal and for including critical thinking development as an ingredient of communication curricula or training. This evidence would also indicate that critical thinking and related, argumentative behavior should be encouraged and verbal aggression discouraged by those in leadership positions (in schools,

business or industry), who wish to responsibly influence the reduction of hostility and aggression at all levels of interaction. This could be accomplished through training and education.

Critical Thinking and Argumentativeness. This study should show that individuals who have a high disposition to think critically will be more likely to be argumentative than those who have a low disposition to think critically. As has been discussed elsewhere, there is a need for developed communication skills to increase the confidence in communicators (Infante and Rancer 1996). This would suggest, that in the absence of skill, disposition should not alone relate to high scores on argumentativeness. Those who have highly developed critical thinking skills should, as a result, score high on skills. These participants should report higher argumentativeness, as tested by the Argumentativeness Scale than those who score high on disposition only or low on skills. The resulting interaction effect of high disposition and skill should relate most closely with high scores of argumentativeness. There is, though, a confounding factor that might affect this expected result. High disposition, according to Infante, et al. (1996) can be a motivator for the development of skill. That means that those who score highest on disposition also may have been highly motivated to develop skill and therefore high disposition may be present in the score that represents the skill element. This means that it may be rare to find participants who score very high on disposition and have not yet developed skill. A series of hypotheses have been developed in order to determine separately and interactively which of the elements affect argumentativeness and verbal aggression and to what extent.

As has been mentioned elsewhere, the disposition to think critically consists of seven sub-factors that make up disposition: truth-seeking, open-mindedness, systematicity, analyticity, inquisitiveness, self-confidence and maturity. Also, critical thinking skill encompasses five sub-skills: analysis, evaluation, inference and both deductive and inductive reasoning. It is expected that these factors will be positively related to argumentativeness.

The hypotheses representing these expected results are:

H_1: Self-ratings of critical thinking dispositions (CT_D) composite score will significantly affect self-ratings of argumentativeness.

H_2: Self-ratings of critical thinking skills (CT_S) composite score will significantly affect self-ratings of argumentativeness.

H_3: Self-ratings of critical thinking dispositions (CT_D) and critical thinking skills (CT_S) composite scores will interactively affect self-ratings of argumentativeness.

H_4: Self-ratings of the seven elements of critical thinking dispositions (CT_D) will independently affect self-ratings of argumentativeness.

H_5: Self-ratings of the five elements of critical thinking skills (CT_S) will independently affect self-ratings of argumentativeness.

Critical Thinking and Verbal Aggression. This study should also show that those who have low scores on the disposition to think critically, as indicated by low scores on the California Critical Thinking Disposition Inventory (CCTDI) will tend to score higher on verbal aggression, as determined by scores on the Verbal Aggressiveness Scale, than those who score high on critical thinking disposition. Those who score in the mid to high

range on the CCTDI, while scoring low on critical thinking skills, as measured by the CCTST, should score higher on verbal aggression than those who scored high on both disposition and skills. This expectation is supported in the literature by the research that indicates that even those who wish to communicate positively might not when lacking the requisite skills. As with the relationship between disposition and skills and argumentativeness, it is expected that the seven and five elements that make up each component, respectively, will also be related to verbal aggression in varying degrees.

The hypotheses representing these expected results are:

H_6: Self-ratings of critical thinking dispositions (CT_D) composite score will independently affect self-ratings of verbal aggressiveness.

H_7: Self-ratings of critical thinking skills (CT_S) composite score will independently affect self-ratings of verbal aggressiveness.

H_8: Self-ratings of critical thinking dispositions (CT_D) and critical thinking skills (CT_S) composite scores will interactively affect self-ratings of verbal aggressiveness.

H_9: Self-ratings of the seven elements of critical thinking dispositions (Ct_D) will independently affect self-ratings of verbal aggression.

H_{10}: Self-ratings of the five elements of critical thinking skills (CT_S) will independently affect self-ratings of verbal aggression.

Finally, this study is interested in learning about students perspectives toward critical thinking and how they personally define critical thinking.

R Q_1 : What are students' perceptions toward the construct of critical thinking?

CHAPTER THREE

Method

Participants

University students attending a communication course to fulfill a lower-level general education requirement were chosen to participate in the study. The seventy-eight student participants in this study ranged in age from eighteen to thiry-two, with the average age being twenty-one. Forty-three were male and thirty-five, female. Of the seventy-eight, seventy-one indicated their class standing: Freshmen: two; Sophomore: twenty-four; Junior: nineteen; and Senior: twenty-six. Students were from no particular academic background with thirty-four different majors reported among the students. Thirteen participants (17%) indicated they had "completed a college course specifically designed to teach you to think logically, to improve your reasoning, or to sharpen your critical thinking skills" (CCTST, Form A, 1990). Eleven indicated that English was not their first language. The students received credit toward their course in communication for participating in the study, but participation was voluntary. Five instruments were administered to all students registered in the course at two different sittings. Students used only the last four digits of their student identification numbers to identify themselves on the instruments.

Instruments

Model and instruments. The research model is a comparison of scores obtained from a series of inventories administered over a period of two months. The instruments were self-reports of personal dispositions, skills, traits and attributes. Self-reports are

subjective in that they rely on those reporting to understand and respond truthfully to the questions asked; both are assumed in this study. The tests of reliability and validity of all instruments (below) support their use here. Except for the fact that the California Critical Thinking Disposition Inventory (CCTDI) (Facione, et al., 1996) must be administered before the California Critical Thinking Skills Test (CCTST) (Facione, et al., 1998), instruments could be administered in any order. The other instruments employed in this study were the Argumentativeness Scale and the Verbal Aggressiveness Scale (Infante & Rancer, 1982; 1986) and an additional debriefing tool developed to capture students' perspectives on critical thinking. All five will be discussed below.

California critical thinking disposition inventory (CCTDI). The first instrument was designed by Peter and Noreen Facione in 1992. The California Critical Thinking Disposition Inventory (CCTDI) consists of 75 statements that prompt one to "express familiar opinions, beliefs, values, expectations and perceptions and is designed to assess seven dispositions toward critical thinking: truth-seeking, open-mindedness, analyticity, systematicity, critical thinking self-confidence, inquisitiveness and cognitive maturity (Facione, Facione & Giancarlo, 1996) (See Appendix A for a description of the Disposition Scales.) According to the manual supplied with the CCTDI, it must be administered before the CCTST "to decrease the likelihood of giving a cue to the respondents as to the socially desirable responses to the CCTDI" (Facione, et. al.1996, p. 19).

The internal reliability of the overall scale as well as the sub-scales of the CCTDI were tested using a group of 1019 college freshmen in 1992-3. "[T]he alpha

levels...remained relatively stable (ranging from .60 to .78 on the scales and .90 overall), thus empirically supporting the internal reliability of the instrument and each scale" (Facione, Facione, & Giancarlo, 1996, p. 6).

The items were written based on the conceptualization of critical thinking agreed upon in the Delphi report. A factor analysis of the responses to the pilot study enabled a comparison of the "common...factors in the disposition toward critical thinking...in relation to the dispositional phrases that guided their construction. The description of the ...critical thinker was thus reduce from nineteen phrases to seven dispositional characteristics," refining the earlier conceptualization (Facione, Facione, & Giancarlo, 1996, p. 4).

California critical thinking skills test (CCTST). The CCTST measures critical thinking skills using short problem statements and real-life scenarios. The CCTST is a 34-item, multiple choice test that can be used to determine an overall score on critical thinking skills or to determine the individual or group score on five sub-scales (Facione, Facione, Blohm, Howard & Giancarlo, 1998, p.5-6). Those sub-scales test the skills of analysis, evaluation, inference and deductive and inductive reasoning. (See Appendix B for description of the CCTST sub-scales.)

The CCTST manual reports internal consistency estimates that range from .68 to .70 for undergraduate examinees. Internal consistency rates were higher when testing graduate students. Based on recommendations by Norris and Ennis that suggest ratings of .65 to .75 for a test of this type, this rating is considered by the author, P. Facione, to be acceptable. He writes that the test is not designed to "target a single, homogenous

ability...(but instead), a variety of cognitive skills,"(so) there is no theoretical reason for believing that items should correlate highly with one another" (Facione, Facione, Blohm, Howard & Giancarlo, 1998, p. 17).

According to the CCTST test manual, content validity was assured in the following manner: "items selected for inclusion in the CCTST cover the domain of the five CT cognitive skills identified by the Delphi experts. These items are discipline neutral...; Sex-role and social class stereotypic contexts were avoided; equal numbers of male and female referents are used." Construct validity was measured in a set of studies carried out in 1988-89.

> [A]nalyses were conducted to investigate whether or not undergraduate student completing a required semester-long college course in critical thinking would show gains in CT skills as compared to students who had not completed such a course.... This research used both the cross-sectional and the matched pairs pretest-post-test measures (and) were examined with a control group design...(Facione, Facione, Blohm, Howard & Giancarlo, 1998, p. 19).

