Constructive Thinking From Theory to Practice: An Exploratory Study

BY

ALANNA KIM HEWLETT

A Thesis

Submitted to the Faculty of Graduate Studies

In Partial Fulfillment of the Requirements

For The Degree of

DOCTOR OF PHILOSOPHY

Faculty of Education

University of Manitoba

Winnipeg, Manitoba

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES
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Constructive Thinking From Theory to Practice: An Exploratory Study

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ALANNA KIM HEWLETT

A Thesis
Submitted to the Faculty of Graduate Studies at The University of Manitoba
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DOCTOR OF PHILOSOPHY

Language and Literacy
Faculty of Education
The University of Manitoba
Winnipeg, Manitoba

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ABSTRACT

Constructive thinking is a relatively new construct entering the forefront of empirical research, but lacks consistency in its operational definition, has limited indices of measurement, yet holds promise for enhancing problem solving by extending critical thinking. Constructive thinking is defined as a reflective and active process that values experience, integrates different ways of knowing (reason, imagination, intuition and emotion), builds caring relationships, and creates new ideas that benefit society.

This exploratory study investigated the theory of constructive thinking and its practical application within the context of an undergraduate writing course and other selected disciplines. The purpose was to define constructive thinking operationally, compare constructive to critical thinking, explore constructive thinking in relation to student success and demographics, and describe its implementation in post-secondary classrooms.

The following data were used--findings from: (1) a questionnaire administered to students enrolled in a research paper writing course and their instructors, (2) interviews with the instructors and professors from other disciplines, plus (3) research paper and final grades, and writing portfolio ratings.

Results indicated that constructive thinking was similar to critical thinking on three dimensions and independent on two: perspectives/position and caring relationships, and consequences/conclusions and concepts benefiting society. Critical thinking was associated with student success on both research paper and final grades. Unexpected findings indicated that females had higher constructive thinking scores than males and

students whose first language was not English scored higher on three of the five

constructive thinking dimensions.

Findings from the qualitative analysis triangulated findings from the quantitative

analysis. Instructors and professors were also able to relate the theoretical strands of

constructive thinking to their instructional practice.

Constructive thinking as an instructional practice parallels many of the

characteristics of exemplary teaching. When educators balance critical and constructive

thinking, they appeal not only to objective, scientific doctrines, but also incorporate

humanistic factors. The challenge for future research is to verify elements of constructive

thinking and establish how constructive thinking extends critical thinking.

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CHAPTER I

Introduction

One of the major issues confronting undergraduates when they come to university

is how to think critically. Many professors and undergraduates are unsure about what

critical thinking means. The term is challenging to define. In the University One writing

course at the University of Manitoba, students are told that to think critically is a

developmental process that incorporates Bloom's Taxonomy (1956, as cited in Huitt,

1998). This developmental process is often described as a hierarchical movement

progressing first through the lower levels of knowledge and comprehension, and then

gradually advancing to higher levels involving application, analysis, synthesis, and

evaluation (Bloom, 1956). Reference to these levels of thinking and learning are made to

assist students in understanding what is expected in writing a research paper. Students are

led to realize that collecting and organizing facts, and assembling what is learned in order

to develop an argument are important aspects of conducting and writing research.

The Problem

Unfortunately, this developmental process goes only so far. Students tend to

regurgitate what they read, create a list of references, and form a logical argument to

exhibit critical thinking. Once the paper has been written, it is submitted to the professor

for formal grading.

To develop student voice in writing is a challenging task. The development of

voice requires not only a rational, reasonable, and logical argument but also a perspective

that integrates different ways of knowing; reason, imagination, intuition, and emotion

(Atwell, 1987; Belenky, Clinchy, Godlberger, and Tarule, 1997, Calkins, 1994; Palmer,

1999; Rief, 1992; Thayer-Bacon, 1993; 2000). Prominent academic scholars (Ennis, 1987; Paul, 1992) have incorporated affective elements into their critical thinking definitions, but in practice have emphasized the importance of reason and logic. Such reasoning and logical thinking, in and of itself, may not be value-free.

Another concept, constructive thinking, attempts to capture additional forms of knowing encompassing not only objective but also subjective and more introspective thought that is sensitive to broader world issues and moral perspectives. Accordingly, this study explores the concepts of critical and constructive thinking in more depth.

Critical thinking has been an important focus of instruction and will continue to be for decades in academic institutions. Still questions remain: (1) Do students encounter teaching environments in which they learn about themselves in relation to others, or do they continually review what is known from the perspectives of others to satisfy or justify an argument? and (2) Do instructors or professors develop other ways of thinking to extend critical thinking? This study investigates critical thinking within the context of undergraduate writing course and other selected disciplines and explores how constructive thinking relates to and extends critical thinking. These terms are explained further under the heading definitions related to the study at the end of this Chapter.

Defining Critical Thinking in Relation To Bloom's Taxonomy

Two leading scholars in the field of critical thinking, Ennis (1987) and Paul (1992) believe that they can challenge undergraduate students to reach higher levels of thinking as set out in Bloom's Taxonomy and have developed critical thinking dispositions and skills that are closely related to logic (Noddings, 1998). Ennis (1987) asserts that Bloom's Taxonomy does not allow for enough guidance in the use of the top

three levels of analysis, synthesis, and evaluation. He prefers to clarify the concepts of critical thinking further by developing criteria used in judging a product or activity. His criteria specifically addresses the importance of: forming and analyzing an argument, judging the credibility of the source, deducing and judging deductions, inducing and judging inductions, inferring explanatory conclusions and hypotheses, making value judgements, and employing and reacting to fallacy labels (Ennis, 1981, p. 12-15). He defines critical thinking as "reasonable reflective thinking that is focussed on deciding on what to believe or do" (Ennis, 1981, p. 10). Although Ennis indicates that his definition includes creative elements, his work emphasizes reason and logic.

To assess student reasoning, Paul (1992) highlights purpose, question at issue, assumptions, inferences, implications, point of view, concepts and evidence as central elements. These elements are often applied in assessing and grading undergraduate writing and forms the basis of Washington State University's Critical Thinking Rubric. Paul (1992) envisions critical thinkers as being either strong or weak in their way of thinking. He defines a strong sense critical thinker as one who is able to demonstrate the ability to:

1)   question deeply one's own framework of thought;
2)   reconstruct sympathetically and imaginatively the strongest versions of points of view and frameworks of thoughts opposed to one's own;
3)   and reason dialectically (multilogically) in such a way as to determine when one's own point of view is at its weakest and when an opposing point of view is at its strongest (Paul, 1992, p. 666).

Based on this definition, a strong sense critical thinker is self-disciplined and able to

overcome egocentrism and socio-centrism (Paul & Elder, 2005).

In contrast, a weak sense critical thinker

1) does not hold him/her self or those whom s/he ego-identifies to
   the same intellectual standards to which s/he holds opponents.
2) has not learned how to reason empathetically within points of view
   or frames of reference with which s/he disagrees.
3) tends to think monologically.
4) does not genuinely accept, though s/he may verbally espouse,
   the values of critical thinking.
5) uses the intellectual skills of critical thinking selectively and self
   deceptively to foster and serve his/her vested interests (at the
   expense of truth); able to identify flaws in the reasoning of others
   and refute them; and able to shore up his/her own beliefs with reasons
   (Paul, 1992, p. 668).

Further, a weak sense critical thinker often lacks the ability "to follow rigorous standards

of excellence and mindful command of their use" (Paul & Elder, 2005, p. 1).

Critical Thinking Challenged

Two prominent educational philosophers, Thayer-Bacon (2000) and Noddings

(1995) have challenged Paul's definition of strong and weak sense critical thinking.

Thayer-Bacon (2000) argued against the concept of establishing dichotomies of critical

thinking and asks, "How do we know if we have thought strongly enough?" (p. 62).

Thayer-Bacon (2000) questioned why Paul (1992) recognized the subjective but devalued

the notion of self in the description of weak and strong sense critical thinkers. Weak

critical thinkers according to Paul cannot seem to detach themselves from the issue.

Central to Paul's theory (1992) regarding strong critical thinkers is that dialogue enables

one to move from an egocentric and ethnocentric position to learn about worldviews and

values different from one's own. Paul (1992) nevertheless relies on dialectical reasoning

to differentiate between one's own perspective in relation to opposing points of view.

On the other hand, Noddings (1995) believes that critical thinking should

encompass more than argumentation. "Logically, we do not need a moral reason for

adopting strong critical thinking, but practically most of us do, and without a moral

purpose, even the strongest critical thinking may be rudderless" (p. 93). According to

Noddings (1998), careful consideration of how to teach critical thinking with a moral

anchor needs to be addressed and this means going beyond logical argument.

Although Paul's theory of strong and weak sense critical thinking appears to value

the qualities of empathy and humanistic tendencies, his skill-based approach emphasizes

that critical thinking occurs mainly when people apply logic (Thayer-Bacon, 2000). Paul

(1992) believes it is necessary for a strong sense critical thinker to remove the self from

the critical thinking process in order to try to understand others' points of view fairly

(Thayer-Bacon, 2000). Thus for Paul, when one assumes a strong sense critical thinking

position, one needs to devalue the subjective. In his strong sense critical thinking, identity

and voice are not reinforced. Thayer-Bacon (2000) believes that sacrificing or removing

one's own voice to become a chameleon is impossible from a post modernist perspective.

One of the problems associated with critical thinking is how we develop student

voice using both objective and subjective ways of knowing. Unlike Ennis (1981) and

Paul (1990), McPeck (1981) believes that critical thinking can be distinguished from

other forms of thinking (including imaginative, sensitive and creative thinking). He does

not generalize critical thinking as a set of skills that can translated across disciplines.

Instead McPeck incorporates both cognitive and affective elements into his definition. He

nonetheless focuses on the solution of problems. He defines critical thinking as "reflective skepticism within the problem area under consideration ...knowing how and when to apply this reflective skepticism effectively requires among other things, knowing something about the field in question" (p. 7). Critical thinking is always critical thinking about a specific subject or identifiable activity. To be able to think critically, one must first and foremost have the knowledge, once this knowledge is activated, the assessment and evaluation of a position takes place. McPeck argues that critical thinking is not strictly based on either formal or informal logic, since logic is restricted to propositions. He (1981) believes that the purpose of critical thinking is not "to be disagreeable, but to advance progress toward the resolution of a problem" (McPeck, 1981, p. 10). To McPeck, then, critical thinking is purposeful, directed, and solution-based.

To teach critical thinking from McPeck's position (1981) demands the rigorous application of content knowledge surrounding the problem or activity, and epistemology-based pedagogy specific to the discipline. Only then, in McPeck's view, can students begin to learn how to think critically. The problem with such discipline-specific critical thinking is that it may exclude the perspective of others outside the field (Noddings, 1995). In fact, the points of view of others from different disciplines may lead to more successful problem resolution.

At the University of Manitoba, undergraduate students are learning how to develop critical thinking skills while writing a research paper. In this curriculum, critical thinking has been associated mainly with logical argumentation, reason and problem-solving. By learning this set of skills, students are expected to understand the importance of Bloom's Taxonomy and apply these skills in other course work. The value of

combining the objective and subjective parts of self to create voice is often ignored.

There is growing awareness, however, that other forms of thinking that address the

integration of different ways of knowing, over and above critical thinking, are necessary.

Other Ways of Thinking

From a social constructivist/post modernist perspective, knowledge acquisition is

social and contextual (Rusu-Toderean, 2003). For the researcher to be detached from the

society s/he is observing, to be value-free, is, from a social constructivist perspective,

impossible. That is, it is difficult to record information that is entirely factual. "To know

something is not just to have received information but to have interpreted it and related it

to other knowledge one already has" (Dietal, Herman, & Knuth, 1991, p.4).

After having interviewed many competent professionals from various disciplines

including architects, physiotherapists, town planners, engineers, and managers, Schon

(1983) contends that what made these experts proficient in their fields was that they knew

more than they could put into words. They seemed to possess a kind of "intuitive

knowing" and used this capacity to cope during "unique, uncertain, and conflicted

situations of practice" (Schon, 1983, pp. viii - ix). The professionals in Schon's study

were not only problem solvers but they were also able to pay attention to their inner

voices to meet challenges in their work. When these professionals were confronted with

new or unique situations in their practice, they had to construct a new conceptualization

of the problem, based on their feeling about the phenomenon. Thus, an important

consideration is that there are other dimensions of knowing and thinking beyond critical

thinking.

Belenky, Clinchy, Godlberger, and Tarule (1997) and Palmer (1999) explored this issue further and questioned how we know what we know. When Belenky and her colleagues (1997) interviewed 135 women, they encountered several themes regarding knowing such as: silence, received knowledge (listening to the voice of others), subjective knowledge (the inner voice), procedural knowledge (the voice of reason), and constructed knowledge (integrating the voices). Constructed knowledge attempts to integrate knowledge felt intuitively with knowledge learned from others. Belenky and her colleagues (1997) describe this process of coming to know as weaving together the strands of rational and emotive thought and integrating objective and subjective knowing, allowing individuals to look from the inside out and the outside in. When individuals look within, they are reflecting on what their different ways of knowing (reason, imagination, emotion, intuition) are telling them. This integration of different ways of knowing is their inner voice. If individuals are aware of their inner voice, they act with immediate insight into the situation in which they find themselves.

Palmer's (1999) description of his personal perception of knowledge and how it impacts on his teaching is very similar to how Belenky and her colleagues describe constructed knowledge. This view of constructed knowledge also relates to Schon's depiction of the reflective practitioner (1983). Palmer (1999) contends that the authentic power of teaching is derived from one's awareness of inner voice. Palmer (1999) identifies the intellectual, the emotional and the spiritual domains of the inner voice as:

intellectual - the way we think about teaching and learning

– the form and content of our concepts of how people know

and learn, of the nature of our students and our subjects

emotional - the way we and our students feel as we teach

and learn -- feelings that can either enlarge or diminish the

exchange between us

spiritual - the diverse ways we answer the heart's longing to be

connected with the largeness of life – a longing that animates love

and work … . (p. 5)

When Palmer is able to listen from within, he is better able to respond to the outer

landscape of his teaching practice. The outer landscape represents the situation in which

teachers find themselves. According to Palmer (1999), when teachers regard truth "as

emerging from a complex process of mutual inquiry, the classroom will look like a

resourceful and interdependent community" (p.51). Learning and teaching in this type of

classroom becomes interpersonal and intrapersonal, intrinsic, authentic and dynamic.

Teachers are providing students with ways to connect with their peers and to develop

ways of knowing.

Educators are becoming more aware of how important it is to connect personally

with students and to build knowledge through self-reflection, discussion and interaction

with others. While maintaining an emphasis on critical thinking and the processes of

analysis and synthesis that are the hallmarks of thinking objectively, there has been a

paradigm shift, other ways of knowing are now being addressed (Belenky et al., 1997;

Cambourne, 2002; Cunningham & Fitzgerald, 1996; Dietal, Herman & Knuth, 1991;

Greene, 1995; Noddings, 1984, 1992, 1995, 2003; Palinscar, 1998; Palmer, 1999; Rusu-

Toderean, 2003; Schon, 1983; Skrtic, 1995; Smith, 1977; Thayer-Bacon, 2000; Theall,

1999; Vygotsky, 1934/1962). Subjective knowledge is beginning to be incorporated into

the teaching-learning process and because of this, there is a new and different perspective

regarding how knowledge should be taught and learned.

Cambourne (2002) and Thayer-Bacon (2000) assert that an effort be made to

combine subjective and objective knowing. According to the Sociocultural Theory of

Vygotsky (1934/1962) and the Sociocognitive Conflict Theory of Piaget (1966),

knowledge and meaning are socially constructed. The Sociocultural Theory emphasizes

that individuals acquire ways of thinking and behaving that make up a community's

culture through cooperative dialogues with more knowledgeable peers and members of

society. Piaget elaborates that understanding comes from experience as what happens

when there is a contradiction between what the learner understands and what the learner

experiences. This contradiction "gives rise to disequilibration, which, in turn, leads the

learner to question his or her beliefs and to try out new ideas" (Palinscar, 1998, p. 3).

New learning takes place when learners are faced with this kind of cognitive dissonance.

Thayer-Bacon (2000) refers to this process when she states that "thinking is something

we actively construct within ourselves" (p.5). Thayer-Bacon (2000) advocates integrating

critical thinking with constructive thinking to emphasize the need for inner voice.

Constructive Thinking

Although Thayer-Bacon (2000) identifies constructive thinking as distinguishable

from critical, she does not define constructive thinking. She prefers to identify its

theoretical underpinnings. She argues for:

> an inclusive model of epistemology, one that embraces the
> importance of plurality, epistemologically as well as morally,
> that we can hope to improve our insights and gain a better understanding
> of out situatedness... . When we view knowing as an activity done with
> people who are in relation with each other, we shift our view from
> seeing knowers as autonomous individual subjects who act upon the

world, trying to master "it' and explain "it" to others. We begin
envisioning ourselves as participants in an intersubjective world, like
a clamor of voices, who will learn more from each other the better we are
able to relate to and care for each other. We realize that an inclusive,
relational epistemology is less vulnerable to ideological abuse because
it values contributions from all people, even contributions that are vague
and ambiguous or discordant and disharmonious, for we need each other
to further the nurturing of knowledge (Thayer-Bacon, 2000, p. 70)

While Thayer-Bacon (2000) advocates that emphasis be placed on developing

reasoning, she also stresses caring in regard to understanding other people's ideas. After

having studied traditional perspectives of critical thinking, Thayer-Bacon realized the

role of caring was in danger of being abandoned. To be a good critical or constructive

thinker, it is essential to develop the ability to care for all arguments and ideas originate

from people. Without denying the value of critical thinking, Thayer-Bacon (2000) invites

another view by exploring the theoretical possibility of constructive thinking.

If one were to teach constructive thinking what would that look like in a

classroom? How could this theory transcend into practice? Palinscar (1998) focuses on

how important it is for students to become more aware of their own thinking, who they

are and how they can share their reflections within a community of learners (Palinscar,

1998). Thus a valuable contribution to gaining knowledge includes considering many

points of view that weave the strands of rationale and emotive thought together and

integrate objective and subjective ways of knowing.

Since knowledge is a constructive process of transacting ideas, either individually

or within a social context, in constructive thinking classrooms students are given time to

discuss, connect, and reflect upon their learning, There may not be agreement, but

everyone's voice is heard in a caring manner (Thayer-Bacon, 2000). Students learn that

even though they have differing ideas about a topic, a respectful tone is necessary in responding and expressing counter opinions.

Lipsitz (1995) and Noddings (1984, 1992, 1995, 2003) believe that what is integral to any curriculum is that students learn to care. "If our main purpose as educators were to encourage the development of caring in our students, we would begin to look more attentively at the need for continuity in place, people, and curriculum" (Noddings, 1992, p. xii). For too long, educators have priorized the intellect or "trained intelligence" within our education system. Noddings (2003) proposes that we consider the basis of moral action. When we teach students that caring relationships matter, they learn how important it is to be receptive, open and fair with each other.

It is reasoned that if constructive thinking were nurtured during the learning journey, students would learn more about themselves (their unique gifts, abilities, strengths and inner voice) as members of a community in relation to others. Similarly, it is the contention of this investigator that undergraduates would be able to learn more in the process of developing a research paper if they were encouraged to extend their ways of knowing to integrate reason, imagination, intuition and emotion. Some key questions remain: What is constructive thinking? How can it be transformed from theory into practice?

Purpose of the Study

The purpose of this study, therefore, was to explore the concepts of critical and constructive thinking in order to discover how constructive thinking relates to and extends critical thinking and to identify challenges and concerns associated with integrating constructive thinking in post secondary classrooms. To this end, the study

investigated both quantitative and qualitative indicators of constructive thinking, examined the role of constructive thinking in relation to student success as well as demographics, and described the implementation of constructive thinking in post-secondary classrooms. The study was conducted in three parts.

Study One investigated the constructs of critical and constructive thinking as manifested in a first year undergraduate writing course (099.111) in which the major assignment was to create a research paper. It is theorized that when students use constructive thinking as they carry out their research, they take more time to develop their ideas, and their end products reflect a deeper understanding of the topic, based on the opportunities they have had to interact with others and discuss the issues they are investigating. The clarity and content of their work will be enriched since they will have had more time to reflect, revise, and edit both their thinking and their writing.

The role of the instructor also changes when writing is viewed as a process. Providing formative feedback becomes an integral component of teaching. Thus, when constructive thinking, over and above critical thinking, is encouraged, professors have more opportunities to nurture students. In turn, students are motivated to learn more about their topic because they find intrinsic value in what they are investigating. Further, given the climate in constructive thinking classrooms, students are more willing to share their ideas with others. The intent of their research is to help others, as well as themselves, learn. Studies Two and Three, therefore, interviewed instructors in the research paper writing course as well as professors who had participated in University Teaching Services workshop on constructive thinking in order to explore its practical application.

Questions Related To The Study

Critical thinking has been difficult to translate from theory to practice, although Ennis (1987), McPeck (1981) and Paul (1992) have been successful in providing more insight into the concept. What is widely conceived as being at the heart of critical thinking, however, is the value of logic and reason. Constructive thinking, on the other hand, is an elusive theoretical concept that seeks to capture elements of thinking that weave together rational and emotive thought and integrate objective with subjective ways of knowing.

The overall question, along with the specific questions explored in this study conducted in a post-secondary setting, included: Can constructive thinking, as defined in this study, be captured in a theoretically-based and applied to specific teaching and learning practice, for example, (a) in an undergraduate university course focusing on writing a research paper? and (b) in other courses in selected disciplines?

1)   Is constructive thinking distinguishable from critical thinking as defined in this study? Are there similarities/differences between both forms of thinking?

2)   Are there various levels of critical and constructive thinking?

3)   How do critical and constructive thinking, as defined in this study, affect student performance as reflected in research paper and final grades, as well as portfolios?

4)   Are there differences in critical and constructive thinking across student demographics (gender, language, international status, age, and high school grade point average)? and

5)   Can constructive thinking be integrated along with critical thinking in the

099.111 writing course and other selected disciplines? If so, how?

Definition of Terms Related To The Study

Defining Critical Thinking

Three main sources were utilized to define critical thinking and develop a

questionnaire to assess critical thinking in this study. The 099.111 writing instructors

from the University of Manitoba use Bloom's Taxonomy as their base for monitoring

developmental stages of critical thinking. The *Critical Thinking Rubric* (Kelly-Riley,

Brown, Condon, & Law, 2001) from Washington State University and the rubric from

The Center for Critical Thinking *Intellectual Standards to Assess Student Thinking* (Paul,

1992) served as a framework for assessing the quality of critical thinking in research

paper writing.

The first strand of critical thinking was based on the ability to identify and

summarize the problem/question at issue. Paul (1992) distinguished good reasoners from

bad by identifying specific skills related to the problem/question at issue. In his view,

good reasoners are: "clear about the question they are trying to settle, can re-express a

question in a variety of ways, can break a question into sub-questions, have sensitivity to

the kinds of questions they are asking, [and can] distinguish relevant questions from

irrelevant ones" (p. 129). For an area to be substantially developed in problem/question at

issue, The Washington State University *Critical Thinking Rubric* (Kelly-Riley et al.,

2001), on the other hand, addresses the need for critical thinkers to identify the main

problem and "the relationships of subsidiary, embedded, or implicit aspects of the

problem" (p. 1). These criteria therefore became the basis for the first strand of critical

thinking used in this study, the ability to summarize the problem/question at issue.

A second strand of critical thinking relates to the identification and assessment of

key assumptions. Paul (1992) indicated that good reasoners are able to "make

assumptions that are clear, reasonable, and that are consistent with each other" (p. 133).

The Washington State University *Critical Thinking Rubric* concurred with Paul (1992)

and suggested further that a critical thinker should be able to "identify and question the

validity of the assumptions and address the ethical dimensions that underlie [an] issue"

(p. 1). Consequently the second strand of the definition of critical thinking used in this

study highlighted the ability to identify and assess key assumptions.

A third strand of critical thinking pertains to the quality of supporting

data/evidence. According to Paul (1992), good reasoners are able to "assert a claim only

when they have sufficient evidence to back it up, can articulate and therefore evaluate the

evidence behind their claims, actively search for information against (not just for) their

position, focus on relevant information and disregard information" (p. 131-133). The

Washington State University *Critical Thinking Rubric* (Kelly-Riley et al., 2001) also

described the importance of being able to identify and assess the quality of supporting

evidence. A research paper must "examine the evidence and source of evidence; question

its accuracy, precision, relevance, completeness" (Kelly-Riley et al., 2001, p. 1). The

third strand of critical thinking, therefore, emphasized the ability to identify and assess

the quality of supporting evidence.

The fourth strand of critical thinking used in this study highlighted drawing on

student and other perspectives. Paul (1992) indicated that good reasoners are able to

"keep in mind that people have different points of view; especially on issues that are controversial, [and] consistently articulate other points of view and reason from within those points of view, seek other viewpoints especially when the issue is one they believe in passionately (p. 130-131). Similarly, the Washington State *Critical Thinking Rubric* (Kelly-Riley et al., 2001) emphasized addressing one's own perspective as well as the perspectives of others. A research paper should identify "appropriately one's own position on the issue, drawing support from experience, and information not available from assigned sources, and address perspectives noted previously" (Kelly-Riley et al., 2001, p. 1). Thus, the fourth strand of critical thinking used in this study focused on the ability to address one's position as well as the perspectives of others.

The fifth strand of critical thinking used in this study represented on the identification and evaluation of conclusions as well as implicating consequences. Paul (1992) indicated that good reasoners are able to "trace out a number of significant implications and consequences of their reasoning, articulate the implications and consequences clearly and precisely, search for negative as well as for positive consequences, and anticipate the likelihood of unexpected negative and positive implications" (p. 134). For a research paper to be substantially developed according to the Washington State University *Critical Thinking Rubric* (Kelly-Riley et al., 2001) the research paper should "identify and discuss conclusions, implications, and consequences considering context, assumptions, data, and evidence" (p. 2). The fifth strand of critical thinking, consequently recognized the ability to identify and evaluate conclusions and implicating consequences.

Summary. These five strands of critical thinking, as described below, were used in the construction of the student and instructor questionnaire and the evaluation of writing portfolios:

1) identify and summarize the problem/question at issue,
2) identify and assess key assumptions,
3) assess supporting data/evidence,
4) address position and perspectives, and
5) identify and evaluate conclusions as well as implicating consequences.

Defining Constructive Thinking

Constructive thinking is very new and in the beginning stages of development. To create a definition of constructive thinking, several works from a review of the literature were combined and synthesized (Belenky et al., 1997; Cambourne, 2002; Cunningham & Fitzgerald, 1996; De Bono, 2000; Dietal, Herman, & Knuth, 1991; Greene, 1995; John-Steiner, 1997; Lipsitz, 1995; Manzo, 1998; Noddings, 1984, 1992, 1995, 2003; Palinscar, 1998; Palmer, 1999; Rusu-Toderean, 2003; Schon, 1983; Skrtic, 1995; Smith, 1977; Thayer-Bacon, 2000, Theall, 1999; Vygotsky, 1934/1962). Five main strands were developed to define constructive thinking for this study. The value of advancing a study-specific definition of constructive thinking was that the definition served as a reference point both in the construction of the questionnaire and for participants who were interviewed.

The first strand of the definition contends that constructive thinking is a reflective process that values experience. Research based on Belenky et al. (1997), Cambourne (2000), Palmer (1999), Piaget (1966), Schon (1983), Thayer-Bacon (2000), and Vygotsky (1934/1962) reinforces how thinking requires self-reflection, interaction, and the

understanding of others. Thinking involves a process of reflecting and actively

constructing meaning from within. Experience is valued as it brings understanding,

insight, and ways of doing things differently.

The second strand of constructive thinking requires individuals to integrate

different ways of knowing (reason, emotion, intuition, and imagination). Cambourne

(2000) and Thayer-Bacon (2000) contend that objective and subjective knowing are

partners. When they are both acknowledged, we become more aware of our inner voice.

Belenky et al. (1997), Palmer (1999), and Schon (1983) reinforce the importance of inner

voice and how it relates to practice.

The third strand of constructive thinking focuses on building caring relationships

with others. As students learn to become more aware of others' needs as well as their

own, there are more opportunities for understanding to take place. According to

Noddings (2003), when we teach morality from a rational cognitive approach, "We fail to

share with each other the feelings, the conflicts, the hopes and ideas that influence our

eventual choices. We share only the justification for our acts and not what motivates and

touches us" (p. 8). How students interact and form relationships becomes just as

important as intellectual ability. In fact, Lipsitz (1995) and Noddings (1984, 1992, 1995,

2003) contend that listening and caring contribute to intellectual growth.

The fourth strand of the definition contends that constructive thinking is an active

process that values experience. Research based on Belenky et al. (1997), Cambourne

(2000), Palmer (1999), Piaget (1966), Schon (1983), Thayer-Bacon (2000), and Vygotsky

(1934/1962) reinforces how thinking requires self-reflection, interaction, and the

understanding of others. Thinking involves a process of reflecting and actively

constructing meaning from within. Experience is valued as it brings understanding, insight, and ways of doing things differently.

The fifth strand of constructive thinking espoused in this study is constructing new ideas and concepts to benefit society (De Bono, 2000). To use this type of thinking demands that students look within and beyond the parameters of the classroom, and apply their insight and creativity to imagine new possibilities in their own lives and in their community (Cunningham & Fitzgerald, 1996; DeBono, 2000; John-Steiner, 1997; Manzo, 1998).

When all five strands are synthesized into one definition, constructive thinking can be defined as a reflective and active process that values experience, integrates different ways of knowing (reason, emotion, intuition, and imagination), builds caring relationships with others, and constructs new ideas and concepts to benefit society (Hewlett, 2003).

Specific strands of critical and constructive thinking related to research writing were targeted when the student/instructor questionnaire was created. For critical thinking strands became subsets that included: problem/question at issue, assumptions, quality of supporting data/evidence, perspectives/position and conclusions/implicating consequences. Constructive thinking strands became subsets that included: reflective process valuing experience, other ways of knowing, building caring relationships, active process valuing experience and concepts benefiting society.

Other Terms

Natural Caring. "...the relation in which we respond as one – caring out of love or inclination. The relation of natural caring will be identified as the human condition that we consciously or unconsciously, perceive as good" (Noddings, 2003, p. 5).

International Status. Refers to a student from another country who has come to Canada to study. It is assumed that English is not their first language. These students were enrolled in a separate section of the University One writing course.

National Status. These were students from within Canada.

Scope of the Study

This research sought to define constructive thinking operationally, to compare critical thinking with constructive thinking, to determine whether constructive thinking is connected to student success and demographics, and to explore the use of constructive thinking within the context of a first year university general writing course (099.111) and other related disciplines. Students and instructors completed a questionnaire, and instructors and professors from other disciplines were interviewed. To triangulate findings, research paper and final grades, as well as writing portfolio ratings and demographics were used in the data analysis.

Significance of the Study

This study explored the concept of constructive thinking, a relatively new construct that at present lacks consistency in its operational definition and has limited indices of measurement, yet shows promise for enhancing problem solving by extending critical thinking to include other ways of knowing. It is hypothesized that the findings

from this study will show that the concept of constructive thinking can be defined.

Results will explore whether constructive thinking can be distinguished from critical

thinking and if the constructive thinking definition can be developed from theory and

manifested in post-secondary teaching and learning. Further, this study further sought to

identify the challenges that professors face as they introduce constructive thinking and

other ways of knowing into their classes.

CHAPTER II

Literature Review

In order to gain a better understanding of what constructive thinking is and how it builds on and extends critical thinking, an understanding of critical thinking is required. While most present day educators associate critical thinking with Bloom's Taxonomy (1956) which arranges thinking in a hierarchy that progresses first through the lower levels of knowledge and comprehension and then advances to application, analysis, synthesis and evaluation, critical thinking has a much more auspicious history. What follows is a review of the current literature on critical thinking theory and research and then an overview of how constructive thinking has developed.

Critical Thinking: Theory and Research

Critical thinking is highly regarded among educators and philosophers. This section examines both the origins and current definitions of critical thinking. It also describes how critical thinking has been taught and assessed in post-secondary classrooms.

Critical thinking is an important element of all post-secondary settings (Dressel & Mayhew, 1954; McMillan, 1987; Smith-Sanders, 1997). The National Association of American Colleges and Universities (1985 as cited in Smith-Sanders, 1997) strongly contend that for students to succeed in this changing world, they need to be able to synthesize large amounts of information, subject data to scrutiny, and use logical abstract reasoning. Many of the practices related to critical thinking that occur today are from the philosophical works of the Greeks, Plato, Socrates, and Aristotle (Thayer-Bacon, 2000). Within these philosophical writings, critical thinking is presented as a form of logical

argument. The mind is separate from the body. The rational aspect of the soul is

considered the highest ranking. It dominates over the other parts of the soul, the appetites

(desires, wants, emotions) and the will (the spirit) (Thayer-Bacon, 2000). The Greeks

viewed critical thinking as a solitary act. Critical thinkers should be able to find the

answers to questions by themselves.

Current educators have a challenging time agreeing on a specific definition of

critical thinking. However, they do seem to focus on critical thinking as being a reasoned

behavior involving an investigation, a process or an opinion, as definitions postulated by

Bean (1996), Ennis (1981), Halpern (1993), Inman and Pascarella (1997), Paul (1992)

and Wilson (1998). Bean (1996) describes critical thinking as "an investigation whose

purpose is to explore a situation, phenomenon, question or problem to arrive at a

hypothesis or conclusion about it that integrates all available information and that can

therefore be convincingly justified" (p. 3). Halpern (1993) specifies this investigation as

"an intellectually disciplined process of actively and skillfully conceptualizing,

analyzing, synthesizing or evaluating information from, or generated by, observation,

experience, reflection, reasoning or communication as a guide to belief and action"

(Halpern, 1993, p.1). Halpern's definition is very similar to these of Inman and

Pascarella (1997), Ennis (1981) and Paul (1992). While these authorities emphasize

critical thinking as an intellectual process, Inman and Pascarella (1997) detail how

critical thinking encompasses the "formulation of concepts, the ability to analyze

arguments and supporting data, and the ability to think abstractly and to discriminate

among abstractions" (p. 2). Ennis (1981) describes critical thinking as a " reasonable

reflective thinking that is focussed on deciding on what to believe or do" (p. 10). A subset

of Paul's critical thinking definition highlights " thinking that displays mastery of intellectual skills and abilities" (p. 643). Wilson (1998) supports Halpern (1993), Ennis (1981), Paul (1992) and Inman and Pascarella (1997) and identifies the base of critical thinking as reason. Wilson (1998) highlights critical thinking as "a reasoned opinion on any matter involving judgement of its value, truth or righteousness" (p. 304).

McPeck (1981) believes that critical thinking can be distinguished from other forms of thinking (including imaginative, sensitive, and creative thinking). He defines critical thinking as "reflective skepticism within the problem under consideration...knowing how and when to apply this reflective skepticism effectively requires among other things, knowing something about the field in question" (McPeck, 1981, p. 7). Critical thinking is discipline specific, purposeful, directed, knowledge and solution-based.

Although there is an agreement on the focus of critical thinking as being an intellectual process or a reasoned behavior, there is little consensus on the wording of the definition of critical thinking. In fact, after analyzing 62 studies focusing on critical thinking among college students, Tsui (1998) found it futile to try to create a definitive and complete definition of critical thinking. In much of the research on critical thinking, however, the emphasis is not placed so much on the definition as it is on how to teach, learn, and assess critical thinking. Ennis (1987) and Paul (1992) do not believe that students are often given the opportunity to achieve the higher levels of Bloom's Taxonomy. Paul (1992) asserts that "A principal function of Bloom's Taxonomy, like that of the concept higher order thinking skills, is to remind us that there is much more that the schools could be doing than promoting recall, routine comprehension, and

application" (p. 10). Ennis (1987) and Paul (1992) claim that once critical thinking

dispositions and skills are detailed, educators should be better able to transfer critical

thinking or higher order levels of Bloom's Taxonomy to students.

Based on the definitions described, most instructional approaches to teaching

critical thinking have reinforced the intellect, independent thought, and the formation of a

logical argument. The strengths associated with critical thinking, along with criticisms,

are presented in the accompanying Table (2.1). These are elaborated on below.

The Intellect and Use of Sound Logic

The intellect is considered the most important of all ways of knowing when the

strengths and limitations of critical thinking are evaluated, as seen in Table 2.1. Educators

are becoming more aware of how important it is to connect personally with students and

to build knowledge through self-reflection, discussion and interaction with others. While

maintaining an emphasis on critical thinking and the processes of analysis and synthesis

that are the hallmarks of thinking objectively, there has been a paradigm shift, others

ways of knowing are now being addressed (Belenky et al., 1997; Cambourne, 2002;

Cunningham & Fitzgerald, 1996; Dietal, Herman & Knuth, 1991; Greene, 1995;

Noddings, 1984, 1992, 1995, 2003; Palinscar, 1998; Palmer, 1999; Rusu-Toderean, 2003;

Schon, 1983; Skrtic, 1995; Smith, 1977; Thayer-Bacon, 2000; Theall, 1999; Vygotsky,

1934/1962). More and more, students are being invited to express their opinions on issues

and problems, subject to the scrutiny of others, thereby incorporating new and different

perspectives and a whole new way of thinking about teaching and learning. Simple

dialogue with the goal of consensus building is not the objective. While valuing the views

of others is important, one needs to reflect on his/her own values and beliefs to discover his/her own voice.

In this vein, Cambourne (2002) and Thayer-Bacon (2000) make the assertion that an effort be made to combine subjective and objective knowing. According to the Sociocultural Theory of Vygotsky (1934/1962) and the Sociocognitive Conflict Theory of Piaget (1966), knowledge and meaning are socially constructed. The Sociocultural Theory emphasizes that individuals acquire ways of thinking and behaving that make up a community's culture through cooperative dialogues with more knowledgeable peers and members of society. Piaget elaborates that understanding comes from experience such as what happens when there is a contradiction between what the learner understands and what the learner experiences. This contradiction "gives rise to disequilibration, which, in turn, leads the learner to question his or her beliefs and to try out new ideas" (Palinscar, 1998, p. 3). New learning takes place when learners are faced with this kind of cognitive dissonance. Thayer-Bacon (2000) refers to this process when she states that "thinking is something we actively construct within ourselves" (p.5). Thayer-Bacon (2000) advocates integrating critical thinking with constructive thinking to emphasize the need for inner voice.

In classrooms where positivism dominates, students must prove themselves through data collection and logic. Viewed in this light, professors need not make connections between the mind, body and spirit to enhance learning. Logical reasoning, to the exclusion of other ways of knowing, is paramount. Thus, from a critical thinking point of view, in making an argument, the use of imagination, emotion and intuition (Thayer-Bacon, 1993) is considered to interfere with intellectual reasoning.

From a social constructivist/post modernist perspective, restricting arguments

based only on the application of logic is a limitation, as shown in the accompanying table

(2.1). Students in classes that are dominated by critical thinking are conditioned to

believe that they must use their logical reasoning skills to ask and answer questions,

identify issues and assumptions, differentiate fact from opinion, engage in making

assertions, make correct inferences, and analyze arguments. Clarifying, defending,

challenging, or judging the positions of others based on logic is what is valued in class

discussions (Beck, 2000; Galotti, 1998; Halpern, 1993; McWhorter, 2000, Novelli, 2000;

Tsui, 1998; Wilson, 1998; Zeidler & Duplass, 2002). Thus, in developing a university

assignment, an objective, neutral voice is preferred. Reporting research findings

supported by both facts and documented research is, in many cases, a sign that a high

degree of academic excellence has been attained.

Table 2.1

Critical Thinking

Strengths	Limitations
*Supports work based on sound, logic and reasoned opinion	*Tends to exclude imagination, intuition, and emotions
*Solves problems and finds solutions independently	*May foster the premise that human interaction is not necessary for learning
*Encourages the defense of one's position by creating a well-formed argument	*May disallow for relationship building – reinforce competitive study
*Leads to knowledge transmission and - reinforces argument using well-documented research	*May prevent new ideas or initiatives from surfacing
*Ideally moves through a variety of levels of thinking as in Bloom's Taxonomy (knowledge, comprehension, application analysis, synthesis, and evaluation)	*May remain mostly at the lower levels of Bloom's Taxonomy (knowledge, comprehension, and application)
*Emphasizes academic performance	*May ignore inquiry learning
*Results in competitive study, good grades being the goal	*May inhibit divergent thinking

Independent Problem-Solving

As outlined in the preceding table, traditional teachers of critical thinking in post-secondary settings have reinforced the idea that the work of critical thinkers should be able to stand alone in defense of the position taken. The emphasis in instruction is to develop students' minds so that they are able to reason independently. What distinguishes critical thinking from other forms of thinking is the quality of reasoning. For instance, to "become a [better] critical thinker, one must understand what constitutes quality reasoning, and have the commitment relevant to employing and seeking quality reasoning" (Bailin, Case, Coombs, & Daniels, 1999, p. 28). In other words, an underlying premise associated with critical thinking is that it is not necessary to interact with others to assure the attainment of knowledge (Thayer-Bacon, 2000). Thus based on critical thinking theory, transmitting knowledge as opposed to offering time for classroom interaction has been promoted.

Well-Formed Arguments

When students are encouraged to think critically, they are taught to create logical arguments. (See Table 2.1.) The emphasis of this instruction is usually on defending one's position, creating either right or wrong arguments. These exercises reinforce what is known based on factual information, but tend not to lead to progressive thinking. Making a logical argument may over-emphasize competitiveness and stifle change (De Bono, 2000). Constructive thinkers argue that an effort needs to be made to connect classroom learning with the community, especially the working community. Goleman (1998) indicated that employers are seeking employees who are able to handle themselves, as well as each other. Intellectual ability and technical know how are

important, but even more essential in work settings are the personal qualities of the employees. To respond to these demands, professors, then, must consider how to address initiative, empathy, adaptability, and persuasiveness within the framework of their teaching if they want to prepare students for successful relationships in and out of the work place.

When Flanagan (1978) conducted a series of follow up interviews in a longitudinal study involving 1,000 students who were invited to reflect on their education from Project Talent, he found a common theme. Participants reported that their schools failed to develop skills applicable to "ethics, politics, values, and life management" (p. 112). Recently, researchers have begun to explore the idea that although much learning takes place in the classroom, out-of-class experiences, too, can have a significant impact on desired post-secondary outcomes (Baxter-Magolda, 1992; Edison, 1997; Kuh et al., 1994). Thus, for student learning to be advanced, students need opportunities to extend what they know to real life situations.

Transmission of Knowledge

Typically, professors promote critical thinking by transmitting knowledge through large group lectures. (See Table 2.1.) Everyone receives the content in the same transmission mode and learners remain passive. Students are seldom given the opportunity to question. On the other hand, instructors ask questions. They are often seeking answers that reaffirm what they have been teaching. Goodlad (1977, 1984) believes that educators spend too much time on eliciting low level responses from students, using questioning and telling as instructional techniques. In these cases, student thinking is apt to remain at the lower levels of Bloom's Taxonomy, absorbing knowledge

and attempting to comprehend and apply the information in their course work. Thus, at best, students in classes dominated by critical thinking are rewarded for lower levels of thinking, thereby thwarting any creative thinking that is beyond the expected norm.

Levels of Thinking and Learning

In post-secondary classes dominated by critical thinking, student competence is expected to evolve developmentally "influenced by experience and education" (Walker & Schonwetter, 2003, p. 286). As indicated, this developmental process is often described as a hierarchical movement through Bloom's Taxonomy (1956, as cited in Huitt, 1998): knowledge, comprehension, application, analysis, synthesis, and evaluation. Many researchers believe that critical thinkers move through the lowest level of knowledge, comprehension, and then gradually advance to the higher levels involving application, analysis, synthesis and evaluation (Huitt, 1998). These levels of critical thinking are usually measured through summative assessment by judging the quality of the discourse in such academic assignments as final essays, and tests or examinations at the end of the course (Goodlad, 1977; 1984; John-Steiner, 1997). Performance is thus quantified and students use their final grade to reinforce behavior. Very little formative feedback to help students realize course expectations and improve their performance is provided in classes that are dominated by classical critical thinking paradigms. When students are graded for their knowledge and comprehension, convergent responses are often the output of learning. Divergent responses using higher forms of Bloom's Taxonomy such as synthesis and evaluation are not often met (Smith, 1977).

Further, when the emphasis is on mastering content and producing polished products, students' voices are often ignored to keep pace with the requirements of the

curriculum. Students are endeavoring to prove what they know and understand, based on the facts they have been taught. This emphasis on turning in polished work, as exemplified in test performance results and final drafts of research papers, does not allow for students to engage in the process of learning throughout the course. The instructional direction leads the students to perform for specific purposes and certain times without becoming actively engaged in what they are learning as the course progresses. According to John-Steiner's interview transcripts (1997), Einstein found fault with this kind of traditional education because it focused on cramming students with content at the same time submerging the "wondering and inventive young mind" (p.47). Bodanis (2000) concurs with John Steiner's findings in that Einstein was so frustrated with the educational system that he attempted to solve his deep problems outside of the classroom. Forgotten is the contention that in order to attain higher critical thinking, students need to have opportunities to develop their own critical questions about the subjects in which they are interested.

Academic Performance Versus Inquiry Learning

The focus in many post-secondary classrooms is on academic performance at the expense of inquiry learning (Gibson, 1985; Goodlad, 1977; 1984), as outlined in Table 2.1. Professors often do not have the time to discover students' interests and reasons for enrolling in the course. Individual questions that drive students' curiosity about the subject remain unanswered. Nevertheless, students have opportunities to improve their performance when professors provide frequent feedback that forces them to rethink and elaborate on their ideas (Bailin et al., 1999). When students are encouraged and given

prompt feedback, they are more willing to take risks, learn from their mistakes, and try

new ideas (Smith, 1977, Theall, 1999).

When conditions that reinforce thinking and learning are not present, students

may feel threatened by others and lack the confidence to express who they are in front of

their peers or their professor. Gibson (1985) indicates that most of the time students are

performing tasks that require mind-dulling learning and the repetition of facts for no

more apparent goal than to pass to the next class and repeat the process. Such surveys as

the National Assessment of Educational Progress and the National Commission on

Excellence indicate that students spend most of their time acquiring factual data and not

connecting this data either to larger concepts or to their personal lives (Goodlad, 1984).

Thus, students do not take the time to ask themselves what is meaningful and purposeful

for them to learn. They maintain the status-quo and commit to the concepts that are

presented to them without questioning why they are learning what they are learning.

Competitive Study

Many students associate their ability to think critically with their academic marks

or final course grades. (See Table 2.1.) If grades are high, students perceive themselves as

being able to think critically better than others. If a bell-curve is used as a standard, only

five percent of the students will receive a high grade. These high-achieving students are,

in many cases, not expected to make a contribution to the class or to society as a whole.

Thus, the emphasis for many higher education students is on the extrinsic value of

achieving good grades, outperforming their peers, and receiving a degree or diploma.

A study conducted by Walker and Schaffarzick (1974) revealed, however, that

when assessment was matched to course content, all students were able to do well. For

example, innovative students did better on tests matched to innovative curricula and innovative programs resulted in higher student achievement (Gibson, 1985). Further, when individual thought was reinforced as opposed to collaborative effort, critical thinking suffered. Dewey (1974), Gibson (1985), Mead (1934), and Taba (1950) emphasize that when critical thinking is carried out in groups, the goal being to understand social phenomena, students achieved higher levels of thinking. Taba (1950) believes that critical thinking cannot be sufficiently gained through independent contemplation, and that interaction enhances critical thinking. Edison (1997), Smith (1977), and Theall (1999) concur with Taba (1950) that peer interaction is essential for higher levels of critical thinking to occur. Yet, a premise that still exists in many post-secondary classrooms is that human interaction is not necessary for critical thinking.

Characteristics of Critical Thinking Classrooms

Thus, as illustrated in Table 2.1, professors of critical thinking tend to teach students how to support their work based on sound, logical analysis and reasoned opinion. Students learn the importance of solving problems and finding solutions independently. Bloom's Taxonomy provides a framework for educators to associate levels of critical thinking. When students are working by themselves on assignments, however, they often function at the lower levels of Bloom's Taxonomy. Interacting with others in a social context facilitates higher order thinking (Smith, 1977; Theall, 1999). Peer to peer interaction, professor feedback, encouragement, formative assessment, and chances to revise and resubmit essays are some of the conditions that help to raise thinking levels.

Assessing Critical Thinking

As suggested earlier, critical thinking in post-secondary settings, for the most part, has been measured using summative assessment as seen in Table 2.2. Often there is but one course assignment, usually submitted at the end of the term after instruction has been completed. Grades are often assigned based on the instructor's general impression of the quality of the course work judged in relationship to the perceived quality of the work of other students. A bell-curve in which approximately five percent of students receive a grade of A, ten percent a grade of B, twenty percent a grade of C, and twenty percent a grade of D may be used as a guideline for marking. Grading criteria that specify instructor expectations and provide guidelines for mastery are not usually described in the course syllabus. Most forms of assessment in classes that are governed by a critical thinking paradigm are summative. The purpose of summative assessment is to substantiate academic performance (Manitoba Education and Training, 1996).

Quantifiable, summative tasks are relatively easy to administer and score but students often do not have an opportunity to receive formative feedback, understand flaws in their thinking, and revise and resubmit their work. Essay grades are considered final once they are returned. Such summative evaluation emphasizes that knowledge is a product that can be measured and quantified. Summative evaluation, thus, epitomizes the view that there is a only one true, correct answer. Knowledge is not judged in a more "pluralistic, qualitatively relativistic way" (Thayer-Bacon, 2000, p. 131). Thus, students who experience summative grading often resort to narrow thinking and often produce work that lacks personal voice. They have been conditioned into learning that convergent responses are more valued than responses that represent more divergent thinking.

Table 2.2

Summative Versus Formative Assessment

Summative Assessment	Formative Assessment

*Purpose is to prove learning has taken place
*Uses quantifiable tasks that are relatively easy to administer
*Reinforces convergent responses
*Grades are used to rank performance and compare work to that of other Students
*Examples include:
  -tests, exams
  -final papers
	*Purpose is to provide feedback over the course of instruction to enhance mastery
	*Uses assignments as a diagnostic tool to inform future instruction
	*Reinforces divergent responses
	*Integrates different ways of knowing
	*Appeals to intrinsic motivation
	
	*Examples include:
	  -informal observations
	  -anecdotal records of students' work
	  -diagnostic checklists
	  -individual or group writing conferences
	  -journals, exit slips, reflections, learning logs, portfolios, I-movies
	  -inquiry projects, oral presentations,

Students often have been taught that critical thinking involves being able to support their work based on sound logical analysis to the exclusion of other ways of knowing. They are to solve problems and find solutions independently, reinforcing competitive study. When they create logical arguments, their learning often does not extend beyond making judgments. They master content without addressing the higher levels of evaluation, synthesis and other forms of divergent responses. This way of thinking has been reinforced for approximately 2600 years (DeBono, 2000). Einstein once wrote that "Everything has changed except our way of thinking" (De Bono, 2000, p. vi).

Transforming Critical Thinking

Thayer-Bacon (1992, 2000), Cambourne (2002) and Brookfield (1987, 1995) challenge traditional critical thinking educational practices. Brookfield (1987, 1995)

argues that critical thinking should include more than logical analysis. He demands a transformation so that critical thinking includes what it means to be a developing person and a citizen responding to social issues. In their work, Thayer-Bacon (2000) and Cambourne (2002) contend that efforts need to be made to combine subjective and objective knowing and to recognize that knowledge and meaning are socially constructed. As postulated by the Sociocultural Theory of Vygotsky (1934/1962) and the Sociocognitive Conflict Theory of Piaget (1966), knowledge and meaning are socially constructed. The Sociocultural Theory of Vygotsky (1934/1962) emphasizes that individuals acquire ways of thinking and behaving that make up a community's culture through cooperative dialogues with more knowledgeable members of that society. He elaborates that understanding is based on experience.

In his Sociocognitive Conflict Theory, Piaget contends that new learning takes place when there is "a contradiction between the learner's existing understanding and what the learner experiences [giving] rise to disequilibration, which, in turn, leads the learner to question his or her beliefs and to try out new ideas" (Palinscar, 1998, p. 350). Thayer-Bacon (2000) stresses that "thinking is something we actively construct within ourselves" (p. 5). Thus, as suggested earlier, to teach constructive thinking is to help students become more aware of who they are and how they can contribute within a community of learners (Palinscar, 1998). An elaboration of concepts related to constructive thinking follows.

Constructive Thinking: Theory and Research

Defining Constructive Thinking

There are not many definitions of constructive thinking in the research literature. Thayer-Bacon (1993) describes an essential characteristic of constructive thinking as being "the ability to be receptive and caring, open to others' ideas and willing to attend to them, to listen and consider their possibilities" (p. 323). De Bono (2001) presents another perspective associated with constructive thinking. He defines constructive thinking as "the deliberate exploration of experience for the purpose of designing practical concepts and ideas that deliver value" (p.1). He emphasizes the importance of connecting experience with imagination so that what is learned responds to social issues. Constructive thinking is progressive. It seeks not only to examine what has been done but what can possibly occur. A synthesis of Thayer-Bacon's and De Bono's work produces a more complete definition of constructive thinking. Constructive thinking can be defined as "a reflective and active process that values experience, integrates different ways of knowing (i.e., reason, emotion, imagination and intuition), builds caring relationships with others, and constructs new ideas and concepts to benefit society" (Hewlett, 2003).

This definition of constructive thinking is a combination of the work of Thayer-Bacon (2000) and De Bono (2001) as well as a creative synthesis of several works that developed elements of the four strands of constructive thinking: learning as a reflective and active process, integrating different ways of knowing, building caring relationships with others, and constructing new ideas and concepts to benefit society (Belenky et al., 1997; Cambourne, 2002; Cunningham & Fitzgerald, 1996; De Bono, 2000; Dietal, Herman, & Knuth, 1991; Greene, 1995; John-Steiner, 1997; Lipsitz, 1995; Manzo, 1998;

Noddings, 1984, 1992, 1995, 2003; Palinscar, 1998; Palmer, 1999; Rusu-Toderean, 2003;

Schon, 1983; Skrtic, 1995; Smith, 1977; Thayer-Bacon, 2000, Theall, 1999; Vygotsky,

1934/1962). As outlined in Chapter One of this thesis, the main strands that define

constructive thinking are described below.

Learning as a Reflective and Active Process

The first strand of this definition is that constructive thinking is a reflective

process that values experience. Research based on Belenky et al. (1997), Cambourne

(2000), Palmer, (1999), Piaget (1966), Schon, (1983), Thayer-Bacon, (2000), Vygotsky

(1934/1962) reinforces how thinking requires self-reflection, interaction and

understanding of others. It is a process of reflecting and actively constructing from

within. Experience is valued as it brings understanding, insight and ways of doing things

differently. Having conducted interviews with 101 students over a period of five years

and establishing a hierarchy of ways of knowing, Baxter-Magolda (1993) found that

when students were able to make personal connections from their experience to the

knowledge they were learning, greater understanding occurred. Their perception changed

about what they were learning and they believed they were "opening the door to

legitimate sources of knowledge" (p. 378). They learned through the process of reflecting

and actively constructing meaning, indicating that they were valuing experience not just

reiterating facts and knowledge from authorities.

The constructive thinking classroom is, therefore, a safe place where students can

afford to take risks and make mistakes. Professors do not sacrifice high expectations of

their students but rather ask students to share ideas and reflect upon their learning within

the context of the classroom, thereby expanding their thinking. At the same time, students

are provided with frequent opportunities for feedback based on responses from their peers and from the professor. When students receive personal comments on how their work can be improved, developed, and changed, they feel encouraged and inspired to learn and their thinking expands. Students need to make personal connections with their experience as they are learning. When these connections are made, learning becomes more meaningful and purposeful (Harvey & Goudvis, 2000). As John Dewey observed, imagination leads learners to meanings derived from past experiences and brings those meanings to the present, providing new insights and a more conscious understanding of what is being learned (cited in Greene, 1995).

This conception of how knowledge is acquired has been developed over the last 30 years mainly as a result of a shift in epistemology from a positivist to a post modernist or social constructivist epistemology (Belenky et al., 1997; Cambourne, 2002; Cunningham & Fitzgerald, 1996; Dietal, Herman, & Knuth, 1991; Greene, 1995; Noddings, 1984, 1992, 1995, 2003; Palinscar, 1998; Palmer, 1999; Rusu-Toderean, 2003; Schon, 1983; Skrtic, 1995; Smith, 1977; Thayer-Bacon, 2000; Theall, 1999; Vygotsky, 1934/1962). When students pay attention to their experience and inner voice (the integration of different ways of knowing – reason, emotion, intuition and imagination), their work becomes a reflection of themselves and how they see themselves in their community. Constructive thinking goes beyond critical thinking in that it attempts to have students engage themselves as a whole (mind, body, and spirit), while critical thinking considers only the intellect. Constructive thinking extends critical thinking in that constructive thinking emphasizes the strands shown in Table 2.3.

This reflective and active process strand of constructive thinking reinforces how essential it is for students to make connections, reflect, and to construct meaning actively as they learn. Within this process, students' needs find voice. The professor, therefore, does not have to infer their needs. There are thus greater possibilities that intrinsic motivation for learning content will arise.

Table 2.3

Extending Critical Thinking To Include Constructive Thinking

Is A Reflective and Active Process That Values Experience *Brings understanding, insight and different ways of doing things *Makes personal connections to what is being learned	Integrates Different Ways of Knowing *Finds inner voice through integration of different ways of knowing (reason, imagination, emotion, and intuition) *Develops learners-each having a unique voice	Builds Caring Relationships With Others *Becomes more aware of others as well as personal needs *Creates more opportunities for understanding to take place	Constructs New Ideas and Concepts to Benefit Society *Applies insight and creativity to imagine new possibilities in personal lives as well as in the community

While the dimensions of constructive thinking listed in Table 2.3 can be viewed positively, there are possible limitations associated with constructive thinking as shown in Table 2.4. As constructive thinking is a theoretical construct, it may have limitations in that it: may not be grounded in research (only reflect personal experience), may lack credibility, may reflect a bias that is not declared, may have time, schedule, and class size constraints particularly at the post-secondary level, as well as difficulty with assessment evaluating specific dimensions of this form of thinking.

Table 2.4

Limitations of Constructive Thinking

Is A Reflective and Active Process That Values Experience	Integrates Different Ways of Knowing	Builds Caring Relationships With Others	Constructs New Ideas and Concepts to Benefit Society
*May not be grounded in research (only reflect personal experience) *May lack credibility	*May reflect a bias that is not declared	*May have time/schedule/ setting/class size constraints Particularly at post-secondary level limited opportunities to build relationships with students	*May have difficulty with assessment/ evaluating these dimensions

Integrating Different Ways of Knowing

The second strand of constructive thinking requires individuals to integrate

different ways of knowing (reason, emotion, intuition, and imagination). Cambourne

(2000) and Thayer-Bacon (2000) contend that objective and subjective knowing are

partners. When objective and subjective knowing are both acknowledged, an awareness

of inner voice occurs. Belenky et al. (1997), Palmer (1999), and Schon (1983) reinforce

the importance of inner voice and how it relates to practice.

Professors of constructive thinking consider the abilities, gifts, interests and

learning styles of their students during the learning of course content. Each student is

believed to be unique and special. This more interactive style of teaching encourages

students to use constructive thinking, and activates all forms of knowing, including

reason, imagination, intuition, and emotion (Thayer-Bacon, 2000). When students are

given opportunities to express themselves as they learn, they reveal the diversity of views

and voices that exist in a community of learners.

Self-expression is encouraged in constructive thinking classrooms. Students are able to integrate all of the different ways of knowing (reason, emotion, intuition and imagination) for self-expression. When all forms of knowing are engaged, students are able to access and develop other modalities artistically, kinesthetically, inter- and intrapersonally as well as morally (Thayer-Bacon, 2000, p. 137). As students use constructive thinking, they stretch the outer boundaries of their consciousness and make the unconscious conscious by listening within as well as to others, and pay attention to what is occurring around them (Belenky et al., 1997). They learn that there is freedom to explore these different ways of knowing as they allow synergy to occur. The sum of all parts is greater than the whole. The assumption is that in becoming more aware of oneself and others, insight and creativity will blossom. When constructive thinking occurs, there is an effort to reclaim the self by attempting to integrate knowledge that is intuitive and knowledge that is learned from others.

Constructive thinking provides students with the opportunity to see themselves as each having a unique and authentic voice. Five main areas are addressed in constructive thinking classrooms: self-awareness, self-regulation, motivation, empathy and social skills (Goleman, 1998). These areas reinforce emotional intelligence and are needed in today's society. When students are using constructive thinking in their personal and professional lives, they question and listen to others in order to understand other perspectives (Belenky et al., 1997). When Harris (2002) conducted research using undergraduates to investigate constructive thinking, he found that those individuals who engaged in constructive thinking were better able to change their thinking habits to meet

the demands of real life situations than those who had lower levels of constructive

thinking.