Both measures resulted in statistically significant results, whereas the control groups in both studies reported no significant gains in CT scores. Criterion validity has been established in a 1992 project that found that the CCTST "correlates with college level grade point average...and with SAT verbal and SAT math scores (Additional validation studies are reported in the CCTST test manual.).

As part of the testing, related information was collected from the participants;

questions included on the CCTST and CCTDI captured the following data: age, grade level, gender, major; career of choice and whether the student had ever completed a course in critical thinking. Values for these variables will be collected in this study to test whether any of them adds to the interaction effects of the critical thinking variables.

Argumentativeness scale. The fourth instrument administered, developed by Rancer and Infante, was the Argumentativeness Scale (ARG) (1982), a 20-item scale designed to measure the combined tendency to approach or avoid communication in certain situations in which controversial issues are argued. This instrument has been much used and well tested.

Scores from a sample of 692 students produced an approximately normal distribution. In addition, Cronbach's coefficient alpha was also calculated on the same participants. The reliability coefficient for the 10 items, which indicated the tendency to approach argumentative situations, was .91; the coefficient for the 10 items testing for the tendency to avoid argumentative situations was .86. A test-retest of the scale using a different group of participants produced an r of .87 for the tendency to approach and an r of .86 for the tendency to avoid argumentative behavior (Infante and Rancer, 1986, p.76).

To test the validity of the ARG scale, Infante and Rancer undertook a series of studies to compare the measures resulting from the administration of the scale to resulting measures from other "measures of communicative pre-dispositions" (1986, p. 77). Their results showed that "with...[one] exception...all correlations were significant, in the slight to moderate range, and in the direction expected (Infante and Rancer, 1986, p.77).

Verbal aggressiveness scale. The Verbal Aggressiveness Scale (VA) (1986), also a

20-item scale, measures the tendency one has to communicate with the intent of attacking another person's self-concept. The scale was first developed using 30 items divided evenly into positively and negatively worded statements and based on the conceptualization of the verbal aggressiveness trait that results in attacks on other's self-esteem. Efforts were made to make the statements as factual and "value-free" as possible, in order to "reduce defensiveness in responding to items pertaining to behaviors usually considered socially undesirable (Infante and Wigley, 1986, p. 63). The 20-item VA scale resulting from factor and item analysis has a coefficient alpha of .81. A subsequent study replicated the coefficient alpha of .81 and a comparison of distribution of the scores resulting from that study with the normal distribution produced non-significant scores, suggesting that the verbal aggressiveness trait is normally distributed. The correlation of this scale with the Argumentativeness Scale was not significant, as was expected (Infante and Wigley, 1986, p. 65).

A study was conducted in which the VA Scale was administered along with seven other measures of personality traits. With one exception, all of the resulting correlations were in the direction expected and significant. This study further supported the theory that verbal aggression and argumentativeness are independent traits and supported their relationship to destructive and constructive communication behaviors, respectively (Infante and Rancer, 1986).

Student perspectives on critical thinking. In addition to the instruments already discussed, a debriefing instrument titled "Student Perspectives on Critical Thinking" was developed for this study to capture student perspectives on some of the issues raised

within the literature review. Specifically, students were asked to 1) identify where they believe they fall within King and Kitchener's stages of learning how to reason; 2) comment on the generalizability of critical thinking, i.e. whether they believe that critical thinking should be taught separately (generally) or as part of each course (within a subject matter); 3) respond to two statements designed to reflect their perspective regarding the transferability of critical thinking; and 4) to provide their personal definition of critical thinking. These perspectives are not included as variables within the design of the research, but will be included within the discussion of students' perspectives toward critical thinking in Chapter Five. (A copy of the instrument is included in Appendix C.)

Data Analysis

Using correlation analysis (Pearson's r), regression and multiple step-wise regression, the data were analyzed to determine relationships between critical thinking (an interaction of an individual's possession of critical thinking disposition (CT_D) and critical thinking skills (CT_S) and both argumentativeness (ARG) and verbal aggression (VA). This was analyzed using the composite scores of each participant and testing their relationship to each of the dependent variables. Then, the effect of the interaction of the two composite scores on the dependent variables was also analyzed. In addition, since the composite scores of the CT_D and the CT_S are made up of seven and five subscores, respectively, the interactive relationship of these variables was also examined, using correlation and step-wise regression, to establish the statistical relationship of that interaction to each trait; all of the same independent variables will be included in each of the interaction equations.

The existence of a strong disposition toward critical thinking could, according to Facione et al., (1996) affect whether students develop critical thinking skills. Because of this, it is important to examine the relationship of each of these independent variables to the dependent variables, both separately and in interaction. The tendencies to be argumentative and verbally aggressive are independent measures, so it is necessary to test the relationship of critical thinking to both to determine whether critical thinking affects only one or both tendencies. That is, argumentativeness and verbal aggression are not simply two ends of one scale. According to Rancer and Infante (1996),

> ...because argumentativeness and verbal aggressiveness are situated in independent dimensions of personality (extroversion and neuroticism, respectively), it is expected that the two traits are not related. Thus, ...argumentatives are equally likely to be high verbal aggressives.... This is important because the model of aggressive communication contends that because argumentativeness is a constructive trait it should not share variability with a set of negative behaviors (Infante & Rancer, 1996, p.323).

CHAPTER FOUR

Results

Descriptive Statistics

The summary of the descriptive statistics for the final composite scores for the two independent and two dependent variables are described below, followed by a summary of the reliability scores (alpha ratings) for the four instruments used to produce these scores.

CT_D. The composite scores of the CT_D variable ranged from 215 to 362 out of a possible score of 420 with a mean of 288.12; those with a score of under 280 are considered weak in critical thinking disposition or show "overall deficiency in the disposition toward CT" (Facione, et al., 1996); those with a score of 350 show "a solid indication of across the board strength in the disposition toward CT" (Facione, et al., 1996) and are considered strong in this disposition.

CT_S. The composite scores of the CT_S variable ranged from 5 to 26 out of a possible score of 34 with a mean score of 15.38; according to the CCTST manual, to interpret the scores resulting from the use of the instrument they are to be compared with similar norms resulting from one of several tests of the CCTST by its developers (Facione, et al, 1998, p. 14-15). The composite scores of the current study compare well with scores from a study conducted in 1989\90 of 781 college students with a comparable range of scores and the same mean. A score of 12 is equated with the 25th percentile, a score of 15 with the 50th percentile, a score of 18 with the 75th percentile (Facione, et al., 1998).

ARG. Scores on ARG ranged from -29 to 40 with a mean of 8.84 and a standard deviation of 14.03. The mean and standard deviation are slightly higher than those

reported from the test of the instrument (Infante and Rancer, 1982, p. 76).

VA. Scores on VA ranged from 27 to 77 with a mean of 47.31 and a standard deviation of 10.44. The results for the male students (mean = 50.30, standard deviation = 10.05) were higher than for the female students (mean = 43.43, standard deviation = 9.79). These results parallel those from studies undertaken by Infante and Wigley (1986) to test the reliability and stability of the instrument (p.64-65).

Reliabilities for the Scales and Sub-scales

The reliabilities of all scales and sub-scales were tested in SPSS using the alpha statistical procedure. The results of the procedure are reported in Table 1. The alpha ratings for the VA & ARG scales and the CCTDI were comparable to those cited in the literature for those instruments. The results for the CCTST were low. This requires that some caution be used when interpreting the scores resulting from the administration of this instrument. (The CCTST alpha rating is discussed further in the next chapter.)

Table 1. Alpha Ratings on Scales and Sub-scales

Scales	Coefficients
Argumentativeness Scale	
Tendency to Approach	.8924
Tendency to Avoid	.8261
Verbal Aggressiveness Scale	.8384
CCTDI Composite	.9038
CCTDI Scales	
Truth-seeking	.6653

Scales	Coefficients
Open-mindedness	.6731
Analyticity	.6563
Systematicity	.6320
Self Confidence	.7555
Inquisitiveness	.7271
Maturity	.7336
CCTST Composite	.4506
CCTST Scales	
Analysis	.0155
Evaluation	.3402
Inference	.5548
Deduction	.3385
Induction	.2535

The Null Hypothesis

The null hypothesis was that the composite of critical thinking disposition (CT_D) and critical thinking skills (CT_S) would not positively affect ratings of argumentativeness (ARG) and would not negatively affect ratings of verbal aggressiveness (VA). The results of the correlations and step-wise multiple regressions using the scores resulting from the CCTDI, CCTST and the ARG and VA scales to test this relationship are presented in this section in several SPSS tables. For each hypothesis the final model will be given, followed by any excluded variables (in the case of multiple regressions) and the model summary. The first five hypotheses relate to ARG; the second five relate to VA. The results indicate

that the null hypothesis must be rejected since the composites of CT_D and CT_S positively affect ratings of ARG and negatively affect ratings of VA with overall significance at the .05 level as indicated by hypotheses H_3 and H_8. These hypotheses specifically tested the interaction of the CT_D and the CT_S composite scores on ARG and VA, respectively. Although, in the test of VA, the CT_S variable was not retained in the final model, the independent test of CT_S and VA resulted in a significant relationship at the .05 level.