Building Caring Relationships With Others

The third strand of constructive thinking is building caring relationships with

others. As students learn to become more aware of others' needs as well as their own,

there are more opportunities for understanding to take place. When educators teach by

using the four components of modeling, dialogue, practice and confirmation, students

witness and recognize what it is to have a moral education (Noddings, 1992). Students

begin to feel valued for who they are and know what it means to be cared for. Through

open-ended dialogue, students connect with each other as they search for common

understanding, empathy or appreciation, and they build substantial knowledge from one

another as they listen. How students interact and form relationships in the classroom

becomes just as important in their learning as their intellectual ability. In fact Lipsitz

(1995) and Noddings (1984, 1992, 1995, 2003) contend that listening and caring

contribute to intellectual growth.

Lipsitz (1995) and Noddings (1984, 1992, 1995, 2003) believe what is integral to

any curriculum is that students learn to care. For too long, educators have priorized the

intellect or "trained intelligence." Noddings (2003) has proposed that "sensitivity in

moral matters" should also be considered, reinforced, and encouraged. When instructors

teach students that caring relationships matter, students learn how important it is to be

receptive, open, and fair with each other. As students learn to become more aware of

others' needs as well as their own, there are more opportunities for understanding to take

place.

Constructing New Ideas and Concepts To Benefit Society

The fourth strand of constructive thinking is constructing new ideas and concepts to benefit society (De Bono, 2000). To use this type of thinking demands that students look within and beyond the parameters of the classroom, and apply their insight and creativity to imagine new possibilities in their own lives and in their community (Cunningham & Fitzgerald, 1996; DeBono, 2000; John-Steiner, 1997; Manzo, 1998).

Manzo believes that for constructive thinking to occur, students need to try new ways of thinking. He contends that professional educators tend to focus mainly on the importance of higher order, critical thinking, or the evaluation of the ideas of others (Manzo, 1998). Constructive thinking goes beyond this, however, and is characterized by generating new ideas and exploring possibilities. Value is created, not just sought (de Bono, 2000).

Badanes (1997), for example, described a collaborative community in which students learned to use constructive thinking. When a constructive thinking model was used in an architecture class in which students were able to obtain experience interacting with working class clients connected to the university through non-profit organizations, students worked in teams. Once student teams were formed, the business community contributed materials and expertise for which they were awarded tax credits. All stake holders benefited. Students obtained first hand experience, faculty and students developed a broader range of skills than was possible in the university setting, and faculty worked together to develop a model for working with the community by offering themselves as consultants. As a result, instructors improved their teaching. Upon the successful completion of the project, bonds between the university and the city were

strengthened. Thus a constructive thinking approach enabled learning to take place

beyond the parameters of the university classroom to benefit both the university and the

community. What drives constructive thinking is to build caring relationships with others

that benefit all.

Teaching Constructive Thinking

The emphasis on teaching constructive thinking differs from that associated with

critical thinking. Constructive thinking relies on professor modeling and social

interaction within a community of learners. The professor enters into a relationship with

the students and uses active listening during discussions. Differentiated instruction is

essential to constructive thinking because it provides a medium for diversity to be

allowed and celebrated.

Establishing a Community of Learners

The climate in constructive thinking classrooms differs from the climate in

traditional critical thinking classrooms. Constructive thinking relies on interaction among

individuals. While individuals can and do make personal contributions to knowledge,

they do not do so in isolation. Greene (1995) concurs with Thayer-Bacon about the

importance of creating a community of learners. "In my view, the classroom situation

most provocative of thoughtfulness and critical consciousness is the one in which

teachers and learners find themselves conducting a collaborative search, each from her or

his lived situation" (p. 28). Students learn about themselves and what they can offer in

the classroom setting. "If teaching can be thought of as an address to others'

consciousness, it may be a summons on the part of one incomplete person to other

incomplete persons to reach for wholeness" (Greene, 1995, p. 26). In constructive

thinking classrooms, instructors move beyond critical thinking by incorporating both

small and whole group discussion so that students can experience what it is like to search

for meaning collaboratively.

Since knowledge is a constructive process of transacting ideas either individually

or within a social context, in constructive thinking classrooms students are given time to

discuss, connect and reflect upon their learning. There may not be agreement, but

everyone's voice is heard in a caring manner (Thayer-Bacon, 2000). Students learn that

even though they have differing ideas about a topic, a respectful tone is necessary in

responding to and expressing counter opinions. Constructive thinking instructors

carefully construct a learning environment in which students have opportunities to

discover how knowledge about a topic can be pieced together like a puzzle, with each

student adding a dimension to the learning.

Active Listening

To teach constructive thinking, instructors enter into a relationship with the

students. The challenge for the constructive thinking instructor is to listen actively to

what is being said during class discussions and to hold back on authoritative impulses

(Palmer, 1998). When instructors suspend inner chatter about what they are going to say

next, they are open to receive external conversations (Palmer, 1998). Palmer (1998)

creates an image of this nonlinear process of understanding students as they are engaged

actively in understanding a topic. He suggests that an instructor learns to connect student

comments during class discussions so that students know where they have been and

where they are about to go that is new. He draws his community of learners together by

relating new comments to comments made previously. New discoveries are thus being

made constantly when instructors take time to listen to their students, and spontaneous (or informal) discussion is allowed.

The Importance of Relationship Building

The focus of constructive thinking instruction is the importance of relationship building and the maintenance of those relationships (Thayer-Bacon, 1992). To be able to create relationships in this manner reflects student ability to: empathize with another, trust, convey an attitude of acceptance, hear the voices of others more completely and fairly, consider other possibilities before passing judgment, encourage, respect the other as a separate autonomous being-- worthy of caring, and work together to problem find and problem solve (Thayer-Bacon, 1992). This style of teaching encourages students to use constructive thinking activating all forms of knowing (reason, imagination, intuition, and emotion) (Thayer-Bacon, 2000). Professors are able to view each student as a whole person and not simply as an intellect. The different abilities and strengths of students are celebrated within the social context of constructive thinking classrooms.

Differentiated Instruction

In a constructive classroom, differentiated instruction occurs. Teachers of constructive thinking consider the abilities and interests of their students as the students are learning the content. By 2013, Gardner (1993) hopes that educators will find different ways to assess students abilities. As indicated, many of the assessment tools advocated in many critical thinking classrooms have been created to measure reasoned behavior.

Choice-Making and Negotiation

Constructive thinking instructors understand the importance of choice-making and negotiation. They are flexible and allow students to pursue areas of interest related to

course content. For example, instructors invite students to negotiate assignments outlined

in the course syllabus within the first two weeks of class and to submit research proposals

for approval. Students thus become part of curriculum construction, choosing what

interests them as the focus of their assignments, thereby giving them ownership.

Learning, in turn, becomes more meaningful and purposeful.

Characteristics of Constructive Thinking Classrooms

Based on previous discussion, constructive thinking classrooms are characterized

by:

a) a safe and encouraging atmosphere in which students feel free to express themselves,
b) differentiated instruction that appeals to the diverse backgrounds and gifts of students,
c) time to share ideas, reflect, revise and edit work,
d) opportunities for students to choose topics that are intrinsically motivating,
e) ongoing formative assessment, interaction and conferences with peers, instructors/professors and others about what is being learned,
f) the development of self efficacy,
g) lessons connected to students' lives and community and,
h) a curriculum that is centered around caring.

Assessing Constructive Thinking

While summative assessment is common in post-secondary classes in which

critical thinking is stressed, constructive thinking is characterized by formative

assessment. Assessing constructive thinking requires an emphasis on formative rather

than summative assessment. Table 2.2, presented previously, outlines the features of both

summative and formative assessment. Formative assessment "is a diagnostic [tool] to

provide feedback to teachers and students over the course of instruction" (Boston, 2002,

p. 1). Professors can create formative assessment tools by providing feedback based on

the use of informal observations, and keeping anecdotal records of students' work and diagnostic checklists related to the content of the course. Professors can hold individual or group conferences about particular projects, carry out a task analysis of papers or projects, and keep students actively engaged through feedback on journals, exit slips, or learning logs that contain self-evaluations or reflections. Students can also compile learning portfolios (Mandell & Michelson, 1990). Learning portfolios encourage and empower students to review, monitor, reflect and express themselves in a variety of ways to reveal their understanding of course content, as well as their multiple intelligences or gifts of expression. Portfolios can be submitted throughout the duration of the course to receive instructor response and feedback. Instructors, in turn, can improve their teaching by reviewing concepts that seem to be misunderstood.

Formative assessment is conducted on an ongoing basis during instruction so that students have frequent opportunities to obtain feedback, observe progress and revise their work. Greene (1995) believes that formative assessment strategies ask students to reflect on what they have learned. Students then are able to determine what goals they should set for themselves based on their progress (Greene, 1995). Usually students are not graded for the work they do in these formative assignments (Manitoba Education and Training, 1996). The emphasis is on learning as a process so that instructors can help students to understand, develop new insights, enhance thinking and take steps to improve performance. When formative assessment is used, students achieve higher levels of thinking and their self-confidence improves mainly because instructors are continuously encouraging and correcting students during the course of instruction (Boston, 2002; Manitoba Education and Training, 1996).

After having reviewed the use of formative assessment in 250 journal articles and book chapters, Black and Williams (1986 as cited in Boston, 2002) concluded that formative assessment resulted in significant learning gains compared to average test score improvements. Professors and instructors who used formative assessment provided enough feedback so that the students could see what they needed to do to enhance learning and achieve desired goals.

As seen previously in Table 2.2, most assignments that students carry out at the post-secondary level have been summative. Critical thinking has become connected with grades and academic performance. Constructive thinking, however, attempts to shift the emphasis away from summative assessment and move to the use of more formative assessment.

The student participants in this study were enrolled in an undergraduate course, the goal of which was to learn to write a research paper. Writing instruction is ideal for engaging constructive thinking. The relationship between constructive thinking and the writing process is discussed next.

Writing As A Representation of Thinking

Writing offers students and instructors an opportunity to use constructive thinking. Writing is particularly suited to the development of constructive thinking because writing is a process that involves: engaging in prewriting activities, wide reading to learn about a topic; creating a first draft; obtaining feedback from others; reflecting and revising based on the feedback, and finally editing. The recursive nature of writing in which drafts are expected to be constructed and reconstructed provides an ideal opportunity for receiving feedback from both peers and the instructor. Flower and Hayes

(1994) have conducted extensive research into the process of writing using protocol analysis. After having recorded and analyzed the thoughts of writers during the composing process, Flower and Hayes believe that they have developed a cognitive process theory of writing that serves as the foundation for the analysis of the writing process.

The greatest joy about teaching writing is having students see and express for themselves the beauty that lies within. When students are able to articulate their experience and reclaim it for themselves (Calkins, 1994), they are able to contribute something that is meaningful. The writing process epitomizes constructive thinking by providing students with: a safe and encouraging atmosphere for self-expression; feedback in developing their arguments; and differentiated instruction. More individualized instruction is possible because students are allowed to choose topics that are intrinsically motivating and conference with peers, instructors and other campus staff about their research. Conferencing helps students begin to engage in monitoring their own writing and in goal setting. Sharing ideas provides for more reflection, further revision and finally editing. Engaging in process writing also develops self-efficacy (Schunk & Zimmerman, 1997).

In creating their research paper assignments, students learn that their writing matters because it is a reflection of how they see themselves in the world in which they live. As Calkins describes the values associated with writing:

> Not surprisingly, for us [as] human beings, the work that is
> deeply personal, that is woven within the fabric of our
> lives, is also interpersonal. We care about writing when we
> write with, for and about the people who matter to us, and
> when we write about or "off of" the issues and experiences
> that matter (p. 14).

To teach the art of writing is to spend time actively listening to students while they are engaged in writing. Atwell (1987) emphasizes the important role that educators play when encouraging writing. For meaningful, purposeful writing to occur, she (1987) insists that writers:

> need honest, human reactions. They need teachers who help
> them discover the meaning they don't yet know by helping
> writers discover and build on what they do know. Writers
> need response while the words are churning out, in the
> midst of the messy, tentative act of drafting meaning (p.
> 66).

Constructive thinking enables instructors and students to monitor their writing. During the writing process, students begin to feel empowered and motivated to share themselves with others.

Critical and Constructive Thinking in Association with Writing

Most research papers that are developed are based on logical argument. The Modern Language Association Style (2003) uses the outline of a tree for researchers to organize their ideas and to build their work on solid ground. What differentiates critical thinking from constructive thinking is that constructive thinking seeks to extend what is learned beyond the parameters of the paper itself. It demands that there be a personal element in which students are allowed to visualize how their main idea relates to their audience. Students are asked to consider how they can help themselves and others within their community. This kind of research becomes progressive rather than stagnant. The

ideas are expected to benefit the researcher, the community, or both, and not be restricted

solely to the extrinsic value of the grade. There is an intrinsic value to what has been

learned.

Assessing Constructive Thinking in Writing

The degree to which authors engage in constructive thinking as they create

research papers has not been measured. In contrast to constructive thinking, however,

critical thinking has been assessed through the use of grading and use of rubrics to

evaluate the quality of writing. The Washington State University Critical Thinking

Project (2001), in collaboration with the Center for Teaching, Learning and Technology

(CTLT), the General Education Program, and the Writing Program, developed seven

main areas that operationalize critical thinking. The elements represented in this critical

thinking rubric stem from the literature on effective informative writing, as well as on

local practice and expertise in the field. This rubric is shared with students to help them

enhance their work by incorporating higher order critical thinking (Kelly-Riley,

Brown, Condon, & Law, 2001). These seven areas include:

a) the identification of the problem/question/main idea;
b) statements that make the student's perspective and
     position clear;
c) salient perspectives and the positions of others;
d) key assumptions;
e) supporting data/evidence;
f) the context of the issue; and
g) conclusions, implications, and consequences.

Paul (1992) also designed a rubric to evaluate writing for critical thinking. Unlike

constructive thinking, Paul's rubric focuses solely on the formation of logical arguments.

He identified the following areas as evidence of student reasoning--statements that

identify purpose; the question at issue or the central problem; point of view; empirical dimensions; concepts and ideas; assumptions; implications or consequences; and inference. Research papers are evaluated based on the degree to which writers defend their position in terms of logic and consistency; the flexibility and fairness with which they have articulated their point of view; the significance and realistic nature of their purpose; and the posing of their questions in terms of precision and depth (Paul, 1992). Such rubrics to evaluate critical thinking are currently being used in many jurisdictions. In contrast, no rubric currently exists to measure the presence of constructive thinking. Manzo (1998) contends that the closest educators have come to asking for constructive thinking is when they name the higher order skills found in Bloom's Taxonomy: synthesis and evaluation.

Summary

Critical thinking is defined by Bloom's Taxonomy (1956) as a hierarchy that begins at lower levels with knowledge and comprehension, and then advances to higher levels that involve analysis, application, synthesis, and evaluation. Often students have a challenging time moving to higher thinking levels. They are simply asked to master content and produce convergent responses. Constructive thinking goes beyond critical thinking in that constructive thinking requires students not only to provide a logical argument, but also to think "outside-the-box," and envision what is possible by incorporating many different ways of knowing (i.e., reason, emotion, intuition, and imagination). The emphasis in instruction is to develop students who can build caring relationships with others and through discussion and collaboration engage in self-reflection, listen to their inner voices, and develop practical and progressive ways of

solving problems to benefit society. Formative assessment is an essential component of

constructive thinking classrooms in that it provides students with feedback during

learning. Table 2.5 summarizes the differences between critical and constructive thinking

that have been delineated in this chapter.

Table 2.5

A Summary of Critical versus Constructive Thinking

Critical Thinking	Constructive Thinking
*Old	*New
*Knowledge is obtained through objective observation	*Knowledge cannot be separated from the context in which it is learned
*Instructional emphasis is placed on one form of knowing: reason	*Instructional emphasis integrates all different forms of knowing: reason, imagination, intuition, and emotion
*Sparks competition with others, regurgitation of facts, Reinforces right/wrong logical arguments	*Instruction is differentiated
*Higher order levels are challenging to reach	*Stresses relationship building and maintenance, insight and creativity, practical and progressive ideas to benefit society
*Assessment has been mainly summative	*Assessment is mainly formative

CHAPTER III

Method

This exploratory thesis investigated the concepts of critical and constructive thinking in order to: (1) discover how constructive thinking relates to and extends critical thinking, and (2) identify challenges and concerns associated with integrating constructive thinking in post secondary classrooms. To this end, the study investigated both quantitative and qualitative indicators of constructive thinking, examined the role of constructive thinking in relation to student success, as well as demographics, and described the implementation of constructive thinking in post-secondary classrooms.

The overall study was composed of three separate studies that are described in detail indicating purpose and design rationale, participants, measures, procedures, data analysis, and anticipated results. Study One explored how first year university students perceived elements of critical and constructive thinking while developing a research paper which was their major course assignment. Study Two focused on collecting data from the instructors in that course in order to determine their views on constructive thinking. Study Three described constructive thinking classrooms and addressed whether constructive thinking had practical application for professors in other fields. Table 3.1 provided a summary of the questions related to the multifaceted purposes of the research in conjunction with data sources for each of the three studies.

This research was exploratory in nature. Exploratory studies allow the researcher to gain familiarity with and develop new insights into a phenomenon (Fletcher, 2003). Constructive thinking was the phenomenon of interest. This research explored how constructive thinking could be translated from theory to practice. The value of

exploratory research is that it allows for many variables and provides ample opportunity for unexpected outcomes. As Root-Bernstein (1994) suggests, exploratory research seeks to find what "no one knew was there… and determine its potential value" (p. 43).

Study One: Exploring Constructive Thinking (First Year Students in a Writing Course)

Purpose and Design Rationale

Using both quantitative and qualitative analyses, Study One endeavored both to explore constructive thinking as a construct and to relate it to student success. The qualitative data was obtained through the administration of a student questionnaire (Appendix A) which operationalized the concepts of both critical and constructive thinking as defined in Chapter One. The first part of the questionnaire gathered demographic data while the second asked students to respond to close-ended items that measured the degree to which they used critical and constructive thinking. The third part of the questionnaire consisted of six open-ended questions related to developing a research paper. (See Appendix B.)

The questionnaire data was used to explore (1) the issue of defining and measuring constructive thinking by examining differences between aggregate scores for critical and constructive thinking as well as correlations among the subsets associated with each, (2) the relationship between thinking stance, research paper and final grades, as well as portfolio ratings, and (3) the relationship between student demographics (gender, language, international status, high school grade point average, age) and the degree of critical and constructive thinking. Finally, (4) profiles that categorized students according to high and low degrees of critical and constructive thinking were compared to the themes that emerged from the qualitative analysis of the open-ended questionnaire

responses in order to confirm or disconfirm the relationship between constructive

thinking and performance. A further descriptive analysis examined the scores of high

critical and high constructive thinking students in conjunction with research paper and

final grades, as well as portfolio ratings. The overall question for this study was: Can

constructive thinking, as defined in this study, be captured in a theoretically-based

definition applied to specific teaching and learning practice in an undergraduate

university course focusing on writing a research paper? Specifically for Study One the

questions were: (1) Is constructive thinking distinguishable from critical thinking as

defined in this study? (2) Are there similarities/differences between both forms of

thinking? (3) Are there various levels of critical or constructive thinking? (4) How do

critical and constructive thinking, as defined in this study affect student performance as

reflected in research paper and final grades, as well as portfolios? (5) Are there

differences in critical and constructive thinking across student demographics (gender,

language, international status, age, and high school grade point average)? and (6) Can

constructive thinking be integrated along with critical thinking in the 099.111 writing

course? If so, how?

As shown in Table 3.1, these questions were addressed by analyzing data from

student questionnaires, from research papers and final grades, and from 099.111 student

writing portfolio ratings. Open-ended questionnaire responses were examined to identify

recurring themes.

Table 3.1
Constructive Thinking: From Theory to Practice
Methods Overview

Study 1: Exploring Constructive Thinking (First Year Students in a Writing Course)

Purpose and Questions	Data Sources	Independent Variables	Dependent Variables	Data Analysis
a) Constructive Thinking Defined				
Can constructive thinking, as defined in this study, be captured in a theoretically-based definition applied to specific teaching and learning practice in an undergraduate university course focusing on writing a research paper?	099.111 Students questionnaire close-ended items of constructive thinking scale.		constructive thinking versus critical thinking close-ended items on the questionnaire critical thinking subsets and totals versus constructive thinking subsets and totals	Pearson's Correlations with critical thinking and constructive thinking subsets and range of aggregate scores
How is constructive thinking related to critical thinking?	099.111 Students questionnaire open-ended items		open-ended themes in response to questions	Theme – qualitative analysis using grounded theory
Are there various levels of constructive thinking?	099.111 Students writing portfolio ratings (includes peer reviewed draft and the final graded copy of the research paper with instructor feedback. If possible, students' reflections of how they viewed their paper before it was graded.)			Theme – qualitative analysis – Development of a constructive/ critical thinking rubric
Difference in const. thinking across demographics?	099.111 Students constructive thinking scale (questionnaire)	constructive thinking and critical thinking subsets and totals gender, language, international status, age, high school grade point average		
b) Constructive Thinking Related to Student Learning Success				
	099.111 Students constructive thinking scale (questionnaire)	constructive thinking and critical thinking subsets and totals gender, language, international status, age, high school grade point average	paper grade, final grade	ANOVA with each independent variable on the dependent variable
	099.111 Students writing portfolios		099.111 instructor feedback, portfolio ratings	qualitative analysis based on grounded theory critical and constructive thinking rubric comparisons
	099.111 Students open-ended responses		open-ended themes in response to questions	qualitative analysis based on grounded theory

Study 2: Exploring Constructive Thinking (Course Instructors)

Purpose and Questions	Data Sources	Independent Variables	Dependent Variables	Data Analysis
a) Constructive Thinking Defined				
Can constructive thinking, as defined in this study, be captured in a theoretically-based definition applied to specific teaching and learning practice in an undergraduate university course focusing on writing a research paper? How is constructive thinking related to critical thinking? Are there various levels of constructive thinking?	099.111 Instructors questionnaire close-ended items of constructive thinking scale			Pearson product-moment correlations between subsets Matrix One way ANOVA
Difference in const. thinking across demographics?	099.111 Instructors questionnaire open-ended items		open-ended themes in response to questions	One Way ANOVA Themes-qualitative analysis. developed through use of grounded theory
b) How Instructors Use Constructive Thinking (University One Writing Course)				
	099.111 Instructor interviews		transcripts	themes – qualitative analysis class makeup of instructors/students

Study 3: Exploring Constructive Thinking (Professors in Other Disciplines)

Purpose and Questions	Data Sources			Data Analysis
a) How Professors Use Constructive Thinking Across Disciplines				
Can constructive thinking, as defined in this study, be captured in a theoretically-based definition applied to specific teaching and learning practice in selected disciplines?	Professors across disciplines interviews		transcripts	themes – qualitative analysis developed through the use of grounded theory

Participants

The 099.111 writing course at the University of Manitoba was specifically selected as the context for this exploratory study. This course was developed in 1992 to help retain undergraduates by improving their attitude towards learning and to promote a positive assimilation into academic life (Walker, LeBrun, MacClean, 1991). The course is based on well-established educational principles concerning good teaching and the role of encouragement and peer interaction (Bloom, 1956; Cross & Angelo, 1988; de Bono, 1971; Diamond, 1989; Eble, 1988; Fuszard, 1989; Gibbs, 1986; Johnson & Johnson, 1991; Light, 1990, 1992; McKeachie, 1986; Wales, Nardi & Stager, 1986; Weimer, 1987). The required course assignment is to develop a major research paper of approximately 2000 to 2500 words.

Instructors in the 099.111 course endeavor to create a community of learners. They strive to fulfill course objectives so that the students learn the importance of: discussion during the learning process, strategies for effective learning, elements of logical and critical thinking, library and computer research skills, and oral and written skills (Walker et al., 1991). When this course was first offered in the fall of 1992, there were only five sections available. Course popularity has developed over the years. Currently, approximately one third of first year students (i.e., 1500) enroll in 099.111 (Cameron, 2002).

A total of 165 undergraduate students, 86 females and 79 males, from the 099.111writing program took part in this first study. Among those 165 students, there were 63 whose first language was not English, 102 whose first language was English, and 126 national and 39 international students who responded to the questionnaire. There

were smaller numbers of participants who responded to the close-ended questions

regarding high school grade point average and age.

Age

The majority of participants ranged in age from 17 to 22, there being 53 students

who were in the age category of 17 to 18, 49 who fell into the category of 19 to 20, 29

students between the ages of 21 to 22, and 12 between the ages of 25 to 26. There were

very few students who were older than 26. Four students were between the ages of 27 and

30, four between the ages of 31 and 35, seven between the ages of 41 and 45, and two,

older than 45.

Grade Point Average

Thirty-five participants ranged in the grade point category from 81 to 85 %, there

being 25 students who were in the grade point category of 76 to 80%, 22 who fell into the

category of 71 to 75%, 22 between the category of 86 to 90%, and 18 between the

category of 66 to 70%. There were 2 students whose high school grade point average fell

within the range of 51 to 55 %, 5 whose averages were between 56 to 60% and 11

between 91 to 100%.

Classes

There were 27 to 35 students in each writing course. In addition, students from

each course section were invited to mail their writing portfolios to the researcher upon

completion of the course. Twenty-three out of 45 participants submitted their portfolios.

Measures

Data obtained from students in Study One included demographic information from the questionnaire, responses from both closed and open-ended questionnaire items, research paper as well as final course grades, and writing portfolio ratings.

Student Questionnaire

The student questionnaire (see Appendix A) was designed to assess student perceptions regarding the constructs of critical and constructive thinking and to identify key elements of critical and constructive thinking that students employ while writing a research paper. An important question was whether constructive thinking, as defined in this study, could be distinguished from critical thinking.

Both closed and open-ended items were created to assess critical and constructive thinking with five subsets under each category. The five critical thinking subsets, as indicated in the strands described in Chapter One were: problem/question at issue, assumptions, quality of supporting data/evidence, perspectives/ position and conclusions/implicating consequences. The five subsets for constructive thinking were: reflective process valuing experience, other ways of knowing, caring relationships, active process valuing experience and concepts benefiting society. Table 3.2 highlights the parallel subsets of both critical and constructive thinking. The close-ended questions gave students the opportunity to identify and rank their familiarity with elements of critical and constructive thinking using a five-point, Likert scale.

Table 3.2

Matching Subsets of Critical and Constructive Thinking

Critical Thinking	Constructive Thinking
*problem/question at issue	*reflective process valuing experience
*assumptions	*other ways of knowing
*perspectives/position	*caring relationships
*supporting data	*active process valuing experience
*consequences	*concepts benefiting society

Items in the questionnaire, were, however, integrated randomly as shown in the coding

key (Appendix B). The coding key also indicated which items were reversals (r). These

reversals were used to identify any fixed response patterns and ensured that students

actively read and responded to the questionnaire.

Critical Thinking Items

The critical thinking items were developed based on rubrics used by Paul (1992)

and Kelly-Riley, Brown, Condon & Law (2001) at their respective institutions to assess

the quality of student research papers. The subsets of critical thinking (i.e.,

problem/question at issue, assumptions, quality of supporting data/ evidence,

perspectives/ position and conclusions/implicating consequences) were developed from

these rubrics. An essential characteristic of a well-written research paper according to

these authors was the degree to which the argument was supported. To evaluate how

students formulated their arguments, the questionnaire (Appendix A) asked students to

indicate how they constructed opinions based on facts. In evaluating the understanding of

critical thinking, it was also important to know how students: drew on diverse

perspectives implicit in their literature review, examined the source of evidence,

persuaded their reading audience, explored an argument in depth, made reasonable

assumptions, and traced out a number of significant implications and consequences associated with their reasoning. Specific five point, Likert scale items were developed for each of the five subsets with scale anchors being used to help students rank each of the items (i.e. never = "1", seldom = "2", sometimes = "3", often = "4", and very often = "5"). Each of the critical thinking subsets is further elaborated upon in the next section.

Problem/Question at issue. Students were asked to rank on a five-point Likert scale whether or not they took the time to state the thesis of their research paper, tried to be clear about the question they were attempting to settle, broke the question into sub-questions, found solutions to the problem, and had unanswered questions about the topic.

Assumptions. When students were evaluated on how they made assumptions as they wrote their research papers, they were to indicate whether or not they took the information source as truth, made reasonable assumptions, judged background facts, considered the evidence supporting their argument, and addressed pros and cons as well as key assumptions underlying the issue.

Quality of supporting data/evidence. When students ranked items measuring the quality of supporting data/ evidence, they were asked to what extent they: repeated information provided in their research, questioned the evidence for accuracy, persuaded their audience that their stance on the issue was well-supported, focused on information relevant to the question at issue, distinguished between fact and opinion, accepted public information without question, and added information not contained in their research review.

Perspectives/Position. Students were also asked how they represented their perspective or position. They ranked the following items: to what extent they supported

their perspective from experience, tried to persuade their audience that their position was right, automatically dismissed positions different from their own, discussed other perspectives not emanating from their research, actively sought information contrary to their position, excluded their personal point of view on the issue, included academic research only, and addressed additional diverse perspectives drawn from outside information.

Conclusions/Implicating consequences. Students were asked on the questionnaire to what extent they: developed their conclusions or implicating consequences, realized where the issue could create further problems, drew all points of the argument together, used facts to assert their arguments, studied the implications of their research, wrote their personal opinion, discussed how their evidence supported their argument, focused only on what was found in the research, and explained the consequences of the issue.

Constructive Thinking Items

Given that constructive thinking had not been measured previously, a new scale was created to capture the concept. These questionnaire items (Appendix B) were designed to reflect aspects of the following definition of constructive thinking developed by Hewlett (2003) after a review of the literature as suggested in Chapter One, and parallel to the critical thinking questionnaire make up of five subsets. Constructive thinking was defined as: a reflective and active process that values experience, integrates different ways of knowing (reason, emotion, intuition and imagination), builds caring relationships with others, and constructs new ideas and concepts to benefit society. A five point Likert-type scale was used to further delineate each of the low inference behaviors

that define constructive thinking. Each aspect of constructive thinking was operationally

defined and grouped into the final categories as follows.

Reflective process valuing experience. The first subset of this operational

definition described constructive thinking as a reflective process valuing experience.

Experience was defined as an "actual observation of or practical acquaintance with facts

or events; knowledge or skill resulting from this; an event that affects one; fact or process

of being so affected" (Sykes, 1982, p. 339). When thinking is viewed as a reflective

process, experience is valued. Research based on Belenky et al. (1997), Cambourne

(2000), Palmer (1999), Piaget (1966), Schon, (1983), Thayer-Bacon, (2000), and

Vygotsky (1934/1962) reinforces how constructive thinking requires self-reflection, as

well as interaction with and an understanding of others. Experience is valued as a critical

aspect of constructive thinking because it encompasses understanding, insight and ways

of doing things differently.

Using five-point Likert items, students indicated how they reflected as they wrote

a research paper by indicating whether or not they: took time to plan their writing ideas in

class and outside of class, assessed the quality of what they had written as they

progressed through the writing process, deepened their understanding about the topic

from their readings, selected a topic that had a broad range of information, and either

chose a thesis that was well supported or created their own thesis that was personally

significant to them.