Results of Critical Thinking and Argumentativeness Hypotheses

Hypothesis H_1 predicted that self-ratings of the CT_D composite scores would be positively related to self-ratings of argumentativeness. The result of the correlation (r = .393) was significant, (p = .000) and in the direction predicted. See Table 2 for the summary of the correlation matrix for CT_D and ARG.

Hypothesis H_2 indicated that the self-ratings of the CT_S composite score would significantly affect self-ratings of ARG. The result of the correlation (r = .395) was significant, (p = .000) and in the direction predicted. See Table 3 for a correlation matrix of CT_S and ARG.

Hypothesis H_3 indicated that the self-ratings of the CT_D and CT_S composite scores would interactively affect self-ratings of ARG. The results of this regression model were significant, (F (2, 73) = 10.595, r = .474, (adjusted) R^2 = 0.204, p < .01). The interaction relationship was also in the direction predicted, with high interaction scores on CT_D and CT_S relating to high scores on ARG. See Table 4 for the model and summary of this relationship.

Table 2. Correlation Matrix: CTd and ARG

		TRUTH	OPENMIND	INQUIZ	SYSTEM	MATURE	CONFID	ANALYT	CTD	ARG
TRUTH	Pearson Correlation	1,000	,376**	,265*	,291**	,511**	,075	-,042	,506**	,116
	Sig. (2-tailed)	.	,001	,019	,010	,000	,516	,715	,000	,317
	N	78	78	78	78	78	78	78	78	76
OPENMIND	Pearson Correlation	,376**	1,000	,573**	,393**	,489**	,383**	,274*	,706**	,012
	Sig. (2-tailed)	,001	.	,000	,000	,000	,001	,015	,000	,917
	N	78	78	78	78	78	78	78	78	76
INQUIZ	Pearson Correlation	,265*	,573**	1,000	,535**	,527**	,607**	,606**	,840**	,381**
	Sig. (2-tailed)	,019	,000	.	,000	,000	,000	,000	,000	,001
	N	78	78	78	78	78	78	78	78	76
SYSTEM	Pearson Correlation	,291**	,393**	,535**	1,000	,423**	,571**	,533**	,754**	,319**
	Sig. (2-tailed)	,010	,000	,000	.	,000	,000	,000	,000	,005
	N	78	78	78	78	78	78	78	78	76
MATURE	Pearson Correlation	,511**	,489**	,527**	,423**	1,000	,265*	,264*	,728**	,240*
	Sig. (2-tailed)	,000	,000	,000	,000	.	,019	,020	,000	,037
	N	78	78	78	78	78	78	78	78	76
CONFID	Pearson Correlation	,075	,383**	,607**	,571**	,265*	1,000	,644**	,711**	,354**
	Sig. (2-tailed)	,516	,001	,000	,000	,019	.	,000	,000	,002
	N	78	78	78	78	78	78	78	78	76
ANALYT	Pearson Correlation	-,042	,274*	,606**	,533**	,264*	,644**	1,000	,684**	,486**
	Sig. (2-tailed)	,715	,015	,000	,000	,020	,000	.	,000	,000
	N	78	78	78	78	78	78	78	78	76
CTD	Pearson Correlation	,506**	,706**	,840**	,754**	,728**	,711**	,684**	1,000	,393**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	.	,000
	N	78	78	78	78	78	78	78	78	76
ARG	Pearson Correlation	,116	,012	,381**	,319**	,240*	,354**	,486**	,393**	1,000
	Sig. (2-tailed)	,317	,917	,001	,005	,037	,002	,000	,000	.
	N	76	76	76	76	76	76	76	76	76

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3. Correlation Matrix: CTs and ARG

		ANAL	EVAL	INFER	DEDUC	INDUC	CTS	ARG
ANAL	Pearson Correlation	1,000	,439**	,353**	,572**	,474**	,695**	,281*
	Sig. (2-tailed)	.	,000	,002	,000	,000	,000	,014
	N	78	78	78	78	78	78	76
EVAL	Pearson Correlation	,439**	1,000	,491**	,675**	,882**	,864**	,290*
	Sig. (2-tailed)	,000	.	,000	,000	,000	,000	,011
	N	78	78	78	78	78	78	76
INFER	Pearson Correlation	,353**	,491**	1,000	,850**	,603**	,786**	,361**
	Sig. (2-tailed)	,002	,000	.	,000	,000	,000	,001
	N	78	78	78	78	78	78	76
DEDUC	Pearson Correlation	,572**	,675**	,850**	1,000	,592**	,889**	,392**
	Sig. (2-tailed)	,000	,000	,000	.	,000	,000	,000
	N	78	78	78	78	78	78	76
INDUC	Pearson Correlation	,474**	,882**	,603**	,592**	1,000	,862**	,325**
	Sig. (2-tailed)	,000	,000	,000	,000	.	,000	,004
	N	78	78	78	78	78	78	76
CTS	Pearson Correlation	,695**	,864**	,786**	,889**	,862**	1,000	,395**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	.	,000
	N	78	78	78	78	78	78	76
ARG	Pearson Correlation	,281*	,290*	,361**	,392**	,325**	,395**	1,000
	Sig. (2-tailed)	,014	,011	,001	,000	,004	,000	.
	N	76	76	76	76	76	76	76

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4. Results of H_3

Full Model $y = \beta_0 + \beta_1 Ct_s + \beta_2 CT_D + \varepsilon$

Final Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3325.473	2	1662.736	10.595	.000 [a]
Residual	11456.632	73	156.940		
Total	14782.105	75			

a. Predictors: (Constant), CT_S, CT_D

b. Dependent Variable: ARG

Model Summary

Final Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.474 [a]	.225	.204	12.5276

a. Predictors: (Constant), CT_S, CT_D

Taken together, CT_S and CT_D account for a third more variance than their independent effects on ARG.

Hypothesis H_4 indicated that the self-ratings of the seven elements (truth-seeking, open-mindedness, analyticity, systematicity, confidence, inquisitiveness, maturity) of CT_D would independently affect self-ratings of ARG. Only one of the seven elements, analyticity, is retained in the final regression model. Once effects of analyticity on ARG were accounted for, none of the other variables met the test ($t > 1.96$) to be added to the model. The results of this model were significant, ($F(1, 74) = 22.875$, (adjusted) $R^2 =$

0.226, $p < .01$). See Table 5 for the model and summary of this relationship. The relationship is in the direction predicted with high scores on analyticity related to high ARG scores.

Table 5. Results of H_4

Full Model

$y = \beta_0 + \beta_1$ Truth-seeking $+ \beta_2$ Open-mindedness $+ \beta_3$ Inquisitiveness $+ \beta_4$ Systematicity $+ \beta_5$ Maturity $+ \beta_6$ Self-Confidence $+ \beta_7$ Analyticity $+ \varepsilon$

Final Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3490.507	1	3490.507	22.875	.000 [a]
Residual	11291.599	74	152.589		
Total	14782.105	75			

a. Predictors: (Constant), Analyticity

b. Dependent Variable: ARG

Excluded Variables

Final Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
Truth-seeking	.141 [a]	1.397	.167	.161	.997
Open-mindedness	-.119 [a]	-1.139	.259	-.132	.935
Inquisitiveness	.147 [a]	1.174	.244	.136	.657
Systematicity	.084 [a]	.701	.486	.082	.717
Maturity	.135 [a]	1.295	.200	.150	.947
Self-Confidence	.073 [a]	.548	.585	.064	.590

a. Predictors in the Model: (Constant), Analyticity

b. Dependent Variable: ARG

Model Summary

Final Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.486 [a]	.236	.226	12.3527

a. Predictors: (Constant), Analyticity

An examination of the correlation matrix of the seven CT_D elements with ARG in Table 2 reveals several significant simple correlations: inquisitiveness, (r = .381, p = .001); systematicity, (r = .319, p = .005); maturity, (r = .240, p = .037); self-confidence, (r = .354, p = .002).

Hypothesis H_5 indicated that the self-ratings of the five elements (analysis, evaluation, inference, deductive and inductive reasoning) of CT_S would independently affect self-ratings of ARG. Only one of the five elements, deduction, is retained in the final regression model. Once the model accounted for the effects of deduction on ARG, none of the other variables met the test ($t > 1.96$) to be added to the model. The results of this model were significant, ($F(1, 74) = 13.412$, (adjusted) $R^2 = 0.142$, $p < .01$). See Table 6 for the model and summary of this relationship. The relationship is in the direction predicted with high scores on deduction related to high ARG scores.

Table 6. Results of H_5

Full Model $y = \beta_0 + \beta_1$ Analysis $+ \beta_2$ Evaluation $+ \beta_3$ Inference $+ \beta_4$ Deductive $+ \beta_5$ Inductive $+ \varepsilon$

Final Model	Sum of Squares	df	Mean Square	F	Sig.
Regressn	2268.017	1	2268.017	13.412	.000 [a]
Residual	12514.088	74	169.109		
Total	14782.105	75			

a. Predictors: (Constant), Deductive

b. Dependent Variable: ARG

Excluded Variables

Final Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
Analysis	.093 [a]	.718	.475	.084	.693
Evaluation	.058 [a]	.410	.683	.048	.570
Inference	.099 [a]	.479	.634	.056	.271
Inductive	.150 [a]	1.155	.252	.134	.675

a. Predictors in the Model: (Constant), Deductive

b. Dependent Variable: ARG

Model Summary

Final Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.392 [a]	.153	.142	13.0042

a. Predictors: (Constant), Deductive

An examination of the correlation matrix of the five CT_S elements with ARG in Table 3 reveals that all elements of CT_S produced significant simple correlations with ARG: analysis, ($r = .281$, $p = .014$); evaluation, ($r = .290$, $p = .011$); inference, ($r = .361$, p

= .001); deduction, (r = .392, p = .000); and induction, (r = .325, p = .004).

Results of Critical Thinking and Verbal Aggression Hypotheses

Hypothesis H_6 indicated that the self-ratings of the CT_D composite scores would be inversely related to self-ratings of VA. The results were in the direction predicted with CT_D negatively affecting VA, i.e. high scores on CT_D were related to low scores on VA (r = -.50, p = .000). See Table 7 for the correlation matrix representing CT_D and VA.

Hypothesis H_7 indicated that self-ratings of the CT_S composite scores would be inversely related to self-ratings of VA. The results of this model were significant, (r = -.26, p = .03). See Table 8 for the correlation matrix representing CT_S and VA.

Hypothesis H_8 indicated that self-ratings of the CT_D and CT_S composite scores would interactively affect self-ratings of VA. The results of the regression model were in the direction predicted. CT_S was not included in the final model. Once the effect of critical thinking disposition was accounted for in the model, the effect of critical thinking skill was not significant and was not added to the model ($t = -.652 < 1.96$). The results of this regression model were significant, (F (1, 67) = 21.875, (adjusted) $R^2 = 0.235$, $p < .01$). See Table 9 for the model and summary of this relationship.

Table 9. Results of H_8

Full Model $y = \beta_0 + \beta_1 Ct_S + \beta_2 CT_D + \varepsilon$

Final Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1826.534	1	1826.534	21.875	.000 [a]
Residual	5594.452	67	83.499		
Total	7420.986	68			

Table 7. Correlation Matrix: CTd and VA

		TRUTH	OPENMIND	INQUIZ	SYSTEM	MATURE	CONFID	ANALYT	CTD	VA
TRUTH	Pearson Correlation	1,000	,376**	,265*	,291**	,511**	,075	-,042	,506**	-,510**
	Sig. (2-tailed)	.	,001	,019	,010	,000	,516	,715	,000	,000
	N	78	78	78	78	78	78	78	78	69
OPENMIND	Pearson Correlation	,376**	1,000	,573**	,393**	,489**	,383**	,274*	,706**	-,507**
	Sig. (2-tailed)	,001	.	,000	,000	,000	,001	,015	,000	,000
	N	78	78	78	78	78	78	78	78	69
INQUIZ	Pearson Correlation	,265*	,573**	1,000	,535**	,527**	,607**	,606**	,840**	-,463**
	Sig. (2-tailed)	,019	,000	.	,000	,000	,000	,000	,000	,000
	N	78	78	78	78	78	78	78	78	69
SYSTEM	Pearson Correlation	,291**	,393**	,535**	1,000	,423**	,571**	,533**	,754**	-,299*
	Sig. (2-tailed)	,010	,000	,000	.	,000	,000	,000	,000	,012
	N	78	78	78	78	78	78	78	78	69
MATURE	Pearson Correlation	,511**	,489**	,527**	,423**	1,000	,265*	,264*	,728**	-,264*
	Sig. (2-tailed)	,000	,000	,000	,000	.	,019	,020	,000	,028
	N	78	78	78	78	78	78	78	78	69
CONFID	Pearson Correlation	,075	,383**	,607**	,571**	,265*	1,000	,644**	,711**	-,230
	Sig. (2-tailed)	,516	,001	,000	,000	,019	.	,000	,000	,057
	N	78	78	78	78	78	78	78	78	69
ANALYT	Pearson Correlation	-,042	,274*	,606**	,533**	,264*	,644**	1,000	,664**	-,217
	Sig. (2-tailed)	,715	,015	,000	,000	,020	,000	.	,000	,073
	N	78	78	78	78	78	78	78	78	69
CTD	Pearson Correlation	,506**	,706**	,840**	,754**	,728**	,711**	,664**	1,000	-,496**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	.	,000
	N	78	78	78	78	78	78	78	78	69
VA	Pearson Correlation	-,510**	-,507**	-,463**	-,299*	-,264*	-,230	-,217	-,496**	1,000
	Sig. (2-tailed)	,000	,000	,000	,012	,028	,057	,073	,000	.
	N	69	69	69	69	69	69	69	69	69

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 8. Correlation Matrix: CTs and VA

		ANAL	EVAL	INFER	DEDUC	INDUC	CTS	VA
ANAL	Pearson Correlation	1,000	,439**	,353**	,572**	,474**	,695**	-,189
	Sig. (2-tailed)	.	,000	,002	,000	,000	,000	,121
	N	78	78	78	78	78	78	69
EVAL	Pearson Correlation	,439**	1,000	,491**	,675**	,882**	,864**	-,248*
	Sig. (2-tailed)	,000	.	,000	,000	,000	,000	,040
	N	78	78	78	78	78	78	69
INFER	Pearson Correlation	,353**	,491**	1,000	,850**	,603**	,786**	-,159
	Sig. (2-tailed)	,002	,000	.	,000	,000	,000	,191
	N	78	78	78	78	78	78	69
DEDUC	Pearson Correlation	,572**	,675**	,850**	1,000	,592**	,889**	-,251*
	Sig. (2-tailed)	,000	,000	,000	.	,000	,000	,038
	N	78	78	78	78	78	78	69
INDUC	Pearson Correlation	,474**	,882**	,603**	,592**	1,000	,862**	-,204
	Sig. (2-tailed)	,000	,000	,000	,000	.	,000	,092
	N	78	78	78	78	78	78	69
CTS	Pearson Correlation	,695**	,864**	,786**	,889**	,862**	1,000	-,259*
	Sig. (2-tailed)	,000	,000	,000	,000	,000	.	,032
	N	78	78	78	78	78	78	69
VA	Pearson Correlation	-,189	-,248*	-,159	-,251*	-,204	-,259*	1,000
	Sig. (2-tailed)	,121	,040	,191	,038	,092	,032	.
	N	69	69	69	69	69	69	69

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Predictors: (Constant), CT_D

b. Dependent Variable: VA

Excluded Variables

Final Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
	CT_S	-.076 [a]	-.652	.517	-.080	.845

a. Predictors in the Model: (Constant), CT_D

b. Dependent Variable: VA

Model Summary

Final Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.496 [a]	.246	.235	9.1378

a. Predictors: (Constant), CT_D

The results of this test reveal that the interaction of CT_D and CT_S composite scores is no better at predicting the variance in VA than the CT_D composite score alone.

Hypothesis H_9 indicated that the self-ratings of the seven elements (truth-seeking, open-mindedness, analyticity, systematicity, confidence, inquisitiveness, maturity) of CT_D would independently affect self-ratings of VA. Four variables were included in the final model: truth-seeking, open-mindedness, maturity and inquisitiveness. The results of this regression analysis were significant, (F (4, 64) = 13.960, (adjusted) $R^2 = 0.433$, $p < .01$) and were in the direction predicted. See Table 10 for the model and summary of this

relationship.

Table 10. Results of H_9

Full Model

$y = \beta_0 + \beta_1$ Truth-seeking $+ \beta_2$ Open-mindedness $+ \beta_3$ Inquisitiveness $+ \beta_4$ Systematicity $+ \beta_5$ Maturity $+ \beta_6$ Self-Confidence $+ \beta_7$ Analyt icity $+ \varepsilon$

Final Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3457.801	4	864.450	13.960	.000 [a]
Residual	3963.184	64	61.925		
Total	7420.986	68			

a. Predictors: (Constant), Truth-seeking, Open-mindedness, Maturity, Inquisitiveness

b. Dependent Variable: VA

Excluded Variables

Final Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
Systematicity	.002 [a]	.015	.988	.002	.640
Self-Confidence	.051 [a]	.419	.677	.053	.568
Analyticity	-.101 [a]	-.823	.414	-.103	.555

a. Predictors in the Model: (Constant), Truth-seeking, Open-mindedness, Maturity, Inquisitiveness

b. Dependent Variable: VA

Model Summary

Final Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.683[a]	.466	.433	7.8692

a. Predictors: (Constant), Truth-seeking, Open-mindedness, Maturity, Inquisitiveness

By examining the correlation matrix for CT_D and VA in Table 7, it can be observed that the three variables that did not emerge from the regression analysis demonstrated small inverse correlations with VA that were significant or approached significance (systematicity, $r = -.30$, $p = .012$; self-confidence, $r = -.23$, $p = .057$, analyticity, $r = -.22$, $p = .073$).