Integrating different ways of knowing. The second subset of constructive thinking

was the integration of different ways of knowing (reason, imagination, intuition, and

emotion). The questionnaire measured how students used these different ways of

knowing by having them rank the extent to which they developed voice and tone. These items that define different ways of knowing are based on Baxter-Magolda (1992), Belenky et al. (1997), Cambourne (2000), Harvey and Goudvis (2000), Palmer (1999), Schon (1983) and Thayer-Bacon (2000). Students were invited to reflect on whether they used these different ways of knowing as they wrote their research paper. For example, there were specific items that measured reason in the questionnaire. Using a five point Likert scale, students ranked how important it was for them to have used reasoning in formulating a clear argument. Imagination, intuition and emotion were also considered to be ways of knowing.

It is important to know whether students use their creativity and hypothesize "What if...?" or "Supposing that...?"as they write. The use of imagination was measured when students were asked to rank the following questionnaire item: To what extent did you make your approach to research creative.

Intuition has been defined as "immediate insight" (Sykes, 1982, p. 526). When students were asked to rank questionnaire items related to intuition, they indicated how important it was for them to have used their intuition (knowing the topic was right for them). Another item that operationalized the definition of intuition was: To what extent did you listen to your intuition?

Examples of questionnaire items that measured emotion in this study included to what extent students felt passionate or excited about their topic and whether or not the tone of their paper conveyed their feelings.

Building caring relationships. The third subset of constructive thinking measured the importance of building caring relationships with others. Thayer-Bacon (1992) defines

a caring attitude as one that gives value to another, by denoting that the other is worth attending to in a serious or close manner. Caring involves "immediacy, generosity, and acquaintance. An attitude of acceptance, trust, inclusion and openness is important in all caring relationships" (Thayer-Bacon, 1992, p. 325). Using a five point Likert scale, caring was operationalized in the questionnaire through ranking such items as to what extent students shared their research ideas with others, received feedback on their research paper from their instructor before turning it in for final grading, listened respectfully to other points of view, discussed their research thesis with their peers during class time, and had a peer review their research paper.

Active process valuing experience. This fourth subset of constructive thinking measured the active process of valuing experience when developing and writing a research paper. As they reflected on writing their research papers, students were asked to rank, on a five point Likert scale, the extent to which they had: learned something new, chosen a research topic that was meaningful to them, collected a variety of text references, supported their personal opinion, drew upon their personal experience, and negotiated the topic of their research. These items defined active thinking based on the work of Harvey and Goudvis (2000). Experience is defined as an "actual observation of or practical acquaintance with facts or events; knowledge or skill resulting from this; an event that affects one; fact or process of being so affected" (Sykes, 1982, p. 339). When thinking is viewed as an active process, experience is valued. Research based on Belenky et al.(1997), Cambourne (2000), Palmer, (1999), Piaget (1966), Schon, (1983), Thayer-Bacon, (2000), and Vygotsky (1934/1962) reinforces how constructive thinking requires self-reflection, interaction and understanding of others. Constructive thinking is a process

of reflecting and actively constructing from within. Experience is valued as a critical

aspect of constructive thinking because it brings understanding, insight and ways of

doing things differently.

Benefiting society. The final subset of constructive thinking was the creation of

new ideas and concepts that benefit society. These items were thought to best define this

strand based on these references (Cunningham & Fitzgerald, 1996; DeBono, 2000; John-

Steiner, 1997; Manzo, 1998). The questionnaire queried students about their motivation

for wanting to study and research a particular topic. The main question invited students to

use a five point Likert scale and rank to what extent they believed that their research had

helped others and created new ideas and concepts of benefit to society and if so how?

Open-ended Questions

The open-ended questionnaire items gave students time to respond and reflect on

what they knew about writing and the use of constructive thinking. While responding to

these open-ended questions, students were able to describe: their motivation for learning,

the process of writing in which they were engaged as they wrote, and the conditions that

helped them write well. Having students voice what was important to them about the

process of writing a research paper provided insight into their personal learning journeys.

Examples of the questions in the open-ended question section included: What do you

know about writing a research paper? What conditions help you to write your very best?

What do you hope to accomplish when you write a research paper? And what have you

learned from the research process? What do you think is the most important thing about

writing a research paper?

Research Paper and Final Course Grades

Each student in the 099.111 writing course was asked whether he or she would provide consent for the investigator to access both his/her research paper and final, overall grade. This data correlated with the quantitative data from the questionnaire to help answer the question of whether constructive thinking related to student success. The quantitative data was then compared to the student profiles. A matrix was developed to study the range of scores between the two forms of thinking to discern if students who had high scores in either form of thinking had a particular thinking stance.

Writing Portfolios

The researcher asked each course section for volunteers to submit their writing portfolios. The instructors from these course sections were not present in the room when the researcher had the students fill out the option for the questionnaire about submitting their portfolios. The researcher, with permission from the Ethics department, made an amendment to the protocol so that instructors would not be aware of who was participating in the study. The students who volunteered their writing portfolios sent their work to the researcher by mail in pre-addressed envelopes. Postage and duplication costs were paid by the researcher. These samples aided the researcher in monitoring growth and development and helped verify the use of constructive thinking. It was expected that the writing portfolios would include peer and/or instructor feedback on research paper drafts as well the final graded copy of the research paper. Portfolios could also contain self-evaluations of expected research paper grades. In gathering this data, the researcher hoped to note progress in the development of critical/constructive thinking from the peer-reviewed rough draft stage to the final paper.

Critical thinking. In addition to the investigator, three reviewers, who had Masters degrees in Business Management or Psychology, used critical and constructive thinking rubrics to rank the 23 portfolios submitted. The anchors or rating scale for both critical and constructive thinking ranged from scant to substantially developed. Scores thus covered from one to seven, *one* being considered scant, and *seven* substantially developed.

The Washington State University rubric for assessing elements of critical thinking (Appendix I) was used to evaluate the portfolios. This critical thinking rubric highlighted "identifying and summarizing problem/question at issue" as an important dimension of critical thinking. A student received *one* point (scant) for problem/question if, for example, the research paper did not "identify and summarize the problem, was confused or identified a different and inappropriate problem". For *substantially developed* in the area of problem/question, the research paper had to specify the "main problem and subsidiary, embedded, or implicit aspects of the problem, identify them clearly, and address their relationships to each other." Another area of critical thinking that was highlighted by the Washington State University Writing Project rubric was students' own and other salient perspectives. A research paper that appropriately identified, "one's own position on the issue, drawing support from experience, and information not available from assigned sources" was considered to have a ranking of *substantially developed.*

Assumptions was another subset of critical thinking identified by the Washington State University scoring rubric. If a research paper did "not surface the assumptions and ethical issues [underlying] the issue," the paper received a *scant* ranking. If the research paper identified and questioned "the validity of the assumptions" and addressed "the

ethical dimensions [underlying] the issue," the paper was given a *substantially developed* ranking.

The quality of supporting evidence was another area the Washington State University identified as a subset of critical thinking. If a research paper "merely [repeated] information provided, taking it as truth, or [denied] evidence without adequate justification, [and] confused associations and correlations with causes and effect," the research paper received a ranking of *scant*. For the quality of supporting evidence to be *substantially developed*, the research paper had to "examine the evidence and source of evidence; [and] question its accuracy, precision, relevance and completeness."

The last subset of critical thinking based on the Washington State University writing rubric was entitled conclusions/implications/ and consequences. If a research paper was ranked as *scant*, it "failed to identify conclusions, implications and consequences of the issue or the key relationships between other elements of the problem, such as context, implications, assumptions, or data and evidence. If the research paper, identified and discussed "conclusions, implications and consequences considering context, assumptions, data, and evidence," it was considered *substantially developed*.

Constructive thinking. The investigator developed the rubric for evaluating constructive thinking in the portfolios (Appendix J). The first dimension of constructive thinking corresponding with problem/question at issue was reflective process valuing experience. A *scant* ranking for reflective process valuing experience fit the descriptor shows the ability "to solve the problem using one approach." To rate a ranking of *substantially developed*, the research paper had to identify optimal solutions to the problem.

The second area of constructive thinking was caring relationships. The critical thinking subset parallel to caring relationships was perspectives/position. To rank *scant* in caring relationships, the research paper "did not have prior feedback from peers or professor to improve the content of the paper". To receive a ranking of *substantially developed*, the research paper included "feedback from peers," and persuaded the reader to take action related to the issue."

The third dimension of constructive thinking, other ways of knowing, corresponded with assumptions under critical thinking. For a *scant* score in other ways of knowing, a research paper's tone was cited as "cold, impersonal, the writer's voice does not reach the reader." For a *substantially developed* research paper in other ways of knowing, the research paper had to "convey a warm, engaging tone, be persuasive, interesting to read and creative."

The fourth dimension of constructive thinking was active process valuing experience. It paired with the quality of supporting data/evidence of critical thinking. To receive a *scant* or *substantially developed* ranking, the paper had to mirror the reflective process, valuing experience. The same anchors were used. The descriptor for *scant* in active process valuing experience was "able to solve the problem using one approach," while the descriptor for substantially developed was "identifies optimal solutions to problems."

The fifth dimension highlighted in constructive thinking was concepts benefiting society. Concepts benefiting society related to conclusions, implications and the consequences of critical thinking. A research paper receiving a *scant* rating in this area,

only "focused on what has already been found to be proven." For a substantially

developed ranking, the paper had to "identify ideas and concepts that benefit society."

An outline of the matching subsets of critical and constructive thinking was

created to compare and contrast both forms of thinking in Table 3.3. From each form of

thinking, a subset was given a pairing or counterpart in order to compare and contrast.

Table 3.3

Matching Subset Pairings of Critical and Constructive Thinking

Critical Thinking		*Constructive Thinking*
*problem/question at issue	←——————→	*reflective process valuing experience
*assumptions	←——————→	*other ways of knowing
*perspectives/position	←——————→	*caring relationships
*supporting data	←——————→	*active process valuing experience
*consequences	←——————→	*concepts benefiting society

Summary

Student measures used in this study included: (a) a questionnaire containing

demographic information (number of credit hours, language, international status, gender,

age, high school grade point average, and expected course grade) plus both closed- and

open-ended items related to critical and constructive thinking, (b) research paper and

final, overall grades, and (c) portfolio ratings.

Procedure

Once the undergraduate students from the 099.111 course had signed their ethics

consent forms, they were asked to fill out the questionnaire during the fourth or fifth

week of a thirteen week course. The questionnaire took 30 minutes of 099.111 class.

Students' writing portfolios were sent by mail to the instructor. These writing portfolios

consisted of a peer reviewed rough draft, peer and/or instructor feedback on writing

drafts, and the final research paper. Please refer to Figure 3.1, for a flow chart indicating the time line for Study One, Study Two, and Study Three.

Data Analyses

The data collected from Study One was analyzed both quantitatively and qualitatively.

Quantitative Analyses

First, the questionnaire responses were examined to establish differences between the range of aggregate scores for critical and constructive thinking levels. A set of Pearson product-moment (Howell, 1987; Moore, 2000) correlations were also conducted comparing each subset of critical thinking with every other subset of constructive thinking to determine which aspects of constructive thinking went beyond critical thinking. The analyses of these dependent variables highlighted differences between critical and constructive thinking. The relationship between thinking stance and research paper and final grades was also analyzed. One-way ANOVAs were also conducted for both forms of thinking with each of the following independent variables: gender, language, international status, age, and high school grade point average. The dependent variables were student responses on each of the five subscales for both critical and constructive thinking as well as the total critical and constructive thinking scores.

Qualitative Analyses

The open-ended responses from student questionnaires and the analysis of writing portfolio data were analyzed qualitatively. Grounded Theory was used to analyze the data. One method of coding that is associated with Grounded Theory is known as constant comparison analysis (Padgett, 1998). As themes were discovered from initial

coding, the researcher went back over the data to ensure that the coding was suitable. As

the researcher reviewed the data, new themes emerged and new codes developed

(Padgett, 1998). The scores of high critical and high constructive thinking students were

then examined to explore the question of whether constructive thinking enhanced student

engagement and writing quality.

Figure 3.1: *Time Line of Procedure*

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                            ┌──────────────────────┐
                            │   Letter of Consent   │
                            └──────────┬───────────┘
            ┌──────────────────────────┼──────────────────────────┐
    ┌───────────────┐          ┌───────────────┐          ┌────────────────────┐
    │ 099.111 Students │        │    099.111     │        │  Professors from   │
    └───────┬────────┘          │  Instructors   │        │ other disciplines  │
    ┌───────────────┐          └───────┬────────┘          └─────────┬──────────┘
    │ Questionnaire │           ┌───────────────┐          ┌────────────────────┐
    └───────┬───────┘           │ Questionnaire │          │     Interviews     │
            │                   └───────┬───────┘          └─────────┬──────────┘
    ┌───────────────┐                   │                            │
    │ Collection of │           ┌───────────────┐                    │
    │  students' writing │      │  Interviews   │                    │
    │   portfolios  │           └───────┬───────┘                    │
    │     and       │                   │                            │
    │  final grades │           ┌───────────────┐          ┌────────────────────┐
    └───────────────┘           │ Member Checks │          │   Member Checks    │
                                └───────────────┘          └────────────────────┘
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February

March
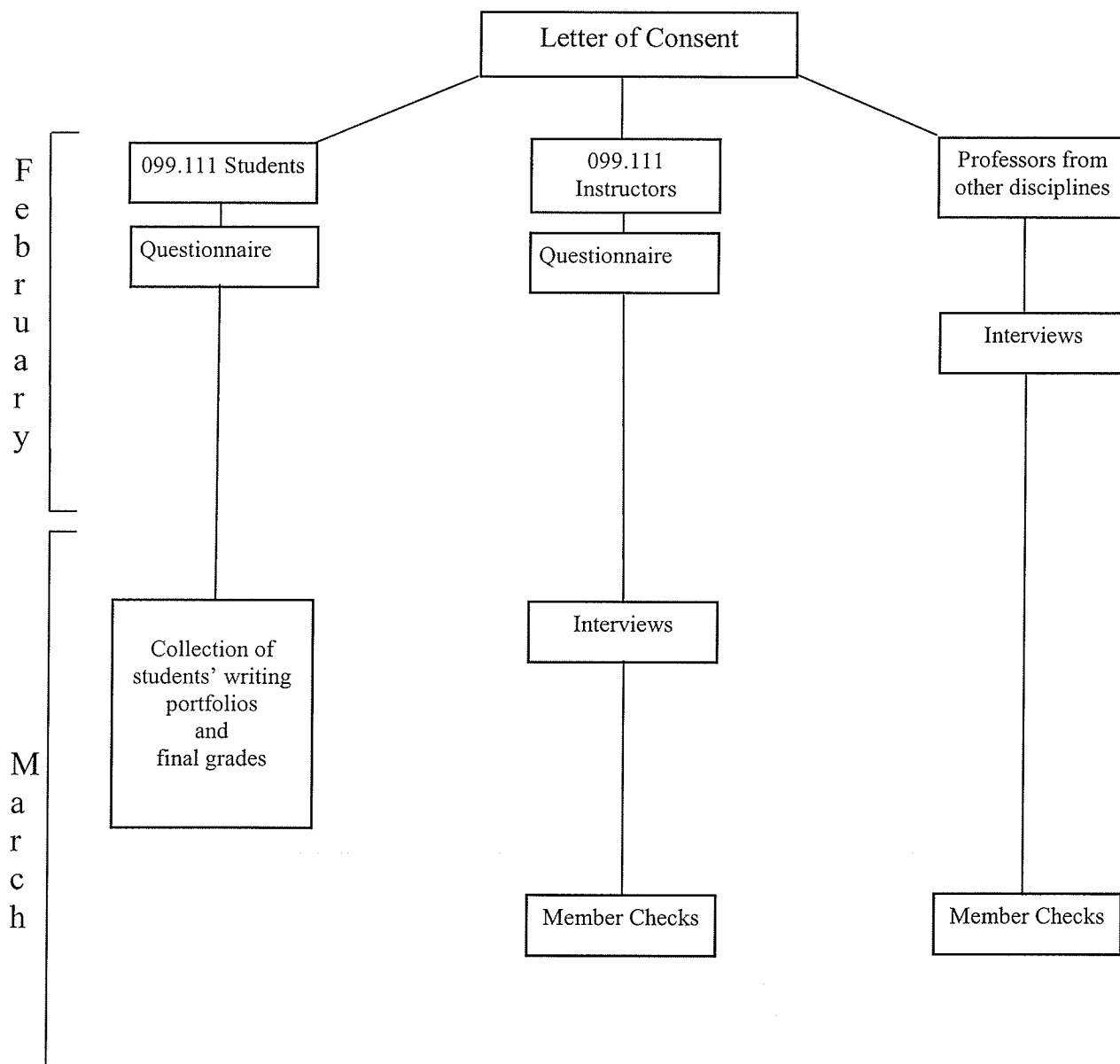
Anticipated Results

The goal of the student questionnaire that made up the main part of Study One was to discover whether students perceived a difference between critical and constructive thinking in relation to developing a research paper. Further, data analyses that compared thinking stance to research paper and final grades indicated the degree to which constructive thinking related to the quality of students' work. The relationship between gender, language, international status, age and high school grade point average was also explored. Further details from the open-ended responses at the end of the questionnaire also helped to determine how students viewed the development of writing a research paper. Finally, the writing portfolios and the feedback received from peers and instructors provided additional evidence to confirm or disconfirm the role played by constructive thinking in enhancing learning.

Study Two: Exploring Constructive Thinking (Course Instructors)

Purpose & Design Rationale

The purpose of this phase of the study was to investigate the primary stance taken by instructors in the 099.111writing course and to determine whether critical or constructive thinking was emphasized during the writing of research papers. The rationale behind this research design was to compare and contrast critical thinking with constructive thinking and explore how constructive thinking can be translated from theory to practice in post-secondary classrooms.

A questionnaire was developed containing items that gathered information on such demographics as instructor gender, number of years taught, as well as items that measured either critical or constructive thinking for the purpose of determining the primary instructional stance (either critical or constructive thinking) assumed by each instructor. This data was examined and compared with the student questionnaire data from each course section to determine whether or not there were differences between students and instructors in terms of their perception of constructive thinking. This information supported the finding of whether or not there were similarities and differences between critical and constructive thinking. As indicated in Table 3.1 these questions addressed how constructive thinking compared to critical thinking, whether constructive thinking was independent of critical thinking, and whether there were various levels of constructive thinking.

Participants

The setting for this study was carefully chosen. The underlying premise and objectives in the 099.111 course regarding the role of instructors was that they make a conscious effort to (a) influence the attitudes of students, (b) enhance student self-image as competent learners, (c) stress the importance of student planning and goal-setting, (d) become student mentors and (e) help all class members function as a support group (Walker et al., 1991).

The 099.111 instructors meet on a monthly basis during the academic year to talk about course content and assessment. They often share mini-workshops at these meetings to become familiar with new instructional techniques. Eight out of ten instructors agreed to participate in the study.

Measures

Instructor Questionnaire

An instructor questionnaire was used to determine what aspects of critical

thinking and constructive thinking were being implemented by each instructor. (See

Appendix C.) The instructor questionnaire paralleled the close-ended items asked in the

student questionnaires in terms of operationalizing critical and constructive thinking as

concepts, and followed the same organizational pattern. The instructor questionnaire also

contained the same subsets of critical and constructive thinking as the student

questionnaire. For critical thinking, subsets included: problem/question at issue,

assumptions, quality of supporting data/evidence, perspectives/position and

conclusions/implicating consequences. Constructive thinking subsets included: reflective

process valuing experience, other ways of knowing, building caring relationships, active

process valuing experience and concepts benefiting society. Items in the instructor

questionnaire were similarly randomized for administration. The coding key for the

reversals in the instructor questionnaire was also comparable. (See Appendix D.)

Development of close-ended items for critical thinking. The critical thinking items

for instructors were the same as those for students, except that the stems were different

(Appendix C). Instructors were asked to what extent they encouraged students to use the

following subsets of critical thinking (problem/question at issue, assumptions, quality of

supporting data/ evidence, perspectives/ position and conclusions/ implicating

consequences). Specific Likert items were developed for each of the five subsets and are

indicated below. Scale anchors were used to help instructors to rank each item (ie.,

"never = 1", "seldom = 2", "sometimes = 3", "often = 4", and "very often = 5").

Open-ended questions. The open-ended questionnaire items gave instructors time to respond and reflect on what they knew about writing and the use of constructive thinking. While responding to these open-ended questions, instructors were able to describe: their motivation for teaching, the process of writing in which they were engaged as they taught, the type of relationship they wish to have with their students, and their goals in teaching the 099.111 course.

The instructor questionnaire was designed to identify the key elements associated with critical and constructive thinking that instructors use as they teach students how to write. An important goal in creating this instrument was to establish whether instructors assume either a more critical or constructive thinking stance as they teach. The sub-questions of interest included: When instructors emphasize a particular stance do students mirror what they have been taught, or do students exhibit varying degrees of critical or constructive thinking based on their own individual backgrounds?

This research hoped to illustrate how elements of critical thinking and constructive thinking are captured in the process of instruction. The question for study was: Is constructive thinking independent of critical thinking? While the questionnaire was constructed to make definite distinctions between the two forms of thinking, there may also be bridges where the two forms of thinking come together. If there was a definite difference between these two forms of thinking, this instrument attempted to show what elements in teaching students how to write relate more to either a critical or constructive thinking stance. If constructive thinking levels were captured and traced to student success, findings would suggest how informative writing instruction can be improved.

Instructor Interviews

The instructor interviews provided descriptive data to substantiate the findings from the quantitative analysis of data obtained from the questionnaires. The instructor interview questions, as seen in Appendix E, indicated how writing is taught, what instructors believe is important in writing instruction, how they think writing instruction should occur, and the emphasis they place on assuming either a constructive or critical thinking stance. This data served as the medium for hearing instructor voices and the beliefs they hold about best practice in the teaching of writing. Because this research was exploratory, this data could be used as a platform for themes that could be either developed in future research or incorporated to help understand elements of constructive and critical thinking

Summary

Instructor measures included data obtained from (a) the administration of instructor questionnaires, and (b) instructor interviews.

Procedure

As seen in Figure 3.1, the researcher collected consent letters to administer the questionnaire.

Instructor Questionnaire

The instructors were also asked to complete a 30-minute questionnaire during class time while the students were completing their questionnaires. These questionnaires were administered in the second week of February, approximately half-way through the university course.

Instructor Interviews

Instructors were interviewed at the mid-point of the course. After the eight instructors signed the letter of consent (Appendix F), the researcher created a mutually agreeable schedule to conduct individual interviews of 30 to 45 minutes in duration. These interviews were audio-taped so that the transcripts could be used as data. Notes were also taken during and directly following the interview to ensure accuracy and authenticity. Once the transcriptions were completed, member-checking (Guba & Lincoln, 1985) occurred so that the participants were able to review what they had said during the interview and make revisions if necessary.

Writing Portfolios

The instructors did not know who was submitting a writing portfolio to the researcher. Within the portfolios were copies of students' final research papers with grade, peer reviews of the research papers, and instructor feedback. The instructor feedback helped the researcher understand how the final research paper was graded and what the instructor emphasized as important in order to achieve a high mark.

Data Analyses

The close-ended responses to the instructor questionnaires were analyzed by tallying and graphing instructor responses in order to determine trends as to whether the instructors assumed primarily a critical thinking stance or went beyond emphasizing critical thinking to assume a constructive thinking stance. The interview transcripts were analyzed qualitatively using Grounded Theory (Padgett, 1998) to seek answers to the question of whether or not and how the theory of constructive thinking could be put into practice in the context of the 099.111 writing course. Data from these interviews served

as a check and balance to data collected from 099.111 student questionnaires and helped triangulate findings.

Anticipated Results

The instructor questionnaire data showed both the dominant stance assumed by the instructor, whether his or her instructional approach emphasized primarily critical or primarily constructive thinking. This quantitative data also indicated various levels of critical and constructive thinking that were occurring when instructors informed students about conducting research and how to write a research paper. Instructor interview data triangulated these findings by showing the relationship between student and instructor stance, the educational philosophy held by each instructor, and how these beliefs were manifested in practice.

Study Three: Exploring Constructive Thinking (Professors in Other Disciplines)

Purpose & Design Rationale

Studies One and Two were conducted using post-secondary students in an undergraduate class that focused on developing a research paper. Teaching students how to write, as a process (Flower & Hayes, 1994), lends itself to constructive thinking. This part of the overall study extended Studies One and Two by interviewing professors from other disciplines. These professors were interviewed to find out whether or not they incorporated constructive thinking into their instruction as operationally defined. The purpose of Study Three was to compare and contrast critical thinking with constructive thinking and explore how constructive thinking can be translated from theory to practice

in other post-secondary classrooms in which the major focus is on teaching content. The

two main questions for Study Three relate to Table 3.1: How are professors using

constructive thinking within their courses? and How is constructive thinking best taught?

Challenges and concerns regarding the integration of constructive thinking into

instructional practice at the post-secondary level were also explored in the interviews.

Participants

Ten professors from other disciplines on the University of Manitoba campus, who

previously enrolled in a University Teaching Services (UTS) workshop on *Transforming*

Critical Thinking To Constructive Thinking, were also invited to participate. These

disciplines included Anthropology, Architecture (specifically City Planning), Dental

Hygiene, Engineering, Management, Nursing, Philosophy, and Soil Science.

Measures

Interviews

Once the professors had signed the letter of consent (Appendix F), the researcher

created a mutually agreeable schedule to conduct individual interviews of 30 to 45

minutes in duration. These interviews were audio-taped so that the transcripts could be

used as data. (See Appendix E.)

Procedure

Once the professors had signed the letter of consent, the researcher created a

mutually agreeable schedule to conduct individual interviews of 30 to 45 minutes in

duration. These interviews (Appendix E) were audio-taped and transcribed and took place

between the months of March to May. Notes were also taken during and directly

following each interview to ensure accuracy and authenticity. Once the transcriptions

were completed, member-checking (Guba & Lincoln, 1985) occurred so that the

participants were able to review what they had said during the interview and suggest

revisions if necessary The researcher also collected course syllabi from each of the

professors. Please refer again to Figure 3.1 for a flowchart of this procedure.

Data Analyses

The responses of the professors from the other disciplines were analyzed

qualitatively. Repeated searches through the transcript data using grounded theory

(Padgett, 1998) were carried out to identify concerns associated with assuming a

constructive thinking stance to instruction at the post-secondary level.

Anticipated Results

The qualitative data collected from the professors revealed whether or not

constructive thinking had practical application across disciplines in which the focus is

more on content then on the writing process. The intent of the interview questions was to

discover why professors from other disciplines did or did not believe constructive

thinking was important. The overriding question was: In what ways, can constructive

thinking be integrated into instructional practice?

Summary

This overall study consisted of three studies. For each study, there was a specific

purpose and set of research questions. Table 3.1 was developed to provide a summary of

the questions related to the multifaceted purposes of this research and the data sources. In

addition to the overall question restated from Chapter One: Can constructive thinking, as

defined in this study, be captured in a theoretically-based definition and applied to

specific teaching and learning practice in an undergraduate university course focusing on

writing a research paper? and in other courses in selected disciplines? There were also sub-questions. Is constructive thinking distinguishable from critical thinking as defined in this study? Are there similarities/differences between both forms of thinking? Are there various levels of critical and constructive thinking? How do critical and constructive thinking, as defined in this study affect student performance as reflected in research paper and final grades, as well as portfolios? Are there differences in critical and constructive thinking across student demographics (gender, language, international status, age, and high school grade point average)? and Can constructive thinking be integrated along with critical thinking in the 099.111 writing course? If so, how? This study also explored the following related questions:

a)   Do undergraduate students perceive a difference between critical and constructive thinking based on open-ended responses?

b)   How does thinking stance relate to student grades?

c)   Do student perceptions of critical and constructive thinking correspond with those of their respective instructors?

d)   Is constructive thinking independent of critical thinking as captured in the process of instruction?

e)   Can instruction in informative writing be improved by fostering constructive thinking?

f) How are professors, who had previously participated in a University Teaching Services (UTS) workshop entitled *Transforming Critical Thinking to Constructive Thinking*, using constructive thinking within their courses?

h) How do the professors view critical and constructive thinking?

i) What did they identify as the challenges and concerns they faced while integrating constructive thinking into instructional practice? and

j) Were there any different philosophies regarding constructive thinking according to Faculty or instructional level (undergraduate/graduate)?

The implications of these anticipated results may: (1) help students to extend their learning beyond critical thinking; (2) assist instructors in teaching students through new instructional approaches that embrace constructive thinking, and (3) guide future researchers in refining the assessment of critical and constructive thinking.

CHAPTER IV

Data Analysis

This exploratory study investigated how the theory of constructive thinking could enhance critical thinking using university students and instructors in a first year research paper writing course and professors from other selected disciplines as participants. The purpose of the research was to explore the concept of critical and constructive thinking in order to discover how constructive thinking relates to and extends critical thinking and to identify challenges and concerns associated with integrating constructive thinking in post-secondary classrooms. To this end, the study investigated both quantitative and qualitative indicators of constructive thinking, examined the role of constructive thinking in relation to student success as well as demographics, and described the implementation of constructive thinking in post-secondary classrooms. This chapter presents the data analysis from each phase of the study.

Study One: Exploring Constructive Thinking (First Year Students in a Writing Course)

Data Analysis

Study One explored constructive thinking as a construct in an attempt to capture its essence through a series of close- and open-ended questionnaire items. As defined in this study, constructive thinking was compared to critical thinking by having first year students enrolled in an undergraduate writing course (099.111) develop a research paper as their major assignment. It was hypothesized that when students used constructive thinking as they wrote their papers, the following would occur: (1) They would take more time to develop their ideas; (2) Their end product would reflect a deepened understanding

of the topic based on opportunities to discuss ideas with others; and (3) Both the clarity

and content of their work would be enhanced, since they had more time to reflect, revise

and edit both their thinking and their writing. The questionnaire consisted of 112 close-

ended items; 12 specific to demographics, 50 that measured critical thinking and 50 that

measured constructive thinking. To triangulate questionnaire findings, all research paper

and final writing course grades, as well as the writing portfolio ratings of 23 students

were used in the analysis.

Questionnaire Analysis

A total of 175 participants responded to the questionnaire. Ten students left more

than ten questions unanswered. As a result, these respondents were dropped from the

study, leaving 86 females and 79 males.