Hypothesis H_{10} indicated that the self-ratings of the five elements (analysis, evaluation, inference, deductive and inductive reasoning) of CT_S would independently affect self-ratings of VA. Only the variable, deduction, was included in the final model. Once deduction was accounted for in (inversely) affecting VA, the effects of the other variables were not significant and were not added to the model ($t < 1.96$). The results of this regression model were significant, ($F(1, 67) = 4.49$, (adjusted) $R^2 = 0.049$, $p < .05$). The model produced significant results, but the R^2 is very low. See Table 11 for the model and summary of this relationship.

Table 11. Results of H_{10}

Full Model $y = \beta_0 + \beta_1$ Analysis $+ \beta_2$ Evaluation $+ \beta_3$ Inference $+ \beta_4$ Deductive $+ \beta_5$ Inductive $+ \varepsilon$

Final Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	466.759	1	466.759	4.497	.038 [a]
Residual	6954.227	67	103.794		
Total	7420.986	68			

a. Predictors: (Constant), Deductive

b. Dependent Variable: VA

Excluded Variables

Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
Analysis	-.068 [a]	-.469	.640	-.058	.677
Evaluation	-.147 [a]	-.940	.351	-.115	.576
Inference	.199 [a]	.879	.382	.108	.274
Induction	-.090 [a]	-.616	.540	-.076	.667

a. Predictors in the Model: (Constant), Deductive

b. Dependent Variable: VA

Model Summary

Final Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.251 [a]	.063	.049	10.1880

a. Predictors: (Constant), Deductive

Examining the simple correlations for components CT_D and VA in Table 8 reveals that evaluation ($r = -.25$, $p = .04$) was significantly and inversely related to VA and induction approached significance ($r = -.204$, $p = .092$).

CHAPTER FIVE

Discussion

The Null Hypothesis

The null hypothesis was that the composite of critical thinking disposition (CT_D) and critical thinking skills (CT_S) would not positively affect ratings of argumentativeness (ARG) and would not negatively affect ratings of verbal aggression (VA).

$$CT = (f)(CT_S + CT_D)$$

The null hypothesis was rejected based on the results of hypotheses H_3 and H_8 which tested the interaction of CT_D and CT_S on ARG and VA. Hypothesis H_7 which tested the relationship of CT_S to VA independently further supported this conclusion. The results suggest that CT_D and CT_S affect ARG positively and affect VA negatively as was expected. The final model testing the interaction of CT_D and CT_S on ARG included both of these variables and was a better predictor of ARG than either of the variables alone. The final model testing the interaction of CT_D and CT_S on VA did not include CT_S. The interaction of the two variables was no better at predicting variance in VA than the CT_D alone. Although CT_S alone was significantly related to VA, it was predicted that the interaction of the two would be strongest. The outcome of the tests does not support that prediction. But because the test of effects of CT_S on VA independently produced significant results in H_7, as reported above, the null hypothesis could be rejected. A further discussion of these results follows in two sections, beginning with critical thinking as it relates to argumentativeness and followed by a discussion of critical thinking as it relates

to verbal aggression. Results from items on the "Student Perspectives on Critical Thinking" debriefing tool and the CCTST background item seven are then discussed. The results of the debriefing tool suggest the need for further study into the areas of the generalizability and the transferability of critical thinking and the need for a better understanding of the definition of critical thinking among students; the results of the CCTST background question, number seven, report the level of importance the student participants gave to critical thinking (the other background questions were discussed in the participants section of Chapter Three). Limitations of the study are discussed after those sections. Implications for future work are also offered and conclude this chapter.

Critical Thinking and Argumentativeness

The results of the hypotheses within this study offer some insight into the relationship between critical thinking and argumentativeness. The first three hypotheses tested the relationship between CT_D and ARG and between CT_S and ARG, before testing the interaction of the two with ARG. The CT composite of CT_D and CT_S accounted for approximately 20% of the variance in ARG. This was about 6% more than for either of the variables alone. This is the result that was expected and in the predicted direction. The relationship between critical thinking and argumentativeness is further defined in conjunction with the remaining hypotheses of the individual CT_D and CT_S elements discussed below.

Of the seven elements (truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, maturity) of CT_D, analyticity was the only element retained in the final regression model of the relationship of the CT_D elements to ARG

(hypothesis H_4). Analyticity accounted for over 22% of the variance of ARG. This variable had a higher predictive value in relation to ARG than the total CT_D score or the CT composite of CT_D and CT_S. The only other variable in the regression model containing analyticity that came near to being entered was truth-seeking. Its $t = 1.397$ was just under the "enter value" of 1.96 to be added to the model. Some of the other elements of CT_D independently correlate with ARG significantly: systematicity ($r = .32$), self-confidence ($r = .35$) and inquisitiveness ($r = .38$) in addition to analyticity ($r = .49$) correlate at the .01 level and maturity ($r = .24$) correlates at the .05 level. (See Appendix A for descriptions of these elements.) In interaction these elements predicted no more of the variance in ARG than the analyticity element alone. The fact that only one element of CT_D was retained in the final regression model although five of them are significantly correlated with CT_D could be explained by determining how much overlap exists among these elements, suggesting that they are not discrete factors. This will be discussed further within the limitations section. A closer look at the element of analyticity that was retained in the regression analysis follows.

Those who scored high on analyticity also tended to score high on argumentativeness. The analyticity scale "targets *prizing the application of reasoning and the use of evidence to resolve problems, anticipating potential conceptual or practical difficulties, and consistently being alert to the need to intervene*" (Facione, et al, 1995, p. 5). As such, this result is not surprising; because argumentativeness is a tendency to approach communication with a locus of attack on ideas and topics (in contrast to VA where the locus of attack is people or specifically their self-esteem), the relationship is

clear. Analyticity contains elements of meta-thinking in that it stresses being alert to the difficulties related to the communication itself while communicating. This outcome supports the overall assumption of this study that the development of critical thinking can support other positive communication behaviors.

Of the five elements (analysis, evaluation, inference, deductive and inductive reasoning) of CT_S, deduction was the only element retained in the final regression model of the relationship of the CT_S elements to ARG (hypothesis H_5). All of the elements of CT_S independently correlate with ARG: inference ($r = .36$), deductive ($r = .39$) and inductive reasoning ($r = .33$) correlate at the .01 level and analysis ($r = .28$) and evaluation ($r = .29$) correlate at the .05 level of significance. (See Appendix B for descriptions of these elements.) In interaction these elements predicted no more of the variance in ARG than the deduction element alone. As is mentioned in the manual for the critical thinking instrument (CCTST) used to measure these elements, there is some overlap in the skills needed in deductive and inductive reasoning, evaluation and analysis. Therefore, it is difficult to pinpoint which of these skills is most important beyond measuring scores representing the skills in interaction with one another as was done in the regression analysis. It may take other instruments or measures to better establish this relationship. A closer look at the element, deduction, that emerged in the interaction analysis follows.

Deduction is defined within the literature; based on deduction, "[t]he assumed truth of the premises purportedly necessitates the truth of conclusion. It is not logically possible for the conclusion to be false and all the premises true" (Facione, et al, 1998, p.6). Deduction accounted for about 14% of the variance in ARG which is about the same

predictability as the total CT_S score. In applying the skill of deductive reasoning, students who are confronted with false conclusions in multilogical problems must re-examine the premises upon which they based their conclusion and by doing so practice the skills of logical argumentation. But to practice the skill of deductive reasoning successfully, the dispositions supporting meta-thinking, as described above, may be important or even necessary. Since the CCTDI was given before the CCTST, it would be statistically safe to look at the skills score given disposition scores. A regression run on the relationship of disposition to skills produced significant results ($\underline{F}(1, 76) = 13.94$, $\underline{r} = .394$, (adjusted) $\underline{R}^2 = 0.144$, $\underline{p} < .01$). Not surprisingly, there is a positive relationship between high scores for disposition and high skills scores. According to the developers of the critical thinking instruments used in this study,

> These habits of mind [disposition], or mental disciplines, can be thought of as the elements in our character which impel us toward using CT, rather than something less rational.... Without the cultivation of these habits of mind, drills to hone CT skills could produce persons who have the cognitive tools for solving ill-structured problems but do not do so because they lack the inclination to use those tools (Facione, et al, 1998, p. 4).

Looking beyond statistical significance at the nature of the variables that predict the tendency to be argumentative, it could carefully be suggested that skill, deductive reasoning in this case, and the "skill-supporting" disposition, analyticity, defined as "prizing the application of reasoning and the use of evidence to resolve problems" along with analyticity's associated meta-thinking elements are the stronger predictors of

argumentativeness (Facione, et al, 1995, p. 5). The suggested emphasis here being that the analyticity disposition is more important in its role of skill-support than in its own right. This proposition must be further investigated. The assumption is supported in the interaction model of CT_D and CT_S in that skill was more strongly related to ARG and was entered into the equation first. A regression run using the two CT_D and CT_S variables (analyticity and deduction) from the final models of H_4 and H_5 was significant at the .01 level, resulted in predicting over 27% of the variability in ARG and included both variables.