Among the remaining 165 participants, there were 119 students who completed

the total questionnaire and 46 students who left from one to nine close-ended items

unanswered. To capture a profile of these students, a separate scoring system was

developed. For instance, if a student had completed eight of the ten items in a subset, the

sum score was divided by the number of responses completed (i.e., 8). These scores were

then averaged for each subset of critical and constructive thinking to establish the

participant's overall stance. A t-test analysis was then applied to determine whether there

were any significant differences between the two groups, those who had responded to the

complete questionnaire and those who had not. As shown in Table 4.1, only one critical

thinking subset-problem demonstrated a significant difference. Students who had

completed between 90-98 % of the questions had a higher score than those who

completed all of the subset items. Given that only one subset item out of ten

demonstrated significant differences, questionnaire data were pooled bringing the number of questions analyzed to 165, with the caveat that results on this one particular subset would be carefully scrutinized keeping this difference in mind. It was found subsequently, that one student omitted his/her student number. The final number of participants was thus 164. The overall research question was: Can constructive thinking as defined in this study be captured in a theoretically-based definition applied to specific teaching and learning practice in (1) an undergraduate university course focusing on writing a research paper, and (2) other selected disciplines? Responding to this question was left in abeyance until all of the related questions were addressed.

Overall Relationship Between Critical and Constructive Thinking

The first supplementary question was: *Is constructive thinking distinguishable from critical thinking as defined in this study?* Having resolved the issue of incomplete data sets, comparisons between critical and constructive thinking were conducted. The issue was whether or not critical and constructive thinking could be captured by a series of questionnaire items and whether critical and constructive thinking were independent of one another. First, the close-ended item scores representing each critical and constructive thinking subset on the questionnaire were tallied and then the total scores calculated, the range of scores for critical thinking being 125 to 205.44, and for constructive thinking, 106 to 199. Two-tailed Pearson product-moment correlations conducted on the total scores for each construct indicated statistically significant overall differences ($R = .456$, $p = .0001$) between critical and constructive thinking, suggesting that in aggregate terms, constructive thinking was distinguishable from critical thinking. A further analysis to locate the source of the differences was then conducted.

Table 4.1

Profile of Complete and Incomplete Student Questionnaire Data Sets

Group Statistics	Complete Incomplete	N	Mean	Std. Deviation	T	p Sig. (2-tailed)
Critical Thinking-Problem	Complete Incomplete	119 46	33.78 36.17	3.21 3.78	-4.060	0.000
Critical Thinking-Assumptions	Complete Incomplete	119 46	36.58 36.32	3.98 4.08	0.380	0.704
Critical Thinking- Quality of Supporting Evidence	Complete Incomplete	119 46	31.29 32.27	3.32 3.59	-1.659	0.099
Critical Thinking-Perspectives	Complete Incomplete	119 46	31.89 30.95	3.41 4.03	1.517	0.131
Critical Thinking-Conclusions, Consequences	Complete Incomplete	119 46	27.91 27.79	2.89 4.19	0.216	0.830
Constructive Thinking-Valuing Experience	Complete Incomplete	119 46	33.50 32.93	3.40 3.13	0.980	0.328
Constructive Thinking-Reflective	Complete Incomplete	119 46	35.60 35.31	4.45 4.88	0.363	0.717
Constructive Thinking-Different Ways of Knowing	Complete Incomplete	119 46	32.97 33.31	4.00 4.37	-0.475	0.636
Constructive Thinking-Caring	Complete Incomplete	119 46	32.45 33.17	6.73 6.81	-0.614	0.540
Constructive Thinking-Benefiting Society	Complete Incomplete	119 46	25.36 25.17	4.90 5.01	0.217	0.829
Critical Thinking Total	Complete Incomplete	119 46	161.48 163.49	10.65 14.69	-0.974	0.332
Constructive Thinking Total	Complete Incomplete	119 46	159.89 159.91	15.42 17.38	-0.006	0.995
Constructive Thinking Versus Critical Thinking	Complete Incomplete	119 46	-1.58 -3.58	14.53 15.94	0.769	0.443

Note: df = 1, 163

Relationships among the Subsets

The next question to be addressed was: *Are there similarities and differences*

between critical and constructive thinking? As seen in Table 4.2, when each critical and

constructive thinking subset was compared with every other subset using Pearson

product-moment correlations, findings demonstrated statistically significant relationships

between three of the five critical/constructive thinking subset pairings: problem/question

at issue and reflective process valuing experience; assumptions and other ways of

knowing; as well as supporting data and active process valuing experience.

Table 4. 2

Summary of Critical and Constructive Thinking Subset Correlations

Critical Thinking	Constructive Thinking	Correlation Co-Efficient	Significance
Problem/question at issue	Reflective process valuing experience	$R = .346$	$p = .0001**$
Assumptions	Other ways of knowing	$R = .301$	$p = .000**$
Supporting data	Active process valuing experience	$R = .200$	$p = .01*$
Perspectives/position	Caring relationships	$R = .123$	$p = .115$ (ns)
Consequences/ conclusions	Concepts benefiting society	$R = .077$	$p = .324$ (ns)

As indicated in Table 4.3, no statistically significant relationships were found between

two of the critical/constructive thinking pairings: perspectives/position and caring

relationships; as well as consequences/conclusions and concepts benefiting society,

suggesting possible subset independence. These results, therefore, indicate that

constructive thinking are related on three out of the five identified subset pairings and

that two, of the five subset pairings were independent of one other.

Table 4.3

Subset Correlations

Student		Critical Thinking-Problem Total Score (1)	Critical Thinking-Assumptions Total Score (2)	Critical Thinking-Quality of Supporting Evidence Total Score (3)	Critical Thinking-Perspectives Total Score (4)	Critical Thinking-Conclusions Total Score (5)	Constructive Thinking Valuing Experience Total Score (6)	Constructive Thinking-Reflective Total Score (7)	Constructive Thinking-Ways of Knowing Total Score (8)	Constructive Thinking-Caring Total Score (9)	Constructive Thinking-Benefit Society Total Score (10)	Critical Thinking Total	Constructive Thinking Total
Critical Thinking-Problem Total Score (1)	Pearson Correlation												
Critical Thinking-Assumptions Total Score (2)	Pearson Correlation	.378**											
Critical Thinking-Quality of Supporting Evidence Total Score (3)	Pearson Correlation	.248**	.377**										
Critical Thinking-Perspectives Total Score (4)	Pearson Correlation	.087	.143	.279**									
Critical Thinking-Conclusions Total Score (5)	Pearson Correlation	.419**	.447**	.351**	.326**								
Constructive Thinking-Valuing Experience Total Score (6)	Pearson Correlation	.176*	.218**	.200*	.362**	.410**							
Constructive Thinking-Reflective Total Score (7)	Pearson Correlation	.346**	.350**	.233**	.077	.417**	.286**						
Constructive Thinking-Ways of Knowing Total Score (8)	Pearson Correlation	.221**	.301**	.359**	.217**	.371**	.393**	.515**					
Constructive Thinking-Caring Total Score (9)	Pearson Correlation	.170*	.182*	.120	.123	.191*	.231**	.437**	.479**				
Constructive Thinking-Benefit Society Total Score (10)	Pearson Correlation	.088	-.007	.079	.164*	.077	.183*	.108	.168*	.233**			
Critical Thinking Total	Pearson Correlation	.638**	.724**	.669**	.549**	.752**	.406**	.426**	.439**	.237**	.118		
Constructive Thinking Total	Pearson Correlation	.292**	.298**	.276**	.257**	.405**	.546**	.697**	.741**	.792**	.520**	.456**	
Constructive Thinking vs. Critical Thinking	Pearson Correlation	(-.197*)	(-.259**)	(-.239**)	(-.164*)	(-.167*)	.259**	.404**	.442**	.657**	.462**	(-.310**)	.704**
Mean	Female (86)	34.58	36.71	31.85	31.40	27.79	33.33	36.40	33.71	33.84	25.89	162.33	163.19
	Male (79)	34.31	36.3	31.25	31.88	27.97	33.36	34.56	32.36	31.35	24.66	161.73	156.32
	Total (165)	34.45	36.51	31.56	31.63	27.88	33.34	35.52	33.06	32.65	25.30	162.04	159.90
Standard Deviation	Female (86)	3.67	4.06	3.45	3.93	3.34	2.89	4.38	3.97	6.31	4.33	12.62	13.90
	Male (79)	3.39	3.94	3.37	3.23	3.26	3.76	4.58	4.15	6.99	5.44	11.07	17.28
	Total (165)	3.53	3.99	3.41	3.61	3.29	3.33	4.56	4.10	6.74	4.92	11.9	15.94

Note: $\underline{N} = 165$

$* p < .05.$ $** p < .01.$

Qualitative Analysis of Students' Thinking Stance

The question was: *Are there different levels of critical and constructive thinking?* To find the answer to this question through a qualitative analysis of student questionnaire data, a matrix was developed to establish the range of scores distinguishing critical from constructive thinking. These high/low critical and high/low constructive thinking categories were used: (1) to compare thinking stance as well as to identify emerging themes, and (2) to examine total critical and constructive thinking scores for each course section.

There were only four participants out of the 164 who had equal questionnaire scores on both types of thinking. The critical and constructive thinking total scores of the remaining 160 respondents were divided into degrees of high to low for each course section based on the range of difference score (ds) where ds = total critical thinking score – total constructive thinking score. Student scores based on the matrix where plotted on to a line graph to represent high and low scores for each class or course section. (See Appendix G.) The resultant matrix for each course section showed that low scores clustered within a range from 1 to 12, and the remaining scores, designated as high, ranged from 13 to 46. This cut off pattern was used to classify students as being high/low critical thinkers or high/low constructive thinkers.

As shown in Table 4.4, in total, there were 92 students who were categorized as assuming a high or low critical thinking stance and 68 who exhibited a high or low constructive thinking position. There were 42 students who had high critical thinking scores and 50 with low scores. Twenty four had high constructive thinking scores, while 44 had low constructive thinking scores. Thus, based on student questionnaire data and

the matrix dividing high/low critical and high/low constructive thinking scores, there

were more high critical thinkers than high constructive thinkers.

These profiles of high and low critical and constructive thinking students were

also used (1) in the thematic analysis comparing the responses of each group to the open-

ended questionnaire items, and (2) held in reserve to be used later to compare the

thinking stance of students and instructors in Study Two.

Table 4.4

Profile of High and Low Critical and Constructive Thinking Scores

High Critical Thinking Scores (above 13) 42	Low Critical Thinking Scores (below 13) 50	Total $N = 92$
High Constructive Thinking Scores (above 13) 24	Low Constructive Thinking Scores (below 13) 44	$N = 68$

Distinguishing between High/Low Critical and High/Low Constructive Thinking:

Open-Ended Responses

To further distinguish similarities and differences between critical and

constructive thinking, the open-ended questionnaire responses were examined. The

subset question was: *Do undergraduate students perceive a difference between critical*

and constructive thinking as shown in their open-ended questionnaire responses? To

triangulate findings, the open-ended responses from the student questionnaire

representing each of the four critical/constructive thinking cohorts of high and low were

reviewed and analyzed according to emerging themes using Grounded Theory (Padgett,

1998). Although 137 out of the 165 student participants completed the open-ended

responses, 25 did not complete all five open-ended questions. These responses were still

included in the analysis, however. Several themes emerged from the analyses of these responses.

Themes

The number of identified themes varied for each question: five themes emerged from question one regarding previous knowledge about how to write a research paper; twenty-one themes emerged from question two in which students stated what they had learned in the course; twenty-two themes were identified in question three concerning what was the most important thing about writing a research paper and six themes emerged for best conditions for writing. Twenty-eight themes were identified for future interests and fourteen emerged regarding what students hoped to accomplish when writing a research paper. Each theme was given a number and coded beside the student number to develop a profile for reference. (See Appendix H for a table summarizing the themes that emerged.)

Comparison Between Overall Thinking Stance and Open-Ended Responses

Once all of the open-ended responses were analyzed for recurring themes, comparisons were made between students categorized in the matrix as high/low critical thinking and high/low constructive thinking scores to discover if their open-ended responses regarding writing a research paper would correspond with their overall thinking stance.

Findings

There did not seem to be any differences in the open-ended responses of students with high critical and high constructive thinking scores. Students who had high critical and high constructive thinking scores did not differ on the themes that emerged from the

open-ended responses. Responses seemed very similar (Appendix G) as described in the following discussion of each of the five issues addressed.

Previous background. The majority of students in both groups had very little background in writing a research paper. There were 23 students with high critical and 13 students with high constructive thinking scores who had *very little* or *not much* background in writing research papers. The remaining respondents had some research paper writing experience. There was only one student with a high critical thinking score who reported having had previous experience writing a research paper.

Knowledge gained. The themes that emerged regarding knowledge gained included: the use of APA for citing references, how to organize ideas, and view writing as a process. When asked what they had learned about writing a research paper, both high critical (8 of the 42 in this group) and high constructive thinking respondents (7 out of the 24 in this group) believed that they had learned how to cite references using APA style. Learning how to cite references represented the top-ranking theme for both groups. The second most common theme that emerged was learning how to organize ideas into an academic format with five high critical thinking and three high constructive thinking students noting that they had learned how to organize their writing into a research paper format.

The third ranking theme that arose from responses to knowledge gained was the process involved in writing a research paper. There were three participants from both groups of high critical and high constructive thinking students who viewed the writing process as new to them. There were a variety of other responses regarding what was

learned about writing a research paper, including issues involving how to: manage time, gather information, identify different styles of writing, and construct a thesis.

There were, nonetheless, some differences in themes that emerged from the two groups. One or two participants from each group cited a theme that the other group had not. Students with high critical thinking scores indicated the following themes regarding what they had learned. They either requested more direction or had developed their knowledge base regarding how to carry out research on the Internet or now realized the importance of their research papers. The students with high constructive thinking scores mentioned that they had learned a lot and had expanded their previous knowledge about writing.

Importance of writing a research paper. The themes that emerged from the analysis of high critical and high constructive thinking open-ended responses regarding interested in the topic, building an argument, incorporating current information and attending to organization. Both groups viewed having an interest in the topic as very important, with five students with high critical and high constructive thinking scores listing this theme. This was not the top ranking theme for students with high critical thinking scores, however. Six high critical thinking participants cited building a solid argument as the most important theme, whereas only one high constructive thinking participant focused on this idea.

The third ranking themes for this question for students with high critical thinking scores were: incorporating current information, and organizing information into a proper academic format. Four of the high critical thinking participants identified each of these

themes as important, whereas only 2 of the 24 high constructive thinking participants noted the relevance of information being current.

There were other differences between these groups following these top ranking themes. One or two students with high critical thinking mentioned it was important to have the right type of references, produce quality work, obtain a high mark, and compose a paper that mattered. One or two participants who had high constructive thinking scores cited that they thought it was important to: learn more, understand the writing process itself, and develop an understanding of the research topic. One or two participants from each of the high critical and high constructive thinking groups indicated the importance of staying focused, learning the process of writing a research paper, writing in their own words, developing a clear thesis statement, editing drafts, using correct grammar, getting their points across to the audience, and having someone review their paper for feedback.

Accomplishment in writing a research paper. The top ranking theme that emerged when participants were asked what they hoped to accomplish when writing a research paper was to achieve a high mark (15 from the high critical thinking and 9 from the high constructive thinking group). Following this theme, the next form of achievement cited by both groups, five from each, was to learn something new.

One accomplishment that was ranked higher by students with high critical thinking scores was to be able to persuade the reader (six with high critical thinking scores compared to three participants with high constructive thinking scores). Five out of the 42 students with high critical thinking scores also suggested they wanted to improve upon their writing skills, whereas the students with high constructive thinking scores did not touch on this issue. One or two students with high critical thinking scores indicated

that they hoped to educate others and finish the research paper. Students with high constructive thinking scores, on the other hand, specified that they wanted to construct a good thesis and conduct thorough research.

Best conditions for writing. The fourth question asked students what kind of conditions they needed to write well. It was hoped that there would be varied responses that signaled the underlying motivation for writing a research paper. This question did not provide any information regarding motivation, however. Findings that emerged from repeated searches through the responses of the 137 students who replied to the open-ended questions, indicated that 65 respondents specified the need for a quiet place without any distractions, a good night's sleep and "plenty of" time to write. Fifteen students indicated that they had to have an interest in the topic, while 30 believed writing an outline or creating webs from brainstorming ideas proved helpful. Since the analysis did not separate responses by thinking group, these themes were not profiled in the table. They were, however, identified in Appendix H.

Future interests. There were, nevertheless, differences between the future interests of students with high critical and high constructive thinking scores, with high critical thinkers citing the following top-ranking future interests: Faculty of Management ($N = 15$), Faculty of Education ($N = 5$), Human Ecology ($N = 2$). Interestingly, a pattern emerged. High critical thinking students, who indicated that being accepted into the Faculty of Management was their ambition, indicated wanting to achieve a high mark in response to question four regarding what they wanted to accomplish in writing a research paper.

Students with high constructive thinking scores, however, had more varied responses to future interests and their interests were more general. The top ranking themes mentioned by other participants were: helping people, Faculty of Management and not sure. Following these top ranking themes, there were no similarities.

Summary of findings . While the matrix patterns based on close-ended questionnaire items responses suggested that more students had high critical thinking scores than high constructive thinking scores suggesting different levels of thinking, findings from the open-ended responses revealed that there were no differences between the high critical and high constructive thinking groups. For both types of thinking, students had relatively similar backgrounds in terms of knowing how to write a research paper before attending the course, identified similar areas of knowledge gained, listed similar conditions conducive to writing, and addressed similar goals for writing a research paper. There were slight differences in responses regarding what was important in writing a research paper, and future interests. Altogether, nonetheless, the thematic analysis seemed to show more similarities than differences between student thinking stances. Unlike the statistical analysis, findings from the qualitative analysis of critical and constructive thinking seemed inconclusive.

Relationship between Critical/Constructive Thinking and Student Performance

The question was: *How does critical and constructive thinking, as defined in this study, affect student performance as reflected in research paper and final grades as well as portfolio ratings?* Both a quantitative and a qualitative analysis were carried out to determine if a thinking stance affected student performance as reflected in research paper and final grades. When the portfolio ratings were examined, however, only a qualitative

analysis was used as found in the section "Portfolio Ratings" following the quantitative analysis of research paper and final grades.

Quantitative Analysis of Research Paper and Final Grades

To determine whether critical or constructive thinking was connected to student performance on research paper and final grades, students were classified as either low, medium, or high critical thinkers or low, medium, or high constructive thinkers based on close-ended questionnaire scores. [Please note that this categorization of students into low, medium and high for statistical analysis was different from the high/low critical and constructive thinking categories established for the qualitative pattern analysis.]

A one way ANOVA was used to compare how critical thinking scores affected final course grades, with low ($N = 54$; $M = 64.53$; $SD = 12.04$) versus high ($N = 56$; $M = 72.38$; $SD = 11.01$) critical thinkers and low ($N = 56$; $M = 68.04$; $SD = 13.28$) versus high ($N = 53$; $M = 70.49$; $SD = 11.85$) constructive thinkers. Findings indicated that students who had higher scores on critical thinking (those in the top third) also performed better on final grades ($F (1, 108) = 12.73, p. < .001$ ($MSE = 132.97$) than students whose questionnaire responses placed them were in the highest third of the constructive thinking range.

A one-way ANOVA was used to compare how critical thinking scores affected research paper grades. First, the research paper grades of low versus high critical thinkers were compared (low $N = 51$; $M = 13.42$; $SD = 2.26$) versus high ($N = 58$; $M = 14.51$; $SD = 3.37$) second the low versus high constructive thinkers (low $N = 53$; $M = 14.33$; $SD = 2.48$) versus high ($N = 53$; $M = 14.31$; $SD = 2.47$). Findings indicated that students who

had higher scores on critical thinking (those in the top third) performed better on research papers (F (1, 107) = 3.83, $p.$ <.053 (MSE = 8.47).

Qualitative Analysis of Research Paper and Final Grades

Research paper and final grades in relation to critical and constructive thinking as designated by perusal of the matrix were examined further through a descriptive analysis using the scores of high-ranking students in each category.

Research Paper Grades

Based on the matrix results, of the 42 students with high critical thinking scores, 38 provided details regarding research paper grades. When these grades were averaged, the mean was 14.9 out of 20 (*range*: 8 to 19.3). In contrast, there were 24 students with high constructive thinking scores, with 21 of the 24 providing information about research paper grades. The average score for constructive thinking students was 13.6 out of 20 (*Range*: 10.20 – 16.80).

Final Grades

When final grades were averaged for students in the critical thinking group, the average for 37 out of 42 students was 74 percent (*Range*: 57.7 to 93.7%). When the final grades for the high constructive thinking group were averaged, using 22 out of 24 students, the average was lower than that for students with high critical thinking scores (66 %). As indicated in Appendix G, there were two students who did not include their final grades but had submitted their research paper grades. There were, however, three students with high constructive thinking scores that failed the course. The range of final grades for the constructive thinking group was 41.5 to 86.14 percent. Students with high critical thinking scores thus performed better in terms of their research paper and final

grades than students with high constructive thinking scores. This finding substantiates the

findings from conducting the one way ANOVA that students who had higher scores on

critical thinking (those in the top third) performed better on both research paper and final

grades than students whose questionnaire responses placed them were in the highest third

of the constructive thinking category.

Summary of findings. There were differences between the critical and constructive

thinking groups based on performance on research paper and final grades. These

differences were substantiated by statistical findings. Students with high critical thinking

scores performed significantly better then students with high constructive thinking scores

on both research paper and final grades.

Portfolio Ratings

A qualitative analysis to help resolve the issue of the relationship between critical

and constructive thinking was carried out by assessing student portfolios using a rubric as

a scoring guide. Of the 64 students who replied to the invitation and consented to submit

their portfolios, 23 were sent to the investigator. The number of portfolios received from

each course section is depicted in Table 4.5. Twenty-three students volunteered their

portfolios and mailed them to the researcher in pre-stamped envelopes. Table 4.5

indicates how many portfolios students submitted according to each course section.

Portfolios included a copy of the student's research paper with instructor feedback

and grade, peer reviews, and other relevant information such as personal reflections and

research proposals or outlines. Twenty-two of the twenty-three portfolios included

instructor feedback, with one student not including instructor feedback in his/her

portfolio. One student included a personal reflection about what she learned from writing

a research paper. Table 4.5, shows that the portfolio return rate for course section number

one, for example, was seven, even though 18 out of the 20 students in the course agreed

to submit their portfolios. Similarly, in section two, of the 19 students who filled out the

questionnaire, four consented to submitting their portfolios but only two were mailed to

the investigator. The instructor did not know which students submitted portfolios.

Table 4.5

Portfolio Return Rate By Course Section

Course Section	1	2	3	4	5	6	7	8	9
Number of Portfolios Sent By Mail To Researcher	7	2	3	1	1	4	2	2	1
Number of Students who Consented to Submit Portfolios	18	4	8	4	6	11	10	2	1
Number of Students who Had Been Part of the Questionnaire Analysis	20	19	14	20	15	22	21	10	23

The portfolios were reviewed and scored by three independent reviewers who had

their Masters Degrees in either Business Management or Psychology. One of these

independent reviewers had previously taught or was currently teaching the 099.111

course in writing, although not a section with students who participated in the study. One

of the reviewers had had specific training on writing and critical thinking in her Masters

program. The rubric for assessing critical thinking was designed by the Washington State

University (Kelly-Riley et al., 2001) with five subsets for writing a research paper:

problem/ question as issue, assumptions, quality of supporting data/evidence,

perspectives/position and conclusions/implicating consequences. (See Appendix I).

The researcher developed a constructive thinking scoring rubric for rating the portfolios (Appendix J), with five subsets commensurate with the critical thinking rubric that reinforced the definition of constructive thinking. These subsets were: reflective process valuing experience, other ways of knowing, building caring relationships, active process valuing experience, and concepts benefiting society. A scoring key for the writing portfolios was given to each of the independent reviewers to total the critical and constructive thinking subsets. (See Appendix K.)

Shaugnessy and Zechmeister (1990) recommend the use of percentages to measure reliability on qualitative studies when categories are mutually exclusive. Accordingly, the inter-rater reliability among the three portfolio evaluators who met briefly with the investigator to review the rating rubrics before beginning their scoring was measured using the following formula: $\frac{\text{Number of time two observers agree}}{\text{Number of opportunities to agree}}$ X 100.

Table 4.6 shows the percentage of agreement between portfolio raters.

Table 4.6

Inter-Rater Reliability Among Portfolio Evaluators

Investigator	Compared To Rater 1	Compared To Rater 2		Compared To Rater 3	
Critical Thinking	Constructive Thinking	Critical Thinking	Constructive Thinking	Critical Thinking	Constructive Thinking
17 %	4.3%	8.6 %	4.3%	8.6%	0%

A perusal of Table 4.6 indicates that there was little agreement when rubric scores between the investigator and the three reviewers were compared. The ratings were also compared to critical and constructive total scores on the close-ended questionnaire items to determine whether or not there was a relationship. However, due to the lack of consistency between the ratings of the investigator and the independent reviewers, it was

difficult to match rubric scorings with scores on close-ended responses from the questionnaire.

Comparisons between thinking stance (close-ended questionnaire items),and research paper and final grades based on portfolio submissions. Of the 23 portfolios received, twelve students completed the close-ended section of the questionnaire. Of these twelve respondents, four had higher scores on constructive compared to critical thinking. Two students had equal critical and constructive thinking scores, while the remaining six participants had higher critical thinking scores (Appendix L).

After reviewing the critical and constructive stance of the 12 participants who submitted their portfolios and completed the questionnaire, both research papers and final grades were compared. Five students with higher degrees of critical thinking on the questionnaire and on the research paper rubric received high grades on their research paper with grades that ranged from 14.6 to 17.5 out of 20. Their final course grades ranged from 63.6 to 93 percent.

Four participants who scored higher on constructive thinking had research paper grades that ranged from 12.6 to 16.4. Their final grades ranged from 65 to75.8 percent. There were two participants who had equal scores on critical and constructive thinking on the close-ended questionnaire items. Their research paper grades ranged from 11 to 13.4 out of 20. Their final grades fell between 60 and 76.9 percent. Thus, critical thinking seemed to be more valued than constructive thinking as shown by such performance indicators as research paper and final grades. The lack of inter-rater reliability regarding portfolio ratings made these findings inconclusive.

Comparisons between thinking stance and open-ended questionnaire responses based on portfolio submissions. Of the 23 portfolios received, three students completed the open-ended responses. Their open-ended responses were coded, numbered, and charted with the student number to reveal an overall profile of the student. From the three respondents who answered the open ended responses, there were no definitive differences that occurred between the qualitative and quantitative data. Of the three respondents, there was only one student who received a higher score on critical thinking than on constructive thinking. Based on the demographic questionnaire information, this participant was identified as being male. His profile indicated that he had a strong background in writing research papers. He hoped to learn how to cite references APA style and organize information into a specific format. He wanted to be able to write an academic paper and achieve a high mark.

There were two respondents who scored higher on constructive compared to critical thinking on the close-ended items. They had also completed the open-ended responses, their responses varying according to previous experience in writing a research paper. One had very little experience, while the other reported an extensive background. The process of learning how to write a paper while being able to expand on their previous knowledge and learn something new was viewed as something they hoped to learn while in the course. When asked what they hoped to accomplish by writing a research paper, they wanted to write in an academic, organized manner so that they could persuade the reader, learn something new and achieve a high mark. There seemed to be too few students among those who submitted portfolios who also responded to the open-ended questionnaire items to draw any conclusions from this data.

Differences in Thinking Stance Across Demographics

The question to be addressed was: *Are there differences in critical and constructive thinking across demographics (Gender, Language, International Status, Age, and High School Grade Point Average)?* This next statistical analysis examined the relationship among critical and constructive thinking stance and such demographics as gender, language, international status, age, or high school grade point average, using a one-way ANOVA for each independent variable.

Gender

A one-way ANOVA demonstrated that there were significant differences related to gender and constructive thinking (F (1,163) = 7.99, p > 0.005 (MSE = 243.7). Females (N = 86; M = 163.16; SD = 13.90) tended to have high constructive thinking scores compared to males (N =79; M = 156.32; SD = 17.28). A closer look at the constructive thinking subsets revealed a tendency for females to rate these subsets higher: reflective process valuing experience (F (1,163) = 6.956, p > 0.009 (MSE = 20.105), integrating different ways of knowing (F (1,163) = 4.513, p > 0.035 (MSE = 16.497), and building caring relationships (F (1,163) = 5.758, p > 0.018 (MSE = 44.210). There were no other statistically significant relationships related to gender when gender was compared to critical thinking (F (1,163) = 7.570, p > 0.007 (MSE = 214.004).

Language

Critical thinking. A one-way ANOVA demonstrated that students whose first language was not English had higher scores on the critical thinking subset of quality of supporting evidence (N = 63; M = 30.97; SD = 3.41) compared to students whose first

language was English (N =102; M = 32.52; SD = 3.22), F (1, 163) = 8.4, $p < 0.004$

(MSE= 11.18). These results suggest that one aspect of critical thinking, the quality of

supporting evidence, stood out in importance for students whose first language was not

English.

Constructive thinking. A series of one-way ANOVAs demonstrated that students

whose first language was not English, compared to native speakers of English, had higher

scores on three of the five subsets of constructive thinking: different ways of knowing (F

(1, 163) = 6.07, $p < 0.015$ (MSE = 16.34), building caring relationships (F (1, 163) =

12.56, $p < 0.001$ (MSE = 42.496,), and concepts benefiting society (F (1, 163) = 4.96, $p <$

0.027 (MSE = 23.66). An examination of mean scores indicated that students whose first

language was not English had higher scores than native speakers of English on: different

ways of knowing (N =63; M = 34.05; SD = 3.68) compared to (N =102; M = 32.45; SD =

4.24), caring relationships (N =63; M = 34.94; SD =5.53) compared to (N =102; M =

31.24; SD = 7.05) and concepts benefiting society (N =63; M = 26.38; SD = 4.67)

compared to (N =102; M = 24.64; SD = 4.97) for native speakers of English.

International Status

A series of one-way ANOVAs demonstrated that national students had

significantly higher scores on two subsets of critical thinking than international students:

problem/question at issue and conclusions/implicating consequences: problem/question at

issue (F (1, 159) = 5.59, $p < 0.019$ (MSE = 12.377) and conclusions/consequences (F (1,

159) = 5.028, $p < 0.026$ (MSE = 10.685). The descriptive statistics for national students

for problem/question at issue were (N = 126; M = 33.25, SD = 3.14) and for international

students, (N = 39; M = 34.78; SD = 3.62), while the descriptive statistics for

conclusions/consequences were respectively ($N = 126$, $M = 28.24$, $SD = 3.36$ and $N = 39$, $M = 26.90$, $SD = 2.94$). These results suggest that compared to international students, national students believed that both problem/question at issue and conclusions/ consequences were prominent elements associated with critical thinking. There were no statistical differences found when constructive thinking subsets for national and international students were compared.