Critical Thinking and Verbal Aggression

Hypotheses H_6, H_7, and H_8 tested the relationship between CT_D and VA and then between CT_S and VA, before testing the interaction of the two with VA. All of these hypotheses produced significant outcomes at, at least the .05 level. The final model of the interaction regression analysis did not include the CT_S variable. The CT composite of CT_D and CT_S was not any better at predicting VA than the single variable of CT_D which accounted for over 21% of the variance in VA. But the correlation of CT_S and VA produced significant results and the null hypothesis could be rejected. The low (adjusted) R^2 of .053 reported for the regression analysis of this relationship suggests caution in determining how important that relationship is in the presence of the CT_D variable.

It appeared intuitively correct to assume that if a participant were to score highly on the CCTDI that also testing highly on the CCTST would complement that disposition and increase the probability that one would tend not to be verbally aggressive. The results of the final model of hypothesis H_8 using the two variables of CT_D and CT_S suggest that

disposition alone is the better predictor of verbal aggression. The collinearity tolerance for CT_S in the final interaction model of the CT composite on VA was .845 suggesting that CT_S was not excluded for that reason; scores near zero suggest collinearity, scores closer to one suggest the two variables are not collinear. Although the outcome of the interaction model is other than expected, it still must be stressed, as has been throughout this study, that critical thinking is a composite and concentrating on one of the elements at the expense of the other is a mistake. This outcome could highly support that argument. Schools and universities who support the addition of courses on critical thinking within the curriculum, but teach them as "skills" only courses would miss the mark on cultivating dispositions that have been shown in the present case to have a significant and inverse effect on verbal aggression. Although both elements of skill and disposition are equally important in the context of the CT composite, skills, defined within this study as analysis, evaluation, inference, deductive and inductive reasoning, alone counted for only 5% of the variability in verbal aggression whereas disposition accounted for 43%. A skills only instruction would possibly not affect or only slightly affect verbal aggression. Also, it may be, as already mentioned, that skills can only fully be developed within a dispositional framework that includes truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness and maturity. In this case a "skills only" approach might even have limited effects on the development of skills themselves. More research on this aspect needs to be carried out. The results of H_8 suggest that having such a disposition to think critically may negatively affect a portion of the tendency to be verbally aggressive, i.e. to attack a person with the intent of damaging their self-esteem. A further discussion of the

elements of CT_D and CT_S that affect verbal aggression follows.

Of the seven elements (truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, maturity) of CT_D four of them: 1) truth-seeking, "being eager to seek the best knowledge in a given context, courageous about asking questions, and...objective about pursuing inquiry even if the findings do not support one's... opinions;" 2) open-mindedness, "being tolerant of divergent views and sensitive to the possibility of one's own bias;" 3) inquisitiveness, "one's intellectual curiosity and one's desire for learning even when the application of the knowledge is not readily apparent;" and 4) maturity "characterized as one who approaches problems, inquiry, and decision making with a sense that some problems are necessarily ill-structured;" were retained in the final regression model of the relationship of the CT_D elements to VA (hypothesis H_9) (Facione, et al, 1995, p. 5). Although not retained in the model, systematicity ($r = -.30$) also negatively correlates with VA at the .05 level of significance. (See Appendix A for a description of this element.) The four variables in the regression model interactively accounted for over 43% of the variance in VA, whereas the overall CT_D score only accounted for 23%.

Of the five elements (analysis, evaluation, inference, deductive and inductive reasoning) of CT_S, deduction was the only element retained in the final regression model of the relationship of the CT_S elements to VA (hypothesis H_{10}). The evaluation element ($r = -.25$), though not retained in the model containing deduction, also correlates negatively with VA at the .05 level of significance. (See Appendix B for a description of this element.) None of the other skill elements independently correlated significantly with VA.

In applying deductive reasoning, "[t]he assumed truth of the premises purportedly necessitates the truth of conclusion. It is not logically possible for the conclusion to be false and all the premises true" (Facione, et al, 1998, p.6). Deduction accounted for only 4% of the variability in VA which is slightly under the predictive ability of the CT_S composite score at 5%.

In comparing the results of the hypotheses related to VA (H_6, H_7, H_8, H_9, H_{10}), it appears that the tendency to be verbally aggressive can be much better predicted using disposition scores rather than those designed to measure skills. In fact, in a regression analysis using the CT_S and CT_D variables (deductive reasoning, truth-seeking, open-mindedness, inquisitiveness and maturity) from the final models of H_9 and H_{10}, the skill variable was never entered. In comparing the results of the ARG and VA correlations and regression models, the variables that most strongly (significance at the .01 level) related (negatively) to VA did not significantly affect ARG. It would, theoretically, be possible for a variable to affect one of the dependent variables positively and the other negatively, as in the case of the CT_S variable of deduction and the CT_D variables inquisitiveness, systematicity and maturity since VA and ARG are independent traits and stem from different dimensions of personality. It could be argued that the CT_D included in the final regression model of the effects of CT_D on VA appear somewhat different in nature than two of those that were not, namely systematicity and analyticity. (Self-confidence was also not included in the model.) Although, part of the disposition composite, these two elements have perhaps a more mechanical nature than, truth-seeking, open-mindedness and maturity. More research would need to be done to further analyze whether a true

distinction exists.

Students' Perceptions Toward Critical Thinking (RQ_1)

The instrument, Student Perspectives on Critical Thinking, that was used as a debriefing tool within this study consisted of four items (See Appendix C for a copy of this instrument). Each of these items brings up topics of interest for possible future research; each will be discussed briefly. The first asked students to rate themselves using King's and Kitchener's (1994) seven stages to best describe how they reason. Of the seventy-eight participants, sixty-five answered this question and of those, fifty-two placed themselves into one of the top three categories of reasoning. It would be expected that people pursuing a college education would be at higher levels of reasoning, so the results skewed far to the top are not surprising. The self-identified ratings, though, did not correlate significantly with either the CCTST or CCTDI scores.

Items two and three were designed to get student insight into two areas of concern within the literature base of critical thinking: the generalizability and the transferability of critical thinking (skills in particular) that need further study. Students were asked to reply to two statements, the first of which was:

> In order to best learn "Critical Thinking" skills, I think they should be:
> (Choose only one, please.)
>
> _____ offered as a special separate course; then applied to all areas of learning.
>
> _____ taught as part of each course, because you can only learn them within the subject in which you're going to use them;

In choosing the first response, students would be indicating they believed critical thinking to be something that could be taught in its own right. In choosing the second response, students would be indicating the belief that critical thinking should be learned within particular subject matter. Of the seventy-eight students, twenty-three chose the first response, fifty two chose the second and three did not respond.

The second statement was:

> Once I've learned a "Critical Thinking" technique, such as analyzing a problem by stating its premises: (Write in either true or false, please.)
>
> _____ I can use it in solving problems in "real life" situations;
>
> _____ I can use it in either an English or a Mathematics course.

In answering "true" to these statements a student would be indicating a belief that critical thinking is transferable from the subject matter it is learned in to other situations or subjects. Of the seventy-eight participants, sixty-nine responded with "true," four responded with "false" and five did not respond to the first statement. To the second statement, forty-seven responded with "true," eleven with "false" and twenty did not respond. (There appeared to be some confusion as to whether both statements should be responded to and twenty responded only to the first statement.)

As was mentioned elsewhere, experts on critical thinking are not in agreement on whether critical thinking is generalizable or transferable and even from the small sample, it is evident that neither do students. But according to this sample a good majority believed critical thinking was not generalizable, but was transferable. A part of undergraduate

education might be to raise awareness of the possibility that critical thinking skills may be both generally learned or transferable once learned. Perhaps a heightened awareness would have an affect on this learning. Raising awareness might also lead to developing strategies that would enable both to be properly tested.

The student perspective could also have an impact on whether or not students would enroll in a course titled "Critical Thinking;" if they do not believe that critical thinking can be learned "generally," students may shy away from taking such a course, if optional, or not fully benefit from it, if required. Why this may be important can be discovered by reviewing the results of an item asked on the CCTST background questions (#7). Seventy-eight participants were asked to complete the following statement:

> In terms of deciding what to believe or what to do, critical thinking and being logical are
>
> A. a waste of time.
>
> B. helpful, but not nearly as important as lots of other things.
>
> C. more important than most other things.
>
> D. extremely important. (CCTST, Background Question #7)

Seventy-three responses were given: no one responded with "A;" thirteen responded with "B;" twenty-one responded with "C;" and thirty-nine responded with "D." To summarize, sixty of the seventy-three who responded (82%) believed that critical thinking was at least "more important than most other things" when it came to "deciding what to believe or what to do." It would seem important to provide these students with the tools they believe they need to make important decisions and in a format they believe will be effective.

Item four of the debriefing tool asked students to provide their own definition of critical thinking. The list of these definitions is in Appendix D. Although there are some threads of similarity that run through the student definitions, the definitions suggest that there is no shared basic understanding of the term, critical thinking, among students. It would be unfair to expect students to do something well that they are not even capable of defining well. The term critical thinking, as it was used throughout this study, was defined over ten years ago. The idea, that people in general and students in particular, would benefit from being able to think more critically is not new; educators themselves may need to better understand critical thinking and be able to model it for their students before progress can be made to teach it well.

There are several discernable themes provided by the definitions offered by the students' sixty-one definitions. Critical thinking was associated with problem solving in twenty-one of the definitions (34%); twenty-one of the students (34%) defined critical thinking as a discrete ability that had to be learned, applied and practiced; eighteen of the definitions (30%) suggested that critical thinking required "taking time," expending effort and undertaking research; eighteen students (30%) believed that the process of critical thinking involved evaluation or breaking down issues into multiple parts and perspectives; twelve of the definitions (20%) referred to logic or logical reasoning as being the basis of critical thinking; eleven (18%) believed open-mindedness was necessary in conjunction with critical thinking; and ten (16%) believed critical thinking was the act of analyzing data (in contrast to evaluating, as mentioned above). Most of the definitions (74%) contained only one of the themes mentioned here; sixteen (26%) contained at least two of

the themes; and only two (3%) contained at least three of the themes. Only those two definitions using multiple themes to critical thinking got close to defining a multifaceted, on-going process. Those two definitions are (verbatim):

> 1. Critical thinking involves identifying a specific concept or problem, analyzing its parts, and coming up with a conclusion or solution based on the research done during the analyzation of the parts.
>
> 2. Critical thinking is a person's setting aside subjective thinking in order to look objectively at a situation or concept. It includes setting biases and prejudices aside to see evidence as it is presented as a whole unit, in full light. A person can then analyze the data and come to an as objective-as-humanly-possible conclusion. Reasoning through your own knowledge and others to find best answer.

The definitions were for the most part positive responses but a few students offered definitions that conveyed distrust of the concept or rejected critical thinking in preference for intuitive or less abstract modes of thinking. They be may rejecting critical thinking unnecessarily. Herbert Simon (1993), offers that in order to compensate for human limitations in solving problems and making decisions, people have developed tools, such as writing, mathematics and experience in the form of expertise. Simon believes that experience is the basis for intuition and that intuition (so defined) can be used as a tool in decision making, problem solving and other complex thinking (pp.403-404).

Limitations

Although the reliability rates for the CCTDI and VA and ARG scales were high,

the reliability score for the CCTST scale was low (See Table 1 for a list of all reliability alpha ratings.). This must be taken into account when analyzing the statistical results. In spite of the low reliability rating, other indicators of the reliability of the CCTST scores appeared within the norm: the CCTST data had a mean, standard deviation and range almost identical to a similar study conducted with a group of students in 1989\90 (n=781). The expected reliability rating is .68 to .70. The present rating of .45 is low in comparison. P. Facione writes, though, that the test is not designed to "target a single, homogenous ability...(but instead), a variety of cognitive skills," (so) there is no theoretical reason for believing that items should correlate highly with one another"(Facione, et al, 1998, p. 17). One explanation for the even lower than normal alpha rating may be test fatigue. The CCTST, in particular, is mentally taxing and the CCTDI and the CCTST were given on the same day. A replication of the study would be helpful in determining whether test fatigue or some other factor may have affected this reliability. According to the manual, a test-retest produces very reliable results.

Statistical power in regression analyses is also a limiting factor. The preference within social science research to avoid Type I errors, i.e. rejecting the null hypothesis when it is indeed true, has lead to the convention in social science disciplines of setting α (probability) equal to .01 or .05 at the highest. To increase the power of the analysis α could be raised to 1.0 or 2.0 according to Hays, but this goes against convention (1994, p.290). The other manner in which power could be strengthened without risking Type I error would be to increase sample size. The participant size, N = 78, of this study may have been too small to have provided adequate power to the regression analyses with α

set to equal .01 or .05.

A limitation implied by the data is that at the most only 20% of the variation in ARG and 43% of the variation in VA is explained by the CT composite or CT_D selected elements, respectively. Although this is a start, in order to explain a higher percent of the variance in the dependent variables, there are other variables needed in addition to CT to explain the tendency to be argumentative or verbally aggressive. A regression equation model that included CT and the variables (taken from the additional information provided by each participant) of age, gender, class standing and whether or not the student had taken a course in critical thinking produced no additional significant results. There may be other variables that should be researched and tested with the CT variables, such as family background information to include educational, political and religious affiliations.

Another limitation exists in interpreting the elements that make up the CT_D and CT_S overall scores. Although certain items on the inventories are designed to measure each of the seven and five elements, respectively, there is some overlap in the elements. The CCTST manual addresses this overlap, but offers no solution for resolving it (Facione, Facione, Blohm, Howard & Giancarlo, 1998, pg. 18). The CCTDI manual also indicates some difficulty with "items loading on more than one factor" and contributes this to the fact that the CCTDI is "an instrument based on a conceptual definition rather than one which presents a clearly faceted model achieved primarily through empirical methods" (Facione, Facione & Giancarlo, 1996, pg. 4). So one can ask whether, for instance, maturity influences self-confidence, even if they can each be measured separately? And what about inquisitiveness and truth-seeking and where is the dividing line between them?

It may be a very fine line. The fact that four elements of CT_D could account for 43% of the variance in VA, when the overall composite score only accounted for about 23%, suggests that those four elements in interaction better predict a tendency not to be verbally aggressive, but those elements may overlap or contain traces of the other elements. Dividing the overall scores into sub-scores may not be exact, but it offers more insight into how critical thinking affects VA and ARG than the overall scores alone do. The discovery of the more parsimonious models, such as the four element model that better predicts VA than the CT_D composite, is helpful in understanding which elements may best define the relationship of critical thinking to verbal aggression and argumentativeness.

Another limitation of this study lies in the two instruments that were developed to measure critical thinking disposition and skills, the CCTDI and the CCTST, and were used here to establish the relationship between critical thinking and argumentativeness and verbal aggression. There are other instruments designed to measure critical thinking. There are also other methods to use to investigate that relationship. King and Kitchener (1994) suggest conducting interviews in order to have participants not only give answers to items designed to test critical thinking, but to share the thinking process they used to arrive at the answer (p. 13). It might be possible to integrate other instruments and methods into a replication of or follow-up to this study.

Implications for Future Work

This study was a beginning into looking at the relationship between critical thinking and argumentativeness and verbal aggression. The statistically significant regression models were able to show that there is a positive relationship between critical

thinking and argumentativeness and a negative one between critical thinking and verbal aggression. There is still much to discover and learn about that relationship; suggestions for areas to investigate further have been mentioned throughout this discussion. A summary of those mentioned include: 1) investigation into the suggestion that certain dispositions may be more important in their role of skill-support than in their own right; 2) further study into whether critical thinking skills can only fully be developed within a dispositional framework; 3) exploring the disposition composite to determine whether the two elements of analyticity and systematicity have a more mechanical nature and therefore may affect some independent variables differently than the other five; 4) a replication or variation of this study that would help to determine whether test fatigue or some other factor may have affected the CCTST reliability; 5) researching other variables, such as family background information to include educational, political and religious affiliations, that when tested with the CT variables might prove to affect more of the variability in argumentativeness and verbal aggression; 6) interpreting the elements contained in the CT_D and CT_S overall scores to determine the extent of any overlap, even though items on the inventories are designed to measure each of the elements; 7) integrating other instruments to measure and methods of measuring critical thinking into a replication of this study; and 8) studying the generalizability and transferability of critical thinking on effects of critical thinking instruction.

Infante and Rancer have studied the repercussions of argumentativeness and especially verbal aggression on individuals; some of the results were reported in the literature review (Infante and Rancer, 1996). More study needs to go into preventing

negative communication in the form of verbal aggression before it does its damage and before victims of this damage have to seek out recuperative therapy. If the teaching of critical thinking in its composite form has some impact on supporting argumentativeness and curbing the tendency to be verbally aggressive, then there should be added motivation to teaching it. The results of this study suggests that this relationship exists.

The motivation for teaching critical thinking should be shared by educational, business and organizational leaders alike. To lead responsibly and to create organizations that survive and thrive in the next century, leaders need to apprise themselves of information that will empower themselves, their colleagues and their followers. This has been demonstrated by organizational leaders who are changing the way learning is defined in schools (Meier & Schwarz, 1995) or who conduct mandatory workshops, such as managing diversity as in-service training in organizations (Thomas, 1991). It may be that critical thinking is important enough to be incorporated into this type of mandatory organizational learning, as well as into school curricula. In addition to being an asset in its own right, critical thinking seems a worthwhile investment into bettering organizational communication, as well. An introduction of critical thinking courses into the organizational arena along with a study of the effects of those courses might be an interesting follow up to the current study.