Age

A statistical analysis of age and critical/constructive thinking was not carried out due to small numbers in particular age ranges. The majority of participants ranged in age from 17 to 22, there being 53 students who were in the age category of 17 to 18, 49 who fell into the category of 19 to 20, 29 students between the ages of 21 to 22, and 12 between the ages of 25 to 26. There were very few students who were older than 26. Four students were between the ages of 27 and 30, four between the ages of 31 and 35, seven between the ages of 41 and 45, and two, older than 45.

High School Grade Point Average

Similarly, a statistical analysis of high school grade point average and critical/constructive thinking was not carried out due to small numbers in grade point average ranges. Thirty-five participants ranged in the grade point category from 81 to 85 %, there being 25 students who were in the grade point category of 76 to 80%, 22 who fell into the category of 71 to 75%, 22 between the category of 86 to 90%, and 18 between the category of 66 to 70%. There were 2 students whose high school grade point average fell within the range of 51 to 55 %, 5 whose averages were between 56 to 60% and 11 between 91 to 100%.

Summary of Findings (Study One)

The findings from Study One focused on the overall relationship between critical and constructive thinking, stance, distinguishing between high/low critical and high/low constructive thinking, the relationship between critical/constructive thinking and student performance, and differences in thinking stance across demographics. Based on the findings from the quantitative and qualitative data in Study One, it was found that constructive thinking was related to critical thinking on three out of five of the subset pairings: (1) problem/question at issue and reflective process valuing experience; (2) assumptions and other ways of knowing; as well as (3) supporting data and active process valuing experience. There were, however, two subset pairings that showed that constructive thinking was independent of critical thinking: perspectives/position and caring relationships as well as consequences/conclusions and concepts benefiting society. While the patterns revealed in the high/low critical and high/low constructive thinking matrix showed that more students had high critical than high constructive thinking stances based on close-ended questionnaire responses, the analysis of open-ended questionnaire data did not support this finding. Students seemed to have relatively similar previous experience in writing research papers, made similar knowledge gains, listed similar conditions that facilitated writing, and addressed similar writing goals. In terms of high/low levels of critical and constructive thinking, then, findings seemed inconclusive.

When the scores from the close-ended items were compared to the open-ended responses, both critical and constructive thinking students tended to learn and value the same outcomes and had similar goals regarding writing research papers. There seemed to be little distinction between the critical and constructive thinking groups based on the

open- ended questionnaire responses. Portfolio ratings were also not connected to critical and constructive thinking questionnaire scores.

Performance differences between students with high critical and high constructive thinking based on research paper and final grades indicated that students with high critical thinking scores performed higher in terms of both research paper and final grades than students with high constructive thinking scores. Thus, critical thinking was more connected to student success than constructive thinking. This finding was substantiated by the descriptive analysis that triangulated findings.

When a one way analysis of variance was conducted to determine if gender, language, and international status played a role in the thinking stance adopted by students, specific critical and constructive thinking subsets became apparent. Females tended to have higher constructive thinking scores than males on three of the five subsets: reflective process valuing experience, integrating different ways of knowing and building caring relationships.

Language also seemed to affect thinking stance scores. Students whose first language was not English compared to English speakers had higher scores on the critical thinking subset, quality of supporting evidence. Students whose first language was not English also scored higher on three of the five constructive thinking subsets: different ways of knowing, building caring relationships, and concepts benefiting society. When the questionnaire data for international students were compared to that of English speakers, English speaking students had significantly higher scores on two of the five critical thinking subsets: problem/question at issue and consequences/conclusions.

One question that was not directly answered in Study One was *Can constructive thinking be integrated along with critical thinking in the 099.111 writing course? If so, how?* Based on the findings, there appears to be a possibility that critical and constructive thinking could partner in developing student writing ability. The emphasis of instruction in the 099.111 classrooms, however, is on how to develop critical thinking skills related to research writing. The quantitative and qualitative analysis revealed that high critical thinking scores was related to better student performance based on research paper and final grades. The question remains, however, is constructive thinking a worthwhile endeavor to nurture? To determine if constructive thinking can be integrated along with critical thinking in the 099.111 writing course, an in-depth look into the classroom was required in Study Two.

Study Two: Exploring Constructive Thinking (Course Instructors)

Data Analysis

Study Two focused on collecting data from 099.111 instructors to explore the implementation of critical and constructive thinking during instruction on how to write a research paper at the post-secondary level. A questionnaire containing items to capture similarities and differences between critical and constructive thinking was administered before the interviews were conducted (Appendix C). Instructor questionnaire responses were then rated and compared with student questionnaire data for each course section, the purpose being to establish whether there were differences between student and instructor perceptions regarding critical and constructive thinking.

Questionnaire Analysis

The instructor questionnaire paralleled the close-ended items asked in the student questionnaires in terms of operationalizing critical and constructive thinking as concepts, and followed the same organizational pattern with the same subsets of critical and constructive thinking. The overall question of interest was: Can constructive thinking, as defined in this study, be captured in a theoretically-based definition applied to specific teaching and learning practice in an undergraduate university course focusing on writing a research paper? and in other courses in selected disciplines? There were also sub-questions. Is constructive thinking distinguishable from critical thinking as defined in this study? Are there similarities/ differences between both forms of thinking? Are there various levels of critical and constructive thinking? Can constructive thinking be integrated along with critical thinking in the 099.111 writing course. If so, how? Do student perceptions of critical and constructive thinking correspond with those of their respective instructors? Is constructive thinking independent of critical thinking as captured in the process of instruction? Can instruction in informative writing be improved by fostering constructive thinking? Before instructors were asked any questions pertaining to the definition of constructive thinking, it was important to understand what values and beliefs these instructors held regarding writing instruction, noting similarities and differences between teaching methodologies.

Values and Beliefs Regarding Writing Instruction

Analysis Open-Ended Responses

The open-ended section of the questionnaire invited eight instructors to respond to four main questions: Why they taught writing? What they thought was the most

important thing about writing a research paper? How they developed student writing, and what factors or conditions helped them teach writing? To analyze the data from these short open-ended questions, instructor responses were charted and compared to one another. Once the table (Appendix M) was completed with all responses entered, the researcher noted similarities and differences between teaching approaches. They are highlighted next.

Why these instructors teach writing. All of the eight instructors indicated that they were passionate about teaching writing. They wanted their students to be able to use this medium to communicate effectively to an academic audience.

What instructors believe is important in writing instruction. When these eight instructors were asked on the questionnaire what they believed was important in writing instruction, there were four different answers. Responses ranged from how instructors valued: (1) the process of writing a research paper, (2) the thoughtful evaluation of an idea, (3) the formation of an argument, and (4) the use of appropriate sources. These themes are analyzed in more depth next, using pseudonyms to refer to the instructors.

Three participants (George, Laura and Ricky) out of the eight participants believed that teaching students how to write a research paper was very important, especially at the first year level, because it helped students understand what was essential by having the writing stages modeled for them. Their students learn how to research a topic of their choice, plan and organize their ideas and then sit down to create, revise and edit their drafts.

Three participants (Cameron, Caterina and Robert) were more concerned about the thoughtful evaluation and analysis of a particular idea along with the ability to present

that analysis to others by means of their paper. Their students were expected to develop a thesis, examine a body of evidence, advance the reader's knowledge base, and state, precisely, their own perspective on the issue. In the view of these three instructors, the medium of writing requires a unique skill that enables the author to express to an audience his or her specific thoughts, feelings and emotions on a topic.

One participant (Larry) believed that the most important aspect of writing a research paper was the formation of an argument. He thought students should learn how to analyze an issue critically, develop strong argumentation, and become disciplined in their writing. One participant (Mark) hoped that his instruction would transfer and help students with any university writing task. He wanted his students to learn how to locate research sources that could be used in the formulation of ideas and, in consultation, use these ideas in a well-written paper.

How writing is developed. When these instructors were asked on the open-ended portion of the questionnaire how writing should be developed, there was general agreement with one dissenting voice. One group favored a process approach, while one participant had his students develop long answers from textbook assignments or supplementary materials, plus review and learn from samples of previously developed research papers. "Larry" who had six years of teaching experience developed assignments based on the textbook or supplementary reading materials such as *Becoming A Successful Student* (Walker & Schonwetter, 2002). He would encourage his students to develop answers ranging from two sentences to a long paragraph, and to review sample pages of previously developed research papers.

Seven of the eight participants (Caterina, Laura, Cameron, Mark, Robert, George and Ricky), whose teaching experience ranged from being a beginning teacher to having taught for 28 years, indicated that instruction in writing a research paper should be a process consisting of several stages including developing: a research proposal, topic, research questions, a main idea, a thesis statement, and a paper outline. All instructors expected students to learn how to gather initial sources and document them according to the style advocated by the American Psychological Association (A.P.A). All of the 099.111 instructors reported having students attend hands-on library workshops to learn how to use Bison and NetDoc (the University of Manitoba Search Engines) to retrieve academic documents. These instructors also believed it was very important to model the writing process at each stage. Often students required practice in developing a thesis, examining a body of evidence, advancing their knowledge base and thinking "outside-the-box". One of the instructors from this group of seven provided a weekly two-hour writing workshop in addition to regular class time. The workshop was designed to provide international students with extra practice in editing their work and formulating solutions for mistakes.

All eight instructors indicated how important it was for their students to receive feedback, either from themselves or from peers, before they submitted their final papers for grading. Consequently, when students had completed their drafts, the instructors urged students to conference with a peer, or with someone from the University Learning Assistance Center.

Summary of findings. On the basis of this descriptive analysis, there appeared to be a major consensus regarding how to instruct the writing of a research paper. Seven

instructors broke the writing assignment into separate steps that included choosing a

topic, conducting research, planning, organizing and creating, and then revising and

editing successive drafts in a recursive pattern. One instructor, who differed from the rest

of the instructors, preferred to scaffold student writing, beginning with short responses

and graduating to the writing of longer pieces. Three instructors emphasized the

importance of developing a thesis and being able to express specific thoughts, feelings,

and emotions to an audience.

The instructor interview data, analyzed next, provided further insight into the

critical/constructive thinking stances of the instructors. This information was then

compared first to the instructor's close-ended item questionnaire responses, and second to

the close-ended item questionnaire responses of his or her students, as well as writing

portfolio information.

Differences and Similarities Between Critical and Constructive Thinking Stance

Instructor Views: Constructive and Critical Thinking Stance

The questions were: *Is constructive thinking distinguishable from critical thinking*

as defined in this study? Are there similarities or differences between the critical and

constructive thinking stance of the instructors in this study? In personal 30-45 minute

interviews, eight instructors were invited to react to an operational definition of

constructive thinking as questioned. It is important to note that instructors had not been

formally introduced to the concept of constructive thinking previous to this interview,

and that all instructors emphasized critical thinking as part of 099.111 course content by

focusing on Bloom's Taxonomy. Although all of these instructors taught the 099.111

course, they also taught other courses in other faculties across campus. Instructor case

studies in which interview data is summarized and compared to critical and constructive

thinking tallies on the questionnaire are presented first.

Cameron

One participant, Cameron from Theology, in his first year of teaching the 099.111

course, found the constructive thinking definition congruent with his teaching style. He

suggested that critical thinking was "only one form of interacting with the world, being

appropriate for a logic class but not necessarily appropriate everywhere else." He

reported that he attempted to "measure his words in such a way that he accesses his

students' hearts and not just their heads." He wanted his students to realize that "thinking

is not separated from how they deal with people, by how they approach life; that all is

integrated." He stated that he tried to show his students that they matter. "Who they are

matters to me, not just where they are intellectually." He strove to affirm whatever

contribution students brought to class. When asked if he felt constructive thinking could

be measured, he believed that it could not be quantified but could be measured

qualitatively by observing relationships and examining different ways of representing

knowledge, such as art. He had several books that he recommended as references for

other ways of knowing. Cameron's interview data closely corresponded with his score on

the close-ended items on the questionnaire. His constructive thinking score was the

highest of the participants, 208 out of a possible 250. His critical thinking score, on the

other hand, was the second highest of the participants at 202 out of 250.

The responses of three of the eight instructor participants, Caterina, George and

Ricky, whose teaching experience ranged from 4 to 34 years were similar. They believed

that the constructive thinking definition had merit but needed to be tempered with critical

thinking. Caterina, George and Ricky were interested in implementing constructive thinking but were concerned about meeting the needs of their international students. These students were struggling with critical thinking and were rushing to complete assignments, feeling constrained by the three credit hour class format. One of these three instructors, in his first year of teaching the 099.111 course, indicated that he felt constructive thinking could only be used if the students had a strong technical background in their field of study.

Caterina

Caterina, from the History department in the Faculty of Arts, who had taught for 28 years, spoke about the importance of valuing student background and experience. She did not feel that her students were blank slates. She used what they knew about writing and "tried to connect their knowledge to new concepts, scaffolding their learning." She believed that there were other ways of knowing, although she acknowledged that "Reason is often reinforced in the university setting through critical thinking." She explained that imagination is an area she constantly tries to get her students to think about. She connected intuition to the Irish word *Faye*, which was to her "like a gut feeling." She felt intuition was a significant factor and should be "listened to." She hoped that her students would get excited about what they were learning and believed that emotions help students to persevere and write in a warm, engaging tone. If students write with this kind of tone, she believed they were able to reach their audience. "If a paper is written in a cold and an objective way, the reader often does not want to continue reading." Her constructive thinking score on the close-ended items was the second highest in this group at 199 out of 250. Her critical thinking score was, nevertheless,

higher than her constructive thinking score. She scored 203 out of 250. Her critical

thinking score was the highest of all of the participants.

George

George, from the Faculty of Agriculture, who has taught for 34 years, believed

that critical thinking can be limited in that "it reinforces only one form of knowing." To

him, constructive thinking enables students to "examine an issue on an emotional level,

why they should or should not do something." He used an example of choosing a life

mate, contending that finding the right person required an examination of how you feel

about the person. He also stressed how important it was to integrate these different forms

of knowing into the learning process because critical thinking can be too linear. He

especially liked the part about caring relationships. As a parent, he always tried to instill

this value in his children, and he hoped that when we teach students they learn how to

extend themselves to others. "The caring part needs to be shared with young people so

that they know we care about them, to take caring and put it into practice so that they

learn they are not above others." His responses on the close-ended items reinforced his

qualitative view, his constructive and critical thinking scores were almost the same. For

constructive thinking, he scored 148 out of 250 and for critical thinking his score was 147

out of 250.

Ricky

Ricky, whose main instructional focus was on teaching English as a Second

Language, was also in his first year of teaching the writing course. He had, however,

taught at the university level for four years. He spoke about how he saw differences

between critical and constructive thinking. He believed that "critical thinking is more of

an evaluative process and is more theoretical than constructive thinking." To him, "constructive thinking focuses more on application and what the final outcome is and actually doing something with some action to follow through on." He indicated, however, that his international students were not ready for constructive thinking. They are "too focused on their own [academic] goals. They are not at the stage where they could want to learn to contribute to society." His overall scores for constructive and critical thinking could not be used as he left some items unanswered. Upon averaging his responses, it appeared that his stance leaned more to critical than constructive thinking.

Robert

One instructor, Robert from Sociology, who had taught for 16 years, disagreed with one strand of the constructive thinking definition (building caring relationships). He found that "the word caring [was] disturbing as it could mean many things to a variety of cultural groups." He preferred the use of understanding as opposed to the word caring. He did, however, see the merit in balancing critical with constructive thinking. He perceived these two forms of thinking as parallel to the notion of inductive and deductive research. He contended that he used both of these research approaches when he taught. His total scores from the close-ended items on the questionnaire were 184 out of 250 for constructive, and 194 out of 250 for critical thinking.

Robert provided an example of where these two forms of thinking differentiate. If he were "performing inductive research, he would likely apply constructive thinking because he would be working toward something." In his mind, inductive research involved:

the process of creating theory; a set of ideas based upon observation and
constructing something new. In those types of relationships, the researcher has
to empathize with his participants to gain an understanding because without
empathy the researcher is not going to get that understanding. In inductive
research, the researcher needs "the cooperation of whoever it is that he is
observing to gain that information. Whereas if he were using deductive research,
and he wanted to evaluate that which he already knew, he would evaluate it from
a critical stance.

He believed that "it is not necessary to have the participants' cooperation" while

conducting this form of research.

Laura and Mark

Two instructors, Laura from the English department and Mark from Economics,

ranging in teaching experience from 5 to 26 years, felt strongly that there was no need for

constructive thinking. Although, they saw a difference between constructive and critical

thinking, they preferred to stress critical thinking in their classrooms, steeped in

university tradition. They disliked the terms caring, different ways of knowing, and

proposed the term creative as opposed to constructive thinking. They believed that due to

time constraints, they could not introduce any more ideas into the 099.111 curriculum.

Laura and Mark also hesitated to put too much onto the shoulders of those

teaching the 099.111 course. They pointed out that four of the classes were consumed

with developing library skills. Further with large class sizes, approximately four to five

classes were taken up with oral presentations. Actual teaching time was therefore

minimal.

Laura, who had 26 years of teaching experience, believed that the 099.111 course

provided an opportunity for students from different cultures to learn about how western

universities view critical thinking. She described critical thinking as "a difficult concept

for those from the Aboriginal culture." She suggested that when these students come to

university, critical thinking skills need to be worked on. She provided these students with

13 extra hours in the summer and taught them about the history of western universities.

Many of her students were the first of their families to attend university.

> These students are not used to taking things, pulling them apart and
> analyzing them and coming up with new ideas, so synthesis is totally
> foreign to them in the sense of how it [relates to] critical thinking.
> Evaluation is a very foreign concept in Canadian aboriginal culture
> because evaluation is seen as a form of criticism.

She focused on roadblocks to critical thinking, citing emotional, cultural, and life

experiences, as well as the location of previous education, whether at a city or at a reserve

school.

In explaining critical thinking to students, Laura referred to the ancient Greeks of

Socrates and Plato and had students examine critical thinking. She reinforced the

importance of critical thinking by relating how the university is structured, and to how

professors teach and conduct research. "Research is based on critical thinking and how

classes are taught is based on critical thinking. The goal of the university is to always go

back to the ancient Greeks." When asked if she felt that there would ever be a time when

there would be a different approach taken, she indicated that: "Since the university has

been doing this since 400 B.C. and it is 2004, this is the basis of western education." She

did not believe that we would see a change in our lifetime. "The whole idea of how we

research is built on the ideas of others. We take others' work, we study it, and build on it,

and take a small step forward." When her total constructive and critical thinking

questionnaire scores were compared to her qualitative responses, her constructive

thinking score was 181 out of 250 and her critical thinking score was 190 out of 250.

Mark, who had five years of teaching experience, was in the field of Economics. He agreed with Laura that critical thinking was often used as a buzz phrase in the university setting. He explained that critical thinking was often associated with active learning. "To be a critical thinker is to be able to go beyond mere recall or regurgitation of facts and concepts and ideas." As an instructor, he tried to get students "to apply what they had learned to new situations and to determine whether a concept or idea was good or bad and to test some of the assumptions found in various theories." Mark's overall questionnaire total scores for constructive and critical thinking did not correspond with his qualitative responses. He scored slightly higher on constructive thinking than on critical thinking. His constructive thinking score was 160 out of 250 and his critical thinking score was 152 out of 250.

Larry

One instructor, Larry from Distance Education, who had taught for six years, did not see the difference between critical and constructive thinking and did not see the value in studying constructive thinking. He believed that "critical thinking should be the focus in the university setting." Using a computer program with his students to reinforce critical thinking, he tried to teach that "critical thinking is linear." In his view, students needed to:

> Know the basics first to think. Once students know the basics, they are able to move to the higher levels of Bloom's Taxonomy. They are not able to advance to these higher levels unless they have the basics. For example, It's like any skill, whether that is learning how to play the clarinet or how to write at some point.

It was important to Larry that his students know how to get information and be able to "do" the basics. He believed that it will "take a quantum leap to get to the higher levels of

Bloom's Taxonomy." His definite interview stance promoting critical thinking corresponded to his total scores on the questionnaire. His constructive thinking score was 158 compared to his critical thinking score of 188 out of 250.

Summary of findings. The views of the writing instructors in regard to critical and constructive thinking were not unequivocal. There seemed to be differences between their perspectives on critical and constructive thinking based on their questionnaire responses and the thoughts they expressed in their interviews. One instructor particularly liked the definition and believed he was implementing constructive thinking tenants as well as teaching critical thinking. Three respondents saw the difference in critical and constructive thinking and considered the possibility of balancing critical with constructive thinking. One instructor questioned the wording of the constructive thinking definition and deliberated over its possible use. He believed he would still focus on critical thinking, although he paired critical and constructive thinking with conducting deductive and inductive research. Two individuals realized the differences between critical and constructive thinking, but did not want to implement constructive thinking due to time constraints related to the existing curriculum and approach to writing instruction. One instructor did not feel there was a difference between constructive and critical thinking. Individual responses are explored in more depth in the following discussion of instructor case studies.

Student and Instructor Perceptions of Critical/Constructive Thinking

The question was: *Do student perceptions of critical/constructive thinking correspond with those of their respective instructors?* There were eight out of a possible ten instructors, two females and six males, who agreed to fill out the questionnaire. One

instructor from this group of participants taught two sections of the 099.111writing course. Their teaching experience ranged from teaching the 099.111 course for the first time to having taught at both the school and post secondary level for 34 years. They also held teaching positions in other disciplines on the university campus in such fields as Distance Education, Economics, English, English as a Second Language, History, Psychology, Sociology, and Theology. Seven instructors completed all of the 100 items, while one male instructor omitted five items. Accordingly, the responses for each subset of critical and constructive thinking in his protocol were added together and the average score for each subset of critical and constructive thinking entered into the instructor data base. (This was identical to the procedure used for missing values in student responses.)

Analysis, close-ended items. Compared to student total scores, critical thinking scores for instructors ranged between 147 and 203, and for constructive thinking 148-208, the range for instructors for each type of thinking being less compared to the range of responses for students: critical thinking (Range: 125 to 205.44) and constructive thinking (Range: 106 to 199). The total scores from the close-ended questionnaire items revealed how each participant valued the elements of critical and constructive thinking, the ultimate purpose being to compare the critical and constructive thinking perspectives of students and their respective instructors. A one-way ANOVA demonstrated that there were no significant statistical relationships between instructor (N=8) and student (N =155) critical thinking stance, F (8, 155) = 1.746, $p.$ <.092 (MSE = 137.119). A one-way ANOVA comparing constructive thinking to instructor (N = 8) and student (N = 155) means also indicated that there were no significant relationships F (8, 155) = 1.801, $p.$

<.081 (*MSE* = 245.594). Findings from the open-ended questionnaire data were then examined to help confirm this result.

Interview data. To gain further insight into the correspondence between student and instructor perceptions of critical and constructive thinking and whether or not there were various levels of critical and constructive thinking, a qualitative analysis of the instructor interview data was compared to the stance of students in his/her course as found in the questionnaire data. Portfolios were also considered. It was assumed that if the instructors reinforced a particular stance (constructive or critical), the writing of the students, as shown in their portfolios, would reflect that stance. Similarly, it was assumed that more students from classes in which the instructor assumed a constructive thinking stance would submit their portfolios to the investigator than students from classes in which a critical thinking stance prevailed.

Levels of Critical and Constructive Thinking

The question was: *Are there various levels of critical and constructive thinking?* Based on the student profile matrix categories developed in Study One, a table profiling the critical and constructive thinking stance of the students in each instructor's class (showing degrees of high and low critical/constructive thinking) was compiled to establish the relationship between instructor and student thinking perspectives. Descriptions of the class makeup and portfolio response rate for each class are also provided. (See Appendix N.)

Cameron's Class Makeup and Portfolio Response Rate

Although Cameron seemed to appreciate the role of constructive thinking in teaching and learning, the profile of students in his class based on the close-ended

questionnaire data responses and the descriptive analysis from the matrix indicated almost an equal distribution of high /low critical and constructive thinking scores (Table 4.7). There were four students who had high critical thinking scores and three students in who had high constructive thinking scores. Five students had low critical thinking scores and five had low constructive thinking scores. The mean for constructive thinking ($N =$ 20) was lower ($M = 156.67$, $SD = 17.04$) than for critical thinking ($M = 158.55$, $SD =$ 13.44).

Table 4. 7

Profile of Critical and Constructive Thinking Student Scores in Cameron's Section

High Critical Thinking Scores 4	Low Critical Thinking Scores 7
High Constructive Thinking Scores 3	Low Constructive Thinking Scores 5

Caterina's Class Makeup and Portfolio Response Rate

Interview responses by Caterina seemed to suggest that she valued constructive and critical thinking. Even though she had the second highest constructive thinking score in the group of participants, her constructive thinking scores were slightly lower than her critical thinking scores. The students in her class reflected that there were slightly more students who had high constructive thinking scores as opposed to those who had high critical thinking scores. Five students had high constructive thinking scores and six had low constructive thinking scores. There were six students who had high critical and low critical scores (Table 4.8). The mean for constructive thinking students ($N = 19$) was higher ($M = 165.54$, $SD = 14.69$) than for critical thinking ($M = 162.3$, $SD = 10.73$).

Table 4.8

Profile of Critical and Constructive Thinking Student Scores in Caterina's Section

High Critical Thinking Scores 2	Low Critical Thinking Scores 6
High Constructive Thinking Scores 5	Low Constructive Thinking Scores 6

George's Class Makeup and Portfolio Response Rate

The interview data suggested that George valued constructive thinking, although questionnaire responses indicated no difference between critical and constructive thinking. Even though his score on critical thinking was lower than his score on constructive thinking, his students had higher scores in critical thinking. There were six students who had high critical thinking scores and four had low critical thinking scores. One student had a high constructive thinking score and four had low constructive thinking scores (Table 4.9). The mean for constructive thinking ($N = 15$ students) was lower ($M = 159.77$, $SD = 159.77$) than the critical thinking mean ($M = 167.37$, $SD = 7.04$).

Table 4.9

Profile of Critical and Constructive Thinking Student Scores in George's Section

High Critical Thinking Scores 6	Low Critical Thinking Scores 4
High Constructive Thinking Scores 1	Low Constructive Thinking Scores 4

Ricky's Class Makeup and Portfolio Response Rate

Both the questionnaire and interview data suggested that Ricky perceived critical thinking as being more important for his students than constructive thinking. The profile of student questionnaire responses in his class showed that students had the same

perspective (Table 4.10). Four students had high critical thinking scores and three

students had low critical thinking scores. There were no students who had high

constructive thinking scores and there were three who had low constructive thinking

scores. The mean for constructive thinking (N = 10 students) was lower (M =159.62, SD

= 10.92) than for critical thinking mean (M = 166.22, SD = 6.48).

Table 4.10

Profile of Critical and Constructive Thinking Student Scores in Ricky's Section

High Critical Thinking Scores 4	Low Critical Thinking Scores 3
High Constructive Thinking Scores -	Low Constructive Thinking Scores 3

Robert's 06 Class Makeup and Portfolio Response Rate

Robert taught two sections of the 099.111 course. To distinguish between these

two course sections, one is coded 06 and the other is labeled 07. Robert saw the merit of

both forms of thinking and paralleled them to specific research methodology. His

interview data corresponded with his close-ended responses on the questionnaire. He had

almost an equal scoring in both forms of thinking. For the 06 class makeup, there were

more students who had high constructive thinking scores than critical thinking scores. Six

students had high constructive thinking scores and seven students had low constructive

thinking scores. Five students had high critical thinking scores and three had low critical

thinking scores (Table 4.11). The mean for constructive thinking students (N = 22) was

higher (M = 163.07, SD = 13.23) than the critical thinking mean (M = 159.37, SD =

11.92).

Table 4.11

Profile of Critical and Constructive Thinking Student Scores in Robert's 06 Section

High Critical Thinking Scores 5	Low Critical Thinking Scores 3
High Constructive Thinking Scores 6	Low Constructive Thinking Scores 7

Robert's 07 Class Makeup and Portfolio Response Rate

Robert saw a difference in the 06 class makeup compared to those in his other course (Section 07). When asked what the difference was, he stated that he found 06 students "easier to teach". He thought that they "were more eager to learn, always came to class, and had many questions." He believed he had a better relationship with them than the students in his 07 section. In the 07 class makeup, there were more students who high critical thinking scores than constructive thinking scores. Eight students had high critical thinking scores and four had low critical thinking scores. Two students had high constructive thinking scores and seven had low constructive thinking scores (Table 4.12). The mean for constructive thinking ($N = 21$ students) was lower ($M = 154.58$, $SD = 14.68$) than the critical thinking mean ($M = 161.67$, $SD = 11.34$).

Table 4.12

Profile of Critical and Constructive Thinking Student Scores in Robert's 07 Section

High Critical Thinking Scores 8	Low Critical Thinking Scores 4
High Constructive Thinking Scores 2	Low Constructive Thinking Scores 7

Laura's Class Makeup and Portfolio Response Rate

Although Laura did not see the difference between critical and constructive thinking during the interview, her close-ended responses indicated that she had almost an equal score in both forms of thinking. Her class makeup reflected a higher number of students with high critical thinking scores than constructive thinking scores. There were eight students who had high critical thinking scores and three students with low critical thinking scores. Two students had high constructive thinking scores and six had low constructive thinking scores (Table 4.13). The mean for constructive thinking ($N = 20$ students) was almost the same ($M = 167.08$, $SD = 12.90$) as for critical thinking ($M = 167.60$, $SD = 12.49$).

Table 4.13

Profile of Critical and Constructive Thinking Student Scores in Laura's Section

High Critical Thinking Scores 8	Low Critical Thinking Scores 3
High Constructive Thinking Scores 2	Low Constructive Thinking Scores 6

Mark's Class Makeup and Portfolio Response Rate

Although Mark did not see the difference between critical and constructive thinking based on his interview data, he had a slightly higher score on constructive thinking than critical thinking. His students had higher critical thinking scores than constructive thinking scores. Six students had high critical thinking scores and four had low critical thinking scores. Two students had high constructive thinking scores and two had low constructive thinking scores (Table 4.14). The mean for constructive thinking (N

= 14 students) was lower (M = 152, SD = 18.43) than for critical thinking (M = 158.01,

SD = 14.94).

Table 4.14

Profile of Critical and Constructive Thinking Student Scores in Mark's Section

High Critical Thinking Scores 6	Low Critical Thinking Scores 4
High Constructive Thinking Scores 2	Low Constructive Thinking Scores 2

Larry's Class Makeup and Portfolio Response Rate

Larry did not see the value of constructive thinking nor did he see a difference

between critical and constructive thinking. Larry's interview stance reflected his student

profile. Students also seemed to value critical thinking compared to constructive thinking

as indicated in Table 4.15. There were four students who had high critical thinking scores

and ten students who had low critical thinking scores. There were three students who had

high constructive thinking scores and six who had low constructive thinking scores. The

mean for constructive thinking (N = 23 students) was lower (M = 158.08, SD = 18.99)

than for critical thinking (M = 160.39, SD = 12.83).

Table 4.15

Profile of Critical and Constructive Thinking Student Scores in Larry's Section

High Critical Thinking Scores 4	Low Critical Thinking Scores 10
High Constructive Thinking Scores 3	Low Constructive Thinking Scores 6

Summary of Findings: Instructor Differences Between Critical and Constructive Thinking

(Study Two)

The findings from Study Two focused on exploring similarities and differences between critical and constructive thinking, student and instructor perceptions of critical and constructive thinking, thinking stance in relation to teaching and learning practice, and constructive thinking from theory to practice in the 099.111 writing course.

Similarities and Differences Between Critical and Constructive Thinking

Although all of the instructors viewed critical thinking as essential to teaching students how to write a research paper, three of the eight instructors perceived differences between critical and constructive thinking and envisioned benefits in both types of thinking. They identified five main differences. Constructive thinking values experience, incorporates and integrates different ways of knowing, looks at going beyond the analysis of a situation through action, builds caring relationships and enhances inductive research.

Thinking Stance

To determine whether constructive thinking was distinguishable from critical thinking as defined in this study, it was important to trace the congruency between the instructor close-ended questionnaire scores and the interview responses and open-ended questionnaire responses. When qualitative interview data was compared to close-ended instructor questionnaire items, critical and constructive stances became more evident.

Findings showed that instructor critical and constructive thinking scores on the close-ended items matched their stances revealed in both the open-ended questionnaire items and the interview data. Of the eight respondents who completed all of the

questionnaire items, seven scores corresponded with instructor viewpoints. If an instructor had a high score on constructive thinking, he or she was implementing this stance in the classroom. There was only one instance out of the eight in which there was a mismatch between instructor perspectives as revealed in the interview and questionnaire scores. This instructor indicated that although he did see the difference between critical and constructive thinking, he was not stressing constructive thinking in his classroom. His responses to the close-ended questionnaire items nonetheless indicated that he had a higher constructive thinking score compared to critical thinking.

Student and Instructor Perceptions of Critical/Constructive Thinking

The findings pertaining to the question related to student and instructor perceptions of critical and constructive thinking indicated that instructors do exhibit a particular stance with certain levels of both critical and constructive thinking. As a result of their emphasis, students obtain a particular perspective on how to develop research writing. It was also found that students exhibit varying degrees of critical or constructive thinking based on their individual backgrounds.

Constructive Thinking From Theory to Practice in a 099.111 Classroom Setting

Even though these instructors did not take part in a formal research intervention on constructive thinking and how to implement constructive thinking in the classroom, there were three who were unconsciously integrating strands of the constructive thinking definition into their instruction. While teaching the process of writing a research paper, these instructors indicated to their students how constructive thinking allows them to value experience, incorporate and integrate different ways of knowing, look at going beyond the analysis of a situation through action, build caring relationships and carry out

inductive research. There was one instructor who indicated that he thought he did not have time to emphasize the elements associated with constructive thinking, but showed in his responses to the close-ended questionnaire items that he valued constructive thinking as part of teaching students how to write a research paper. This seemed remarkable, because at the time that he completed the questionnaire he had not been formally introduced to the concept of constructive thinking. There were no differences related to gender, age or experience in the instructor data regarding who would more readily use constructive thinking in their classrooms.

Study Three: Exploring Constructive Thinking

(Professors from Other Disciplines)

Data Analysis

Study Three extended Studies One and Two in exploring whether constructive thinking has practical application for professors in other disciplines in which the major focus was on teaching content rather than on teaching the writing process. The main question for Study Three was: How are professors, who had previously participated in a University Teaching Services (UTS) workshop entitled *Transforming Critical Thinking to Constructive Thinking*, using constructive thinking within their courses? Three related questions were: (1) How do these professors view critical and constructive thinking? (2) What did they identify as the challenges and concerns they faced while integrating constructive thinking into instructional practice? and (3) Were there any different philosophies regarding constructive thinking according to Faculty or instructional level (undergraduate/graduate)?

Ten professors from selected disciplines on the University of Manitoba campus agreed to participate in individual 30-45 minute interviews (See Appendix E.) These disciplines included Anthropology, Architecture (specifically City Planning), Dental Hygiene, Engineering, Management, Nursing, Philosophy, and Soil Science. Responses were analyzed qualitatively by making repeated searches through the transcript data using grounded theory (Padgett, 1998) to identify themes associated with assuming a constructive thinking stance at the post-secondary level. After several re-readings of the transcripts and coding recurring themes in the right hand margin, four main categories emerged. These were themes associated with teaching philosophy and practice, use of constructive thinking, and differences between constructive and critical thinking. Charts with each of these main themes were created as a framework for sub-themes contained in transcripts. (See Appendix O.)

The question was: *How are professors, who had previously participated in a University Teaching Services (UTS) workshop entitled Transforming Critical Thinking to Constructive Thinking, using constructive thinking within their courses?* Of the ten professors who participated, one was in his first year of teaching, four had three to four years or experience, and five had taught from seven to thirty years. There was almost an equal distribution of gender, four female and six male. The main theme charts were then used to compare and contrast responses from those who were experienced and inexperienced in the field of teaching, as well as those who were female and those who were male.

Importance of Professional Development

All of the respondents spoke about the importance of developing professionally. As practitioners, they enjoyed discussing what they were teaching and how they taught their material. They were eager to discuss university teaching with others from different fields to find out what they could be doing differently, or what they shared in common. All indicated the importance of being able to go beyond technical knowledge to be able to draw on student strengths and abilities.

Teaching Philosophy

Eight of the ten participants had created their own personal philosophy of teaching and seven were in the process of implementing what they valued into their teaching practice. The disciplines of the participants in this group of eight ranged from teaching Soil Management to teaching Engineering, Nursing, Philosophy, Dental Hygiene and Architecture. They believed in the importance of being current in their subject area and preferred to use a case study/problem solving approach to instruction. They emphasized how much they appreciated the diverse abilities and strengths of their students and they valued diverse points of views from students.

Three participants from this group of eight were considered to be mentors or instructional models in their respective disciplines and had been recognized for teaching excellence both by their students and by their colleagues. Their teaching experiencing ranged from 20 to 30 years, being the most experienced compared to other participants. Their students and colleagues come to them for assistance or advice, valuing the knowledge they had in their areas, and contacts in the network. One of the respondents in Design Engineering mentioned that he particularly enjoyed experimenting with new ideas

and concepts and created an interactive classroom learning environment. He believed that establishing teams of students to discuss content stimulated higher learning and higher levels of thinking.

Another participant from this group of three mentioned that she wanted her students in the Faculty of Dental Hygiene to realize that it is impossible to know everything about the profession and to always ask questions. As a mentor, she promoted learning as never-ending. If her students had a question, she reinforced the idea of the importance of opening up a book and researching the answer. She served as a role model by telling students that she had a file that she has collected to help her grow professionally. She explained to students that she has never met anyone who has all of the answers even though she works with many wonderful, intelligent, great individuals.

The two participants, who were not part of this cluster of eight, had not developed their teaching philosophy but relied on mentors in their discipline of Management and Nursing to guide them. One of the two participants was not sure what an instructional philosophy was and the other participant had written a philosophy but was unsure about how to implement it. These two had the least experience of this participant group in the field of teaching. They were in their first or second year of teaching and relied on gathering effective procedures and teaching information from esteemed mentors.

Several people had helped them in acquiring teaching ideas, lesson plans, and assessment and management strategies. Even though these two informants were from different faculties, Management and Nursing, they spoke of similar concerns; the importance of earning the credibility of their audience by being knowledgeable about their subject area, keeping current, and being highly prepared. Both indicated how they

felt particularly challenged because they taught mature students who had vast experience in their disciplines.

Outside of the group of eight, these two respondents also stressed how they had to be very open minded when they taught. Some of the their students had already been practicing in the field for over 20 years and had had excellent experiences. They indicated that because they were novices in the area, being able to draw on student backgrounds during the teaching and learning process was an asset. They found that incorporating student experiences into their lectures was invaluable.

Drawing Out Students

All of the participants from this sample spoke about how they emphasized the learning process as opposed to the final product or performance. Their philosophy was; "It isn't really the teaching that matters, it is the learning." They spoke about how they attempted to draw out their students during the learning journey. Each participant had a unique way of describing how he or she enabled their students.

The Anthropology professor appealed to her students by attempting to engage their senses. Providing students with opportunities to use different faculties while learning was, for her, the most important way to reach students. As a strong proponent of experiential learning, she had her students study artifacts from the past and re-enact events from content by role-playing situations.

A Nursing professor believed that the role of the teacher should be to instill a love for learning. She wanted to impart to her students the values of learning, that "Learning is fun. Learning is enjoyable. Learning makes you a better person and it makes you a better nurse. And that every day you learn something no matter what you do. And you learn

from everyone... ." For her, learning is always active, social, and life-long. When students learn, "It makes a difference to you and everybody that surrounds you. And learning is really a way of connecting with people."

She believed that she learned so much when she listened to her students. And she described how they helped her to make her teaching better. They would come to her and tell her what difficulties they were having. She gave an example of what a student might say, "Oh when I was studying this part you know I decided to do it this way and this is how I remember this hard part." She tried to remember what her students told her and incorporated their feedback into her lessons as they usually "connect with the complexity [of the subject] and simplify it." Exciting moments for her in teaching were the "aha moments" she witnessed. "That makes me feel so good! The simplest little thing in that they can now put that key in and the door now opens and they can see the whole world."

These professors expected their students to learn more than just facts and figures. In their view, the ability to go on learning, to see what could be offered to the world, and how students view themselves as learners was paramount. This group of professors asked themselves: "What expectations would I have as a student coming into this class? Objectives were created to meet student expectations, but realistically, these professors indicated that they are unable to give students a lifetime of knowledge in one semester. They reinforced how important it was to know where to go to find more information. One of their favorite instructional strategies was to create hypothetical questions about real life scenarios so that their students experienced how to "dig up information to find answers."

For example in Soil Management, a question might be, "Should this guy build a hog barn in a certain location?" The professor wanted his students to justify their answers. He deliberately posed the problem so that the class realized there was no right or wrong answer.

> There will be time when they all come up in the middle during their class discussions of this scenario. They look at the size of this barn, how many acres the farmer has, how much manure he has from the barn, and the crops he has grown.

The key factor in this scenario was that students had to think about what they were studying. When they had gathered all of the relevant information, they had to evaluate it and make a judgement call. This professor wanted his students to value the process of discovering what was important in this situation and to learn how to find optimal solutions.

As a professor from Architecture suggested, "It [instruction] is very much a process of drawing out rather than a cramming in. Drawing out, by providing frameworks, so students can make sense of past experiences that they might have otherwise overlooked or devalued." He encouraged his students to make connections to what they know and what they were learning in class. He individualized his assignments so students could express their perspective and voice their opinion on an issue.

His desire was to have students see "education as ultimately as a kind of consciousness raising and broadening movement." He believed that he had never had any plagiarism problems because students could not go to another source for this. "It always involves them inventing something out of their own experience. It makes for a lot of openness, a lot of flux." He had great difficulty quantifying his students' work, however,

and indicated that he "still hasn't figured out what is reasonable." He mentioned how important it was for him that his students had a grounding in the field before he taught them. Most of his students already had undergraduate degrees.

One of the professors from Nursing found herself in the same situation as the professor from Architecture. Many of her students had previous experience in the field, some with more than 20 years, and were coming to her classroom with an extensive background about the subject. She felt her role was to be open-minded while teaching so that she " draws out that information and incorporates that into the lectures." Even though she felt pressure to cover her course syllabus and specific performance skills related to the field, she insisted that "there is also room to incorporate what people have learned and what they come in with.... I am quite a big proponent of interaction with students and trying to, as much as possible, incorporate what they know through discussions."

The professor from Management also emphasized the role of experience in student learning. He described how he tried to improve upon the student experience base by having them relate to real life problems. If students did not have experience with a particular problem, he had them work in problem-solving teams. He has found that students with little experience find it more difficult to relate to the situation. He believed that "the thinking process is probably different for them and the approach [to take] may be different for them in developing certain thinking skills."

One of the Nursing professors described how he had to teach his students one of the most abstract concepts in cardiovascular physiology. He had to explain to them "muscle stretching, volume, pressure, physics and looking at an individual trying to optimize cardiac function by manipulating fluid or medications... For a lot of people there

are a lot of different concepts to grasp and to understand." An advocate of Meyers-Briggs, he tried to address the multiple ways students used to formulate knowledge. By attempting to reach the diversity of student strengths and needs, he helped students to bring their ways of knowing together, to help them to think differently. They must learn to "process multiple things all at the same time to come up with a correct answer. That is what I find rewarding when someone says you know I get it!"

An Engineering professor also enjoyed having students look at other ways of knowing during the learning process to capture areas of discovery. He particularly liked a course curriculum that enabled students to "demonstrate their creativity, their ability to respond to the unknown, to react to the undefined." What was very important for him was to convey to his students what it would be like to be an Engineer. He wanted to parallel his way of teaching to the way he wanted his students to learn. The challenging part was not the tests and the assignments, that was the easy part for the students, but to give them a sense of wondering, an awe for the field. His students have often returned to tell him after they have completed their degrees that he has given them a lot to think about. "As an Engineer, you spend most of your time figuring out what the question is. So I kind of got the impression that they were telling me that I was teaching them about Engineering."

One of the courses he had to teach was a prerequisite course for students entering Engineering. The Engineering curriculum, as he described it, can be "mundane scientific foolishness... The subject matter would be like watching paint dry." To engage his students, he developed a team learning process using team mini-tests and individual mini-tests. He believed that it was essential for students, not only to perform independently but also to work together to learn the content. If students had difficulties,

they could work together to get the answers they needed and if they felt they had been unfairly evaluated, they could appeal as a team to the Engineering professor. If the team presented the position in a reasonable and respectful manner to the authority, everyone "gets an *apple pop*" and a change of grade on their test. Throughout the years, he has had only one complaint about the "*apple pops*".

A professor from Dental Hygiene described how important it was for her to be able to see and assess her students from a holistic perspective. During clinical situations, she spent time conferencing with each of her students discussing, addressing questions, and seeking answers. She deliberately put them in a position where they were engaged in dialogue. She described how intimidated students felt when they were expected to do this and indicated that "not everybody is used to that!" To evaluate her students, she asked them to reflect on their practice using different ways of knowing from the O.R.I.D. model (objective, reflective, interpretive, decisional). She found this assessment tool helped students to identify various dimensions of the learning process.

One philosophy professor, who taught critical thinking, highlighted how he had his students look critically at arguments, assess them and present arguments in a convincing manner. Even though his classes were held in a theatre style room, he had classes of 100 students, he explained how important it was that his students see all elements of an argument. He did not want them to walk away from his classes thinking critical thinking was just a series of reasons, but to be able to see how an argument is supported and to defend their personal opinions. For assignments, he detailed how he encouraged his students to visit him in his office to discuss problems related to the lectures and offered students opportunities for one-to-one conferencing and to turn in

draft work before due dates. He stated that he did not offer class time for students to talk with their peers about their assignments, but that he posed class questions that were like the assignment. "So I know there is discussion both between me and the class, but there is also discussion amongst the people in the class about the questions." He stated three main challenges associated with drawing out students in large compared to small classes. He found it difficult to (1) develop personal rapport with 100 students or more, (2) deal with the constraints of a theatre style room for moving students into groups as well as (3) cope with time constraints associated with offering detailed feedback.

Paralleling Learning to Real-Life Scenarios

Nine of these ten professors attempted to stimulate student intellectual growth, not just by providing them with the knowledge of the specific subject but also by creating a process for their students to learn how to problem solve using real life scenarios. They hoped to inspire their students to develop practical professional skills. They believed that learning will continue after the course has finished.

Two professors from this group of nine, one from Management and the other from Engineering used teams to develop optimal solutions. The professor from Management indicated that he wanted to improve upon his students' experiential base and have them relate issues to real life problems. He introduced simple problems that became gradually more complex as they neared the end of the course. He set up competitions between two teams or between different teams in the class. The team that developed the best "maximum profit solution" was the winner.

Teams were also created in Engineering to simulate work scenarios. Students were expected not only to work together to analyze content, but also to arrive at optimal

solutions to solve real life problems. If students were unable to work as a team, they were not allowed to continue in the program. "A student who lacks interpersonal skills in Engineering is like a hockey player who has no skates." The teams that win were given positive reinforcement and the teams that lost had to find out where they went wrong so that they would be able to approach authority with a better case scenario. This professor believed that it was very important for the teams to understand how to approach authority in a non-threatening and respectful manner so that they were able to convey their point of view in a professional way.

This professor also wanted students to realize that in the field of Engineering company authorities do not have to listen to their employees. He still felt, however, that it was important for students to learn how to approach the company so that authority figures could see other perspectives. In Engineering, it is essential for students to be able to show management that there is another way to be right and how to document their position. The whole point of having students deal with authority is that there will be times during their professional life when they will run into problems with professional codes. Most of the professional codes are imprecise and have been created for specific scenarios. Fire codes, for example, often have to been customized to suit a building.

Learning to Be Humble

Two of the professors, one from Dental Hygiene and the other from Engineering spoke about how students needed to be humble professionals. They wanted their students to appreciate that although they may have excelled in high school, they were going to be up against many things in life. In Dental Hygiene, there are many questions still to be

answered about the profession. As a mentor, this professor modeled professionalism as an ongoing aspect important for success in her field.

An added issue for Engineers was that the students must face the challenge of dealing with inanimate objects. The Engineering professor tells his students that "Engineering starts with: I wonder if this will fix it?" He wanted students to appreciate that they have to be creative and they must keep learning even when they become old. He hoped to instill the idea that students are perfectly capable of learning things that many people would see as confounding. Yet Engineers should be humble enough to appreciate that as much as they can learn they will not have it all. As a profession, Engineers have the potential to cause great harm. Students must realize that they are not going to lead with arrogance and ignore others during the process of construction, and to learn that, when all is done, it is very exciting to walk into a building they have designed.

The Question Why?

All ten professors wanted their students to tell them *why* they believed in relation to a certain position, idea or concept. They also asked their students "Why?" to help them sort through their knowledge base or their feelings. At this point, their students might say, "I don't know!" and seek the professor's help. And the professor would reply, "I don't know either!" These professors wanted their students to know that it is impossible to know everything. So they tried to be open and honest. To be able to answer "Why?" a professor from Philosophy, who teaches critical thinking, has his students form arguments. He wanted them to be better at analyzing arguments and assessing them, and at presenting arguments that were convincing.

Active Learning

All of the participants agreed that an active approach to learning was essential. They valued discussion, social interaction and questioning during class time. They explained that when they were attempting to cover content in class, they hoped to have students either ask questions or answer questions. They suggested that when it comes to the point where students are not asking or answering questions, then they realize that they must "back up a couple of steps and try again."

All participants wanted their students to think actively about the material they were learning and understand that learning should not be just about finding the correct answer. "Everybody gets at least an optimal opportunity to participate." These professors believed that participation in group discussion empowers students to find solutions to problems. In making problems incrementally more comprehensive and complex, one professor from Management explained that he did this "so that students would learn the interpersonal skills necessary [to find] solutions."

Eight out of the ten participants indicated that due to time constraints in covering technical knowledge about the field, they did not use discussion as much in their introductory courses. They preferred to use more discussion to draw out background knowledge and experience when they were teaching clinical or practical courses. The two who did not wait until students were enrolled in post graduate degrees to engage students through discussion and social interaction in introductory class settings were recognized teachers of excellence. They spoke about how important it was for students to share their basic knowledge with each other, understand, experience what worked, what didn't work,

and why someone chose to use a certain approach. These two professors ranged in teaching experience from five to thirty years.

One professor from Engineering indicated that he enjoyed keeping his class active. To illustrate, he shared this experience. When the fire inspector came into class to check the detector, all students were so busy in their groups discussing course content that they never noticed him. The fire inspector was so surprised that he asked the professor if they were having a class. The professor said he believes students learn through peer interaction. "If [he] stood up in front of the class and lectured to them for the whole period, [he] could be replaced by a C.D."

Building Relationships with Students

Six participants, from Nursing, Dental Hygiene, Engineering, Soil Management and Anthropology, stressed how essential it was for them to build collegial relationships with students. They appealed to diverse student needs by using a variety of different formats such as lectures, small and large group discussions, individual oral interviews, films, actual artifacts, and other forms of art. Once these professors had attracted student attention, they really tried to reach out one step further to facilitate student commitment to learning about their subject matter. They believed that developing a learning commitment comes down to developing trust and rapport with students. Students are not just engaging in a subject matter, but are participants in a learning community made up of the professor and their classmates.

One professor from the Faculty of Nursing, who was one of this group of six, indicated that he believed that the desire to educate comes from the heart. He appealed to both student intellect as well as hearts. In doing so he attempted to draw from their

different experiences, abilities, and thought processes. He wanted his students to be successful and encouraged them throughout their learning.

The philosophy of this group of six was to give students opportunities to discover themselves and to provide guidance. One of the professors from Dental Hygiene elaborated on how she shares her experiences with her students and tells them, "This is what my experience has taught me and I am sharing it with you. It may lead you there or it may not." These professors believed that what is essential was to help students, encourage them to go in a particular direction, and to stop them, as the Engineering professors put it, "if they see students heading towards a brick wall."

They wanted their students to be successful. They tried to explain things in different ways because they are aware that people process things differently. They wanted their students to take that one step from mediocrity to a little higher plane. One of the professors from Engineering described what this higher plane was for him. He hoped "to instill [the notion] that although there was the fundamental issue of technical competence, there [was] a much softer, fuzzier issue, call it understanding." This understanding comes from being able to relate to others and to being able to contribute to society. His students learn that "they are no more important than the people that are working on the shop floor or the construction site. Engineers are a part of a system, not a system in themselves." There were four participants who spoke about valuing the whole person as opposed to only the intellect. They believed that there were more dimensions to a person than the ability to obtain knowledge.

Valuing the Whole Person

Of the four respondents who viewed valuing the whole person as important, two were from the field of Nursing. They believed that the art of empathy and the development of intuition were key to understanding patient needs. Benner, a popular theorist in the field of Nursing, was cited for her theory on how to develop intuition from the novice to the expert. One Nursing professor described what can be attained in the field if students achieve expert status on this continuum.

> They are able to just look at something and just know. It is an intuitive
> moment. For example, you can observe someone who is new
> in the intensive care unit. It is like a deer in the headlights because it is the
> nurse's first time. They are standing there wondering where do I start versus
> the nurse who now comes in, and *boom* starts multitasking and can do several
> things at the same time.

A professor from Anthropology commented on the importance of engagement, attracting student attention experientially by presenting something that stimulates, but on all levels. This professor's goal was to involve her students in learning by providing them with diverse ways of looking at the content, thereby capturing both their enthusiasm and attention. She believed that artifacts stimulate student interest and had them work in pairs and groups to develop visual literacy skills.

Making Time to Discuss Content

Four professors from this group of ten made time to discuss content with their students not only during class time, but also during scheduled office periods. They wanted to be available so that they could have individual oral interviews, time to conference over assignments or lessons, or respond to questions about mid-term or final exams. They felt it was necessary to be available for their students to help them understand how their students perceived the content they were teaching.

Recognizing "Aha" Moments

Three respondents spoke about watching their students learn and appreciating those "aha" moments. They wanted to capture the creativity of their students and they found it most rewarding when they witnessed this. One participant from the Faculty of Dental Hygiene described this moment as an awakening of student spiritually, an epiphany. The Engineering professor in this group of respondents enjoyed how student engaged with the content and formed questions that excited their curiosity. His students often returned to tell him that "He gave them a lot to think about." The professor from Soil Management reported that he listens carefully to students on an individual basis to see if they understand what they are learning. He loved when they share what they are learning and how they feel they have developed as learners.

Receiving Feedback

Two professors, one from Soil Management and the other from Engineering, stressed the importance of feedback. The professor from Soil Management found individual interviews essential in learning how students were processing the content, while the Engineering professor provided written feedback on every assignment, weekly. These professors hoped that by giving feedback to students, they were building a knowledge base as well as confidence, and were encouraging students to want to learn more about their subject area. In their view, feedback provides students with many opportunities to reflect upon and edit their work.

Both of these professors also enjoyed receiving feedback about their teaching practice. They have been recognized as teachers of excellence and have been told they

have made a difference in their students' lives. One of them particularly appreciated a

student editing the text that he was currently writing.

Differentiating Assignments

One participant from the Faculty of Architecture gave an example of how he used

differentiated assessment. He spoke about how he did not have any plagiarism problems

because his assignments were individualized. In developing assignments, he required that

students invent something from their own experience. He then provided a set of

customized grading criteria that helped students work and meet expected standards.

Maintaining An Objective Stance

There were two participants, either in their first or third year of teaching, who

stressed the importance of maintaining an objective grading stance by making certain that

assessment was quantifiable. They believed that by being objective, they would be

considered by their mentors and their students as more credible. Interestingly, these same

two participants were in the process of either identifying a personal philosophy or in the

process of implementing a newly created personal philosophy. A professor from this

pairing reinforced the axiom: "You cannot manage what you cannot measure...." He

elaborated on the importance of management in this axiom:

> Even though it is difficult to measure all things in a quantifiable
> manner, an attempt must be made. If it cannot be and it remains
> an abstract concept than we can address or debate it, but we have
> really no idea about the progress.

Seeking Truth

Four professors from the Faculty of Anthropology, Architecture, Management

and Philosophy spoke about how knowledge for some students is a process of seeking

truth. One professor from Management indicated that students need to be aware that people "Do experience reality in different ways and that implies that their perception of reality is different. For people, perception is truth. Perception is reality." He indicated that he was aware that there were those who say that we can never know the absolute truth. He takes heed of that and is ready to debate the issue because he believes that there is an absolute truth.

Summary of findings. All of the professors from selected disciplines indicated how they used constructive thinking within their courses. Although eight out of ten participants had created their own personal philosophy of teaching and seven were in the process of implementing what they valued into their teaching practice, there were two participants who had not examined their personal values and beliefs regarding teaching and learning before this interview. Several characteristics of constructive thinking emerged from the qualitative data: the importance of establishing teams of students to discuss content stimulated higher learning and higher levels of thinking, promoting asking questions and life-long learning, emphasizing the learning process as opposed to the final product or performance, drawing out student abilities, paralleling learning to real-life scenarios, learning to be humble, questioning why in relation to a certain position, idea or concept, active learning, building relationships with students, valuing the whole person, making time to discuss content, recognizing "aha" moments, providing feedback during learning and teaching process, differentiating assignments, and seeking truth.

Differences in Critical and Constructive Thinking

The question was: *How do these professors view critical and constructive thinking?* All of the participants believed that there was a difference between critical and constructive thinking. A professor from Anthropology identified three main areas where critical and constructive thinking differ. She described critical thinking as:

> an outmoded concept of objectivity, whereas constructive thinking attempts to move toward a more appropriate, post modern epistemological base. Secondly, critical thinking is often associated with a male sect view of social relationships which is an authoritarian hierarchical model whereas constructive thinking integrates as a more feminist perspective building caring relationships and a community of learning. Critical thinking does not explicitly have the emphasis on social value that this definition of constructive thinking does. And thirdly, critical thinking typically is linked to a mind focus approach in learning, whereas constructive thinking is incorporating all different ways of knowing.

One professor from Management indicated that critical and constructive thinking were different in that critical thinking can be perceived as a way of carrying out merely an analysis, without an end solution, but constructive thinking "enables students to come up with a process to come up with a solution." To him, the whole process of thinking did not stop in the break down of the analysis of the problem. It went beyond that in coming up with a solution to the problem at higher levels. He believed constructive thinking had a broader scope than critical thinking.

A professor, who taught a course entitled *Critical Thinking* in the department of Philosophy, agreed with the professor from the Faculty of Management. The professor from Philosophy indicated that he believed critical thinking was more about the study of argumentation and was a subset of constructive thinking. Constructive thinking is a holistic perspective that takes into account building a better society, better relationships,

and different ways of knowing. To him, "Constructive thinking is an internal process that drives the whole motor."

Professors from Soil Management and Engineering believed that they have subconsciously used constructive thinking when they teach introductory or graduate students. They have not, however, consciously implemented these elements into their course syllabi. They found constructive thinking appealing because it moved from the critiquing of things to more progressive thought. The Soil Management professor elaborated, indicating that "Critical thinking does not really go anywhere. It is more explicit than implicit." The teaching experience of these participants ranged from five to twenty-six years but their perspective was not restricted to a particular age.

Transforming Critical Thinking To Constructive Thinking

Constructive thinking values critical thinking but goes further in that constructive thinking tries to seek new ideas and concepts that benefit society. One professor from the Faculty of Nursing and one from the Faculty of Architecture spoke about the importance of integrating and valuing both critical and constructive thinking and to think about what kind of integration and balance was required when applying the constructs in different areas of education. All of the participants mentioned how they wanted to give their students the skills or technical knowledge to be successful in their profession, but also help students to find solutions to problems as part of a multidisciplinary team. The professor from Architecture described the implementation of constructive thinking as being "very much the cutting theoretical edge in our discipline right now" and "usually couched in terms of forms of communicative action theory."

All three professors from the Faculty of Nursing emphasized the role of critical thinking and how critical thinking enabled them to deal with problems from a scientific perspective. In their view, however, constructive thinking enabled them to teach the subjective side of their practice. To them, constructive thinking allowed for the development of understanding, and helped focus on empathy, build caring relationships, and view a problem from different ways of knowing. Nursing students learned how to understand the diverse needs of their patients from both an objective and subjective perspective.

These three Faculty of Nursing professors believed, nevertheless, that constructive thinking came later, once students had had more technical information. They thought that constructive thinking provided an umbrella for their program, but not necessarily all the way through. In their view, constructive thinking played a fundamental role in the middle part of their nursing education program, once students had some sort of knowledge base.

The professor from Dental Hygiene used the philosophy of constructive thinking to view her students in a holistic manner. She valued the affective, cognitive and psychomotor piece of learning and believed that all of these dimensions of learning added up. "The synergy of all of those comes with a sort of eureka moment!" For her, constructive thinking enabled students to become inspired and to focus on the humanistic side of learning. She also believed that constructive thinking became more evident as one matured.

The Strands of Constructive Thinking

Strand I: Reflective and Active Process Valuing Experience

All participants agreed with the first strand of the definition of constructive

thinking: "That it is a reflective and active process valuing experience." They particularly

remarked on valuing experience and believed that learning often comes from reflection.

One participant in the Faculty of Nursing said that "Learning is like microwave cooking.

You just need stand time."

The professor from Architecture remarked that words like "reflective" and

"active" for him conjured up the work of Donald Schon (1983). He believed that Schon

had been a key theorist in the architectural profession for the last 20 years and had a

perspective that was still embraced, especially when trying to get students to think about

the relationship between theory and practice. In his view, architects "still have a

tendency, as practitioners, to dichotomize theory and practice. Schon helps them to see

that there is an interrelationship that is more dialectic and that as practitioners they

themselves will be developing theory."

A professor in the Faculty of Nursing particularly liked the words "valuing

experience." He recognized the role of experience as being very important in his field.

He wanted to be a nurse "who could look at a situation and think about everything and be

able to put it all together, but at the higher level bring personal experience into the

situation." Through classroom discussions, he used student background knowledge and

experience to build on their learning. He would begin by giving students a scenario about

being short of breath and then ask students to visualize the cause. He draws on student

experience and then builds on the complexity of the scenario by asking them to think

about someone who has chest pain. He will say, "Now that you have dealt with someone who has shortness of breath, from your past experience what are you going to do about it when you throw chest pain into the mix?" Students have to be able to process multiple things at one time. In his mind, there is a progression that goes beyond Bloom's Taxonomy. "At the highest level of Nursing practice is intuition, a gut feeling." He believed that, in this way, he was building on his students' basic understanding and helping them to transition from novice to expert.

Strand II: Integrating Different Ways of Knowing

All of the participants believed that integrating different ways of knowing, such as reason, imagination, emotion and intuition were necessary and should be part of the learning process. The professors all agreed that critical thinking represented reason. Imagination, however, was viewed as a way of knowing that has not been emphasized as much or fostered as much during teaching and learning. However, participants hoped to capture student creativity. The Nursing and Dental Hygiene professors spoke about emotion as the psychosocial element of learning. One participant from the field of Nursing indicated that students need to realize that "when they [were] stressed, they [were] wearing earmuffs." To these professors, the role of intuition was very important in the field of Nursing "... Benner's theory ranks the intuitive nurse as the expert."

Strand III: Building Caring Relationships with Others

The third strand of the constructive thinking definition: building caring relationships with others, became controversial for one participant in the group of ten, a professor from the field of Anthropology. She indicated how building caring relationships with others, especially the word caring "runs the danger of putting the instructor into an

ethical judgement role which could carry some dangerous implications." She recalled,

however, that the university she is going to for her next professorial assignment, has a

similar mandate. There are eight characteristics the Southern Illinois University in

Edwardsville has explicitly written into their mandate for professors. These serve as

criteria in terms of being evaluated for tenure track positions and involve building such

student characteristics as communication, critical thinking, problem framing and solving,

knowledge, integration and application of knowledge, self development, citizenship, and

life-long learning (SIUE, 2005). As part of their assessment of citizenship, professors

must encourage their students to "participate in the local, national, and global

community; be sensitive to the welfare of others; appreciate democratic values; [and]

acquire a sense of personal and collective responsibility for the social and natural

environment" (SIUE, 2005, p. 2).

One participant from the Faculty of Architecture viewed caring relationships as

very much orientated to societal rather than individual needs. He believed that these kinds

of relationships would lead to consensus-building scenarios.

In the field of Nursing, all three professors described the importance of caring.

They believed that their job was not just to teach their students to be better nurses, but to

care for patients as if the patient were their own mother, aunt or uncle. In their view, it

was important that students realize that they "have to want to do the caring part of

nursing, as one would treat a family member, so that everyone receives." In fact, one

participant from the Nursing faculty indicated that he believed that it was those types of

caring individuals that set high standards for the profession. "There is a difference

between having someone who is skilled as a nurse and practices the role of nursing duties

[and] a nurse who looks at the patient from a holistic view (body, mind and spirit) and believes in providing the best possible care."

Strand IV: Creating New Ideas and Concepts to Benefit Society

All of the participants believed that this strand of constructive thinking, creating new ideas and concepts to benefit society, separated constructive from critical thinking. They thought that the emphasis on thinking changes as students learn how to extend nursing concepts for the benefit of society. One participant from Nursing believed that this part of the constructive thinking definition represented not only an emphasis, but also a commitment on the part of the individual. "It comes down to the professional who has a commitment, those who want to professionally develop, and those people who are happy where they are at and they do not want to put that extra effort into it."

Summary of findings. All of the professors believed there was a difference between critical and constructive thinking. Critical thinking was associated with a variety of characteristics: objectivity, male sect view of social relationships which is an authoritarian hierarchical model, linked to a mind focus approach in learning, a way of carrying out merely an analysis without an end solution, and the study of argumentation. In comparison, constructive thinking was described as: an attempt to move toward a more appropriate post-modern epistemological base, an integration of a more feminist perspective building caring relationships and a community of learning, and a holistic perspective that takes into account building a better society, better relationships, and different ways of knowing. When professors were asked how they implemented strands of constructive thinking into their teaching practice, they spoke about the importance of valuing experience during the learning process, integrating different ways of knowing,

building caring relationships with others, and extending learning beyond the parameters of the classroom to benefit society.

Challenges and Concerns Integrating Constructive Thinking

The question was: *What did participants identify as the challenges and concerns they faced while integrating constructive thinking into instructional practice?* Respondents believed that measuring constructive thinking was particularly challenging. All of the participants were curious as to whether constructive thinking could be formally measured. One participant from Nursing described how he believed it could be assessed qualitatively. He thought that constructive thinking could be observed in practice, heard during individual conferences, and seen in reflective journal entries.

His conclusion from observing and discussing nursing with his students was that practitioners who use constructive thinking just understand and implement all four strands of the definition. As suggested earlier, he compared nurses who were "standing there wondering where do I start to the nurse who now comes in, and *"boom"* starts multitasking and can do several things at the same time." During individual conferences, he finds out how nurses are able to process information. For instance, he will give a student the patient's chart, pull a snippet of information from it, and ask the nursing student "what he or she thinks about that?" Through such interactions he believes that he can hear how the student is thinking and seeing. He finds out through such responses whether or not "the student is able to handle the first level of care because the student can only think about that one piece of information and can not put the big picture together."

He finds students are hesitate to write down how they feel in journal entries and to be reflective about their practice. "There is a fear that if they write something down the instructor will photocopy it. And it will be a big discussion. They are afraid they may not be doing a good job." In his view, other individuals enjoy making journal entrees and it is possible to see the different levels of practice in their writing. When he provides feedback to journal entries, he questions his students further by asking them:

> Now that you have identified this priority patient problem, tell me now
> what you think is causing that problem. The novice individual will say, "Well
> the problem is related to the patient having had open heart surgery." The
> more advanced student will be able to process all of the information and
> go back "Yeah, they had open heart surgery but they had an interrupt heart
> attack. They had a long clamp time (when they stop the heart for the process)
> and it was technically difficult," and that "they had problems with bleeding
> during the surgery"... considering all of the other aspects. They might
> even taken into account the patient's state of mind before going into surgery...
> the family support surrounding that patient, depending on what the particular
> problem was. There are these other different things. You know that is another
> way of looking at the situation.

The professor from Soil Management indicated that even if constructive thinking were not measurable, he still believes it provides choice to the practitioner. The opportunity is provided and the students take the opportunity.

> Maybe that is all professors should really care about. If they decide not
> to take it, well then it is not a black and white thing either. It is just different
> levels and degrees of constructive thinking to which they [rise] ...if [students]
> do any, at all or something in between."

Summary of findings. Based on the findings from this question, the professors found constructive thinking to be particularly challenging to measure. One respondent compared constructive thinking to qualitative methodology suggesting that constructive thinking could be observed through practice, individual conferences, dialogue, and journal entries. Another professor mentioned that maybe it was not so

important to measure constructive thinking and suggested that it still provided choice to the practitioner.

Different Philosophies Regarding Constructive Thinking

The question was: *Were there any different philosophies regarding constructive thinking according to Faculty or instructional level (undergraduate/graduate)?* A common theme that emerged from interviewing the professors was that constructive thinking was viewed more as an umbrella encompassing all forms of knowing, while critical thinking was more related to technical knowledge. For the undergraduate programs, eight out of ten professors felt more comfortable using constructive thinking later in the program as opposed to the beginning of the program. Two professors out of eight did not wait to use constructive thinking in undergraduate classes and incorporated elements of it in their teaching at all levels from the beginning of the course. Among the professors who taught graduate courses, six out of ten, were implementing both critical and constructive thinking in their instruction and interaction with students.

Summary of Findings (Study Three)

Findings associated with Study Three focused on how professors from selected disciplines who had participated in a workshop entitled *Transforming Critical Thinking to Constructive Thinking* use constructive thinking within their courses. Other areas that were addressed in Study Three were professor views of critical and constructive thinking, challenges and concerns integrating constructive thinking into instructional practice, and different philosophies regarding constructive thinking.

Integrating Constructive Thinking into Practice

All of the professors from selected disciplines indicated how they used constructive thinking within their courses. Several characteristics of constructive thinking emerged from the qualitative data: the importance of establishing teams of students to discuss content stimulated higher learning and higher levels of thinking, promoting asking questions and life-long learning, emphasizing the learning process as opposed to the final product or performance, drawing out student abilities, paralleling learning to real-life scenarios, learning to be humble, questioning why in relation to a certain position, idea or concept, active learning, building relationships with students, valuing the whole person, making time to discuss content, recognizing "aha" moments, receiving feedback during learning and teaching process, differentiating assignments, and seeking truth.

Differences in Critical and Constructive Thinking

All of the professors believed there was a difference between critical and constructive thinking. While the professors believed in general that constructive thinking needed to be tempered by critical thinking, one professor from Architecture believed that constructive thinking was "very much on the cutting theoretical edge …couched in terms of communicative action." Professors from the Faculty of Nursing linked critical thinking to the scientific side of the profession and constructive thinking to the humanitarian side.

Critical thinking was associated with a variety of characteristics: objectivity, male sect view of social relationships which is an authoritarian hierarchical model, linked to a mind focus approach in learning, a way of carrying out merely an analysis without an end solution, and the study of argumentation. In comparison, constructive thinking was

described as: an attempt to move toward a more appropriate post-modern epistemological base, an integration of a more feminist perspective building caring relationships and a community of learning, and a holistic perspective that takes into account building a better society, better relationships, and different ways of knowing. When professors were asked how they implemented strands of constructive thinking into their teaching practice, they spoke about the importance of valuing experience during the learning process, integrating different ways of knowing, building caring relationships with others, and extending learning beyond the parameters of the classroom to benefit society.

When operationalizing the first strand of the definition of constructive thinking that centered on constructive thinking as being a reflective and active process that values the role of experience, one Nursing professor used the analogy of a microwave oven. In learning, "You just need stand time." While one professor from Anthropology suggested that building caring relationships might lead to ethical dilemmas, a professor from the Nursing faculty thought that caring distinguished between nurses who were dutiful and efficient, and nurses who were, in addition, also concerned with the overall welfare of patients. In discussing the last strand of constructive thinking, creating new ideas and concepts that benefit society, the professors suggested that this element distinguishes between professionals who make a commitment to develop professionally and those who are content to maintain the status quo.

Professors felt that there needed to be time spent on examining how constructive thinking could be incorporated into their programs. Many of the professors in this group of ten identified with particular strands of the constructive thinking definition and

believed that they were currently implementing aspects of constructive thinking into classroom practice.

Challenges and Concerns Integrating Constructive Thinking

When asked if they believed constructive thinking could be measured, one professor from Nursing indicated that he thought he could measure constructive thinking by examining qualitative data, through: observations, individual conferences, and journal entries. For two of these professors, recognized teachers of excellence, just bringing what they did from the subconscious to the conscious level was important to them. They were going to examine their practice further based on the study of constructive thinking.

CHAPTER V

Findings and Conclusions

This study explored the concepts of critical and constructive thinking in order to discuss how constructive thinking relates to and extends critical thinking and to identify challenges and concerns associated with integrating constructive thinking at the post-secondary level. This chapter provides a summary and discussion of findings, followed by conclusions, as well as implications for instruction, limitations, and suggestions for further research.

Study One, Two, and Three explored whether or not constructive thinking, as defined in this study, could be captured in a theoretically-based definition applied to specific teaching and learning practice, for example, (a) in an undergraduate university course focusing on writing a research paper? and (b) in other selected disciplines. The findings from Study One, Two, and Three investigated how critical thinking was distinguished from critical thinking, examined similarities and differences between both forms of thinking, how critical and constructive thinking affected student performance as well as differed across student demographics.

Summary of Findings

Distinguishing Constructive Thinking From Critical Thinking

The questions were: *Is constructive thinking distinguishable from critical thinking as defined in this study? Are there similarities/differences between both forms of thinking?* Based on the findings from the quantitative and qualitative data in Studies One and Two, as well as in the qualitative data from Study Three, it was found that, as defined

in this study, constructive thinking was similar to critical thinking in particular areas and different in others.

As indicated in Table 5.1, constructive thinking was related to critical thinking on three out of five of the subset pairings: (1) problem/question at issue and reflective process valuing experience; (2) assumptions and other ways of knowing; as well as (3) supporting data and active process valuing experience. There were, however, two subset pairings that showed that constructive thinking was independent of critical thinking: perspectives/position and caring relationships as well as consequences/conclusions and concepts benefiting society.

Table 5.1

Matching Subsets of Critical and Constructive Thinking

Critical Thinking	Constructive Thinking
*problem/question at issue	*reflective process valuing experience
*assumptions	*other ways of knowing
*perspectives/position	*caring relationships
*supporting data	*active process valuing experience
*consequences	*concepts benefiting society

To determine whether constructive thinking was distinguishable from critical thinking as defined in this study, the instructors were interviewed to find out what they believed were the similarities and differences between both forms of thinking. Although all of the instructors viewed critical thinking as essential to teaching students how to write a research paper, three of the eight could see differences between critical and constructive thinking and saw benefits in both types of thinking. They identified five main differences. Constructive thinking values experience, incorporates and integrates

different ways of knowing, looks at going beyond the analysis of a situation through action, builds caring relationships and enhances inductive research.

All of the professors in Study Three saw a difference between critical and constructive thinking. They tried to incorporate aspects of constructive thinking into their classes, in either graduate or undergraduate classes. Critical thinking was perceived to be different from constructive thinking. Whereas critical thinking was believed to embody an "outmoded concept of objectivity" associated with authoritarianism, as well as being hierarchical in nature with little emphasis on social values, constructive thinking was thought to extend critical thinking, be broader in scope, enhance divergent thinking and help resolve issues through a process that "does not stop" at analysis, builds caring relationships and incorporates different ways of knowing. To one professor, constructive thinking was, theoretically speaking, on "the cutting edge". Constructive thinking was understood as being more holistic in that it helps students discover different ways of knowing, find creative solutions to problems, and build better societies and better relationships.

Various Levels of Critical and Constructive Thinking

The question was: *Are there various levels of critical and constructive thinking?* To find out if there were various levels of critical and constructive thinking related to teaching practice in a 099.111 writing course, instructor scores from the open-ended responses were compared to the qualitative data. It was important to trace the congruency between the instructor close-ended questionnaire scores, the interview and open-ended questionnaire responses. When qualitative interview data was compared to close-ended

instructor questionnaire items, critical and constructive thinking stances became more evident.

Findings showed that instructor critical and constructive thinking scores on the close-ended items matched their stances revealed in both the open-ended questionnaire items and the interview data. Of the eight respondents who completed all of the questionnaire items, seven scores corresponded with instructor viewpoints. If an instructor had a high score on constructive thinking, he or she was implementing this stance in the classroom. There was only one instance out of the eight in which there was a mismatch between instructor perspectives as revealed in the interview and questionnaire scores. This instructor indicated that although he did see the difference between critical and constructive thinking, he was not stressing constructive thinking in his classroom. His responses to the close-ended items indicated, however, that he had a higher constructive thinking score compared to his critical thinking score.

Findings pertaining to the question related to student and instructor perceptions of critical and constructive thinking indicated that instructors do exhibit both critical and constructive thinking as they interact with students. As a result of their emphasis, students obtain a particular perspective regarding how to develop research writing. It was also found that students exhibit varying degrees of critical or constructive thinking based on their individual backgrounds.

Critical and Constructive Thinking In Relation To Student Performance

The question was: *How do critical and constructive thinking, as defined in this study, affect student performance as reflected in research paper and final grades, as well as portfolio ratings?* Critical and constructive thinking, as defined in this study, affected

student performance as reflected in research paper and final grades. Performance differences between students with high critical and high constructive thinking based on research paper and final grades indicated that students with high critical thinking scores performed better in terms of both research paper and final grades than students with high constructive thinking scores. Thus, critical thinking was more connected to student success than constructive thinking as substantiated by the statistical and descriptive analysis.

When the scores from the close-ended items were compared to the open-ended responses, both critical and constructive thinking students tended to learn and value the same outcomes and had similar goals regarding writing research papers. There seemed to be little distinction between the critical and constructive thinking groups based on the open-ended questionnaire responses. Portfolio ratings were also not connected to critical and constructive thinking questionnaire scores.

Differences in Critical and Constructive Thinking Across Student Demographics

The question was: *Are there differences in critical and constructive thinking across student demographics (gender, language, international status, age, and high school grade point average)?* Findings indicated that there were differences in critical and constructive thinking across student demographics (gender, language, and international status).

Gender. Females tended to have higher constructive thinking scores than males on three of the five subsets: reflective process valuing experience, integrating different ways of knowing and building caring relationships.

Language and culture. Language also seemed to affect thinking stance scores. Two unexpected findings from the quantitative data analysis suggest that language and cultural background may play a role in thinking stance. Students whose first language was not English compared to English speakers had higher scores on the critical thinking subset, quality of supporting evidence. Students whose first language was not English also scored higher on three of the five constructive thinking subsets: different ways of knowing, building caring relationships, and concepts benefiting society. When the questionnaire data for international students were compared to that of English speakers, English speaking students had significantly higher scores on two of the five critical thinking subsets: problem/question at issue and consequences/conclusions.

Integrating Constructive Thinking

The question was: *Can constructive thinking be integrated along with critical thinking in the 099.111 writing course and other selected disciplines? If so, how?* Findings showed that constructive thinking can be integrated along with critical thinking in the 099.111 writing course and other selected disciplines. Based on findings from Study One and Two, the possibility that critical and constructive thinking could partner in developing student writing ability appeared. The instructional emphasis in the 099.111 writing course is, nonetheless, on how to develop critical thinking skills related to research paper writing. Both quantitative and qualitative analysis supported this finding by showing that high critical thinking scores were related to better student performance based on research paper and final grades. The question remains, however, whether constructive thinking is a worthwhile implementation goal? To determine if constructive

thinking can be integrated along with critical thinking in the 099.111 writing course, an in-depth look into the classroom was required, hence Study Two.

Even though these instructors did not take part in a formal research intervention on constructive thinking and how to implement constructive thinking in the classroom, there were three who were unconsciously integrating strands of the constructive thinking definition into their instruction. While teaching the process of writing a research paper, these instructors indicated to their students how constructive thinking allows them to value experience, incorporate and integrate different ways of knowing, look at going beyond the analysis of a situation through action, build caring relationships and carry out inductive research. There was one instructor who indicated that he thought he did not have time to emphasize the elements associated with constructive thinking, but showed in his responses to the close-ended questionnaire items that he valued constructive thinking as part of teaching students how to write a research paper. This seemed remarkable, because at the time that he completed the questionnaire he had not been formally introduced to the concept of constructive thinking. There were no differences related to gender, age or experience in the instructor data regarding who would readily use constructive thinking in their classrooms.

Study Three focused on how professors from selected disciplines who had participated in a workshop entitled *Transforming Critical Thinking to Constructive Thinking* use constructive thinking in their courses. Other areas that were addressed in Study Three were professorial views on critical and constructive thinking, challenges and concerns associated with integrating constructive thinking into instructional practice, and different philosophies regarding constructive thinking. While the professors believed in

general that constructive thinking needed to be tempered by critical thinking, one professor from Architecture believed that constructive thinking was "very much [on] the cutting theoretical edge...couched in terms of communicative action." Professors from the Faculty of Nursing linked critical thinking to the scientific side of the profession and constructive thinking to the humanitarian side.

When operationalizing the first strand of the definition of constructive thinking that centered on constructive thinking as being a reflective and active process that values the role of experience, one Nursing professor used the analogy of a microwave oven. In learning, "You just need stand time." While one professor from Anthropology suggested that building caring relationships might lead to ethical dilemmas, a professor from the Nursing faculty thought that caring distinguished between nurses who were dutiful and efficient, and nurses who were, in addition, also concerned with the overall welfare of patients. In discussing the last strand of constructive thinking, creating new ideas and concepts that benefit society, the professors suggested that this element distinguishes between professionals who make a commitment to develop professionally and those who are content to maintain the status quo.

Professors felt that there needed to be time spent on examining how constructive thinking could be incorporated into their programs. Many of the professors in this group of ten identified with particular strands of the constructive thinking definition and believed that they were currently implementing aspects of constructive thinking into classroom practice. When asked if they believed constructive thinking could be measured, one professor from Nursing indicated that he thought he could measure constructive thinking by examining qualitative data, through: observations, individual

conferences, and journal entries. For two of these professors, recognized teachers of excellence, just bringing what they did from the subconscious to the conscious level was important. Their aim was to examine their practice further based on the study of constructive thinking.

Discussion of Findings

Distinguishing Constructive from Critical Thinking

Similarities. Based on a review of the questionnaire items constructed from a synthesis of the literature on critical and constructive thinking, it is not surprising to find that three of the five subset pairings overlap (problem/question at issue and reflective process valuing experience, assumptions and other ways of knowing, supporting data and active process valuing experience). An examination of the questionnaire shows that problem/question at issue and reflective process valuing experience are counterparts of one another in that they both require the writer to be clear about the problem or research question and to possess an in depth understanding of the topic. But as John Dewey observed, and as set out in the definition of constructive thinking, imagination leads learners to meanings derived from past experiences and brings those meanings to the present, providing new insights and a more conscious understanding of what is being learned (cited in Greene, 1995). The items in this section of the questionnaire failed to identify this facet of constructive thinking and the items in this section of the questionnaire may not, therefore, have discriminated between the two forms of thinking.

Where assumptions and different ways of knowing interconnect are in using reason to formulate a position. The focus of a research paper from a critical thinking perspective is to build an argument in order to persuade the reader that the position is justified (Ennis, 1987; McPeck, 1981; Paul, 1992; Pascarella & Terenzini, 1991). The

constructive thinking section of the questionnaire also emphasized formulating a clear argument. It is not surprising, therefore, that the questionnaire did not discriminate between the two tenets, critical and constructive thinking, on these dimensions. Supporting data is necessary in taking a position regardless of thinking stance. From a constructive thinking point of view, there is similarly, the need to review factual information and the qualification that a position be based on evidence. Constructive thinking also attempts to have students develop inner voice through the integration of different ways of knowing (reason, imagination, intuition, and emotion) (Belenky et al., 1997; Cambourne, 2000; Palmer, 1999; Piaget, 1966, Schon, 1983; Thayer-Bacon, 2000). It seeks to expand upon the justified position to create optimal or progressive solutions to problems, looking for answers that may not yet have been explored or pursued (DeBono, 2000). Differences between these two forms of thinking on this dimension (assumptions, different ways of knowing) were not captured in this subset pairing.

The critical thinking dimension of quality of supporting evidence (persuading your audience that your stance on the issue is well-supported) is related to the constructive thinking element of active process valuing experience (drawing on references and experience, making personal connections, internalizing intrinsic values, and learning something new). The critical thinking dimension, however, is more external in that it attempts to draw from other references, while the constructive thinking dimension is more internal, seeking understanding from the integration of different ways of knowing. The distinction between external and internal learning in conducting research was not captured by the questionnaire as it currently stands.

Differences. Correlational analysis findings on two of the five subset pairings (perspectives/position and caring relationships and consequences and concepts benefiting society) indicated differences between critical and constructive thinking. Students were asked about the value of including opposing positions on their topic in their research papers. While critical and constructive thinking reinforce the importance of acquiring references and assuming a position, constructive thinking differs from critical thinking in that constructive thinking endeavors to have students build caring relationships. Students are encouraged to share their ideas with others, receive feedback on their research papers from a peer or a professor during class time, listen respectfully to other points of view and, in the process, develop sensitivity as well as new insight. According to Noddings (2003), when we teach morality from a rational cognitive approach, "We fail to share with each other the feelings, the conflicts, the hopes and ideas that influence our eventual choices. We share only the justification for our acts and not what motivates and touches us" (p. 8). The questionnaire did, therefore, discriminate between these two separate dimensions of critical and constructive thinking. The writing course instructors captured these differences aptly when they referred to the linear nature of critical thinking, assessing hearts, not just heads, and the place of intuition or "Faye" in constructive thinking.

The questionnaire also discriminated between the critical thinking dimension associated with consequences and the importance of justifying an argument in comparison to constructive thinking which emphasizes concepts that benefit society-- how the research impacts a family member, an organization, the community, the environment or society as a whole. A paper written from a critical thinking perspective

reflects well-supported research and is rewarded as a complete and graded product. To use constructive thinking demands that students look within and beyond the parameters of the research literature, and apply their insight and creativity to imagine new possibilities in their own lives and the lives of those in their community (Cunningham & Fitzgerald, 1996; DeBono, 2000; John-Steiner, 1997; Manzo, 1998).

Although all of the 099.111 writing instructors viewed critical thinking as essential in teaching students how to write a research paper, three participants perceived a difference between critical and constructive thinking and associated benefits with both types of thinking. They identified five main differences between critical and constructive thinking. From their perspective, constructive thinking values experience, incorporates and integrates different ways of knowing, looks at going beyond the analysis of a situation through action, builds caring relationships and develops inductive approaches to research. There were no differences related to instructor gender, age, or years of teaching experience and views on constructive thinking.

Critical thinking was viewed by instructors as one form of knowing and way of interacting with the world, often reinforced in the western university setting as a tradition borrowed from the Greeks. Critical thinking was matched with the use of logic and reason, to deductive research, to the ability to create a well-formed argument and to Bloom's Taxonomy. Critical thinking was described as more of an evaluative and linear process as well as being more theoretical than constructive thinking. Three instructors thought that critical thinking should be the focus of instruction when writing a research paper. These three instructors felt students required critical thinking skills to form a solid

knowledge base before they were introduced to constructive thinking. These convictions were governed, in part, by course time constraints and perceived language barriers.

Findings from this qualitative analysis are substantiated by the literature on critical thinking. Students in post-secondary classes dominated by critical thinking are conditioned to believe that they must use their logical reasoning skills to ask and answer questions, identify issues and assumptions, differentiate fact from opinion, engage in making assertions, make correct inferences, and analyze arguments. Clarifying, defending, challenging, or judging the positions of others based on logic is what is valued (Beck, 2000; Galotti, 1998; Halpern, 1993; McWhorter, 2000, Novelli, 2000; Tsui, 1998; Wilson, 1998; Zeidler & Duplass, 2002). Thus, students learn that in developing a university assignment, an objective, neutral voice is preferred. Reporting research findings supported by both facts and documented research is, in many cases, a sign that a high degree of academic excellence has been attained. The relationship between research paper, final course grades and critical thinking revealed in Study One confirmed this assumption.

When the instructors had an opportunity to think about the operational definition of constructive thinking, they were able to relate the strands to their teaching practice and explain how those strands differed from critical thinking. In contrast to critical thinking, there is little information on how constructive thinking translates into instructional practice at the post-secondary level. Constructive thinking attempts to have students look at themselves as a whole (mind, body, and spirit) (DeBono, 2000; Thayer-Bacon, 2000), while critical thinking is restricted mainly to the use of the intellect (Beck, 2000; Galotti, 1998; Halpern, 1993; McWhorter, 2000; Novelli, 2000; Tsui, 1998; Wilson, 1998;

Zeidler & Duplass, 2002). Constructive thinking extends critical thinking in that constructive thinking emphasizes: a reflective and active process valuing experience (Belenky et al. 1997; Cambourne, 2000; Palmer, 1999; Piaget, 1966; Schon, 1983; Thayer-Bacon, 2000; Vygotsky, 1934/1962); different ways of knowing, integrating reason, imagination, emotion and intuition (Cambourne, 2000; Belenky et al., 1997; Palmer, 1999; Schon, 1983; Thayer-Bacon, 2000); developing caring relationships (Lipsitz, 1995; Noddings, 1984, 1992, 1995, 2003); and creating new ideas and concepts that benefit society (DeBono, 2000, Manzo, 1998). Thus, constructive thinking seems to go beyond critical thinking.

Levels of critical and constructive thinking. A comparison of the views of students who scored high on critical thinking with the views of students who scored high on constructive thinking indicated few differences. Both groups of students seemed to have the same intent: to complete the research paper as a final product to be submitted for grading. Gibson (1985) indicates that most of the time students are performing tasks that require the repetition of facts for no more apparent objective than to meet minimal requirements and pass. They then repeat the process in the next class.

Instructors who had high critical or constructive thinking questionnaire scores indicated a similar thinking stance in their interviews. There was only one out of the eight cases in which there was not a match. Even though the instructors were not familiar with the concept of constructive thinking until they were interviewed, their responses reflect tacit knowledge or latent understanding of how it could relate to research paper writing.

Critical and constructive thinking in relation to student performance ie. research paper, final grades, and portfolio ratings. A further examination of the constructs of

critical and constructive thinking that compared close- and open-ended responses to

research paper and final grades, as well as portfolio ratings, revealed that there were

differences in student performance for those with high critical and high constructive

thinking scores. Students with high critical thinking scores performed better on both

research paper and final grades than high constructive thinking students. These findings

suggest that critical thinking is reinforced and rewarded in the university setting, while

constructive thinking is not. The focus in assessing research assignments appears to be

on the use of reason and forming a logical argument (Ennis, 1987; McPeck, 1981; Paul,

1992; Pascarella & Terenzini, 1991). There were wide discrepancies among raters in the

assessment of the writing portfolios. As discussed further in "Limitations" section,

findings based on portfolio evaluations were therefore deemed inconclusive.

   Gender. Based on questionnaire findings, there was also a statistically significant

relationship between student gender and critical and constructive thinking. Compared to

males, female students tended to have higher scores on constructive thinking with higher

scores on the following constructive thinking subsets: reflective process valuing

experience, integrating different ways of knowing, and developing caring relationships.

There were no other significant critical/constructive thinking relationships related to

gender.

   A qualitative research study conducted by Belenky et al. (1997) supports this

gender-related finding for the subset pairings reflective process valuing experience and

integrating different ways of knowing. After interviewing 145 women, Belenky and her

colleagues (1997) found the following themes regarding knowing emerged: silence,

received knowledge (listening to the voice of others), subjective knowledge (the inner

voice), procedural knowledge (the voice of reason), and constructed knowledge

(integrating the voices). Constructed knowledge shares some of the characteristics of

constructive thinking in that constructed knowledge is an attempt to integrate knowledge

felt intuitively with knowledge learned from others. Belenky and her colleagues (1997)

describe this process of coming to know as weaving together the strands of rational and

emotive thought and integrating objective and subjective knowing, allowing individuals

to look from the inside out and the outside in. When individuals look within, they are

reflecting