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Appendix A

Critical Thinking Disposition Inventory Scales

Disposition	Description
Truth-seeking	targets the disposition of *being eager to seek the best knowledge in a given context, courageous about asking questions, and honest and objective about pursuing inquiry even if the findings do not support one's preconceived opinions.*
Open-mindedness	addresses *being tolerant of divergent views and sensitive to the possibility of one's own bias.*
Systematicity	measures *being organized, orderly, focused, and diligent in inquiry.*
Analyticity	targets *prizing the application of reasoning and the use of evidence to resolve problems, anticipating potential conceptual or practical difficulties, and consistently being alert to the need to intervene.*
Inquisitiveness	measures *one's intellectual curiosity and one's desire for learning even when the application of the knowledge is not readily apparent.*
Self-confidence	measures the *trust one places in one's own reasoning processes. CT self-confidence allows one to trust the soundness of one's own reasoned judgments and to lead others in the rational resolution of problems.*

Disposition	Description
Maturity	targets the disposition to be judicious in one's decision-making. The CT-mature person can be characterized as *one who approaches problems, inquiry, and decision making with a sense that some problems are necessarily ill-structured, some situations admit of more than one plausible option, and many times judgments must be made based on standards, contexts and evidence which preclude certainty.*

(Facione,Giancarlo, Facione & Gainen, 1995, pp. 4-6).(emphasis in the original)

Appendix B

Critical Thinking Skills Test Scales

Skill	Description	Sub-skill
Analysis	Comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria...to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, reasons, information or opinions.	Categorization Decoding significance Clarifying meaning
Evaluation	To assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief or opinion...to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representations which are accounts or descriptions of a person's perception, experience, situation, judgment,	Justifying procedures

Skill	Description	Sub-skill
Evaluation	belief or opinion...to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representations...to state the results of one's reasoning; to justify that reasoning terms of the evidential conceptual, methodological, criteriological and contextual considerations upon which one's results were based; to present one's reasoning in the form of cogent argument.	Stating results Presenting arguments
Inference	To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses, to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.	Querying evidence Conjecturing alternatives Drawing conclusions

Skill	Description	Sub-skill
Deductive reasoning	The assumed truth of the premises purportedly necessitates the truth of conclusion. It is not logically possible for the conclusion to be false and all the premises true.	None
Inductive reasoning	An argument's conclusion is purportedly warranted, but not necessitated, by the assumed truth of its premises. In the case of a strong inductive argument it is unlikely or improbable that the conclusion would actually be false and all the premises true, but it is logically possible that it might.	None

(Facione, Facione, Blohm, Howard & Giancarlo, 1998, pp. 5-6.)

Appendix C

Student Perspectives on Critical Thinking

1. Patricia King and Karen Kitchener (1994) have written a book about developing reasoning. They believe there are stages to learning how to reason. Below are those stages. Choose the stage that best describes how you reason. (Developing Reflective Judgment, pp. 14-16).

_____ "I know what I have seen."

_____ "If it is on the news, it has to be true."

_____ "When there is evidence that people can give to convince everybody one way or another, then it will be knowledge; until then, it's just a guess."

_____ "I'd be more inclined to believe evolution if they had proof. It's just like the pyramids: I don't think we'll ever know. Who are you going to ask? No one was there. "

_____ "People think differently and so they attack the problem differently. Other theories could be as true as my own, but based on different evidence."

_____ "It's very difficult in this life to be sure. There are degrees of sureness. You come to a point at which you are sure enough for a personal stance on the issue."

_____ "One can judge an argument by how well thought-out the positions are, what kinds of reasoning and evidence are used to support it, and how consistent the way one argues on this topic is as compared with other topics."

2. In order to best learn "Critical Thinking" skills, I think they should be: (Choose only one, please.)

_____ offered as a special separate course; then applied to all areas of learning.

_____ taught as part of each course, because you can only learn them within the subject in which you're going to use them;

3. Once I've learned a "Critical Thinking" technique, such as analyzing a problem by stating its premises: (Write in either true or false, please.)

_____ I can use it in solving problems in "real life" situations;

_____ I can use it in either an English or a Mathematics course.

4. I think "Critical thinking" can best be defined as follows:

5. During this course you have completed four test instruments. A disposition inventory, a critical thinking skills test and argumentativeness and verbal aggressiveness scales. The scores on these tests will be examined and compared to determine whether the results of the first two are significantly related to the second two. If you would like to receive the summarized group results, please provide your last name, first initial and address below. The results will be mailed to you.

Thanks again for your input!

Appendix D

Student Definitions of Critical Thinking

The following list of definitions was transcribed verbatim. Spelling and grammar were not corrected.

1. A logical, well thought out attempt at solving problems, arguing, or setting personal beliefs.
2. A separate entity everyone had the capability to enhance, but it takes practice.
3. A subject that people feel the necessity to define so that their answer or theory appears more correct.
4. A way of looking at ideas, people, things, etc. Evaluating and analyzing different things.
5. Allowing yourself to be open-minded for the majority, but to always second guess and have solid reasons for personal stances.
6. An ability to logically reason complex problems or issues.
7. Analyze problems.
8. Analyzing a problem or question then thinking about from all diff. perspectives.
9. Analyzing a problem to come up w\ a reasonable solution.
10. Analyzing a problem.
11. Applying the concepts that you have learned to real life situations.
12. Being able to deconstruct a problem quickly and efficiently to manageable, simple tasks that lead to a well thought out (correct) answer.
13. Being able to look at the evidence, and comparing facts. Coming up with the correct

answer based upon that.

14. Being open to new ideas that are different from my own and trying to see from other's perspectives. I try to question what is stated as fact and determine if it is true or false.
15. Beneficial to one's thought process.
16. Considering all the options and ways that a problem can be solved.
17. Considering all positions of a subject and then deciding a course of action from these. It is getting to know a topic before making any decisions on it.
18. Critical thinking involves identifying a specific concept or problem, analyzing its parts, and coming up with a conclusion or solution based on the research done during the analyzation of the parts.
19. Critical thinking is the ability to carefully and logically define a problem, and then offer clear concise ways to approach and solve the problem.
20. Critical thinking is the ability to disect (sic) a problem in a logical manner without letting personal biases conflicting with the process.
21. Critical thinking is the ability to use logic to base a decision that a person makes.
22. Defining a problem and then coming to a solution based on evidence and reason.
23. Effectively being able to solve a problem and think through all steps of solving that problem.
24. Evaluation of as many possible considerations with as much outside input incorporated into one's criteria ultimately producing a subjectively reasonable explanation.
25. Good thinking when arguing something.
26. Having an open mind and questioning everything around you.

27. It needs us not to think as read or as we listen. That is to say, we should be able to change viewpoint and think different.
28. Keeping a level head and not letting emotion rule the day.
29. Looking at a problem from all sides, leaving yourself open to the possibility that any preconceived notions you may have had on the issue could be wrong.
30. Make you think that lead you to solve complex problem.
31. Mental skills you use for working out problems.
32. Myself, independently, solving my own problems in everyday life.
33. Not being a sheep; not following and believing everything you hear or see. Find out what you feel about an idea, and you are thinking critically.
34. Critical thinking is a person's setting aside subjective thining in order to look objectively at a situation or concept.It includes setting biases and prejudices aside to see evidence as it is presented as a whole unit, in full light.A person can then analyze the data and come to an as objective-as-humanly-possible conclusion.Reasoning through your own knowledge and others to find best answer.
35. Seeing problems and situations as logically as possible.
36. Taking into thought of all important facts, ideas, beliefs, and knowledge and being able to apply it to different situations.
37. Taking the time to do deep, logical thinking examining the situation from all points to come up with the most logical and best answer.
38. Taking the time to look at all aspects of a subject and drawing the best conclusion.
39. Taking the time to think, analyze, breakdown internally, argue, sift through relevant

knowledge and experience, and then put the pieces back together in coherent form to find the solution.

40. The ability to consider all the factors in determining a course of action that meets the needs of the many.
41. The ability to put aside personal needs, biases and fears and evaluate a situation or problem based upon sound rational principles. It is also important to realize as a critical thinker that reality is in flux, and a true critical thinker must be able to let go of past foundations of knowledge.
42. The ability to take any situation and break it down into components and examine each one into a logical manner.
43. The ability to think about problems logically
44. The ability to view problems with an open mind, and the capacity to solve them.
45. The exhaustive act of analyzing a decision or point. Attempting to address all angles and arriving at the best possible conclusion.
46. The process of one carefully seeing their situation before approaching the problem. Then they look at every angle to solve the problem.
47. The use of your knowledge and experience to reason and justify your claims on certain problems that one comes across.
48. The way of seeing objects correctly.
49. The way you apply your cognitive, so as to come out with something productive, creative or anything to enhance human benefits.
50. Thinking based on who your are and what you have learnt.

51. Thinking deeper than what you see, hear, or feel.
52. Thinking logically about situations and researching the situation as necessary to develop your own personal stance.
53. Thinking that uses cognitive skills.
54. Thinking with an open mind.
55. Viewing the world from a reasoned and proactive perspective. To become a more critical thinker it is important to consider multiple perspectives, clarify values, evaluate information, identify characteristics, make valid assumptions and draw appropriate conclusions. Also it is vital to avoid "common traps."
56. To think about issues from all sides without bias and be able to form your own opinion.
57. Understanding the topic of discussion in order to develop an educated opinion and to think of reasoning on your own.
58. Useful at times but at others not as instinct should take over.
59. Using ones logical senses to rationalize an outcome. It can be paralleled to that of deductive reasoning. Drawing conclusions from facts and theorizing on those facts not known.
60. What you think inside your head and no one else has to know.
61. When you take something you have learned in everyday life then you can use it in the real world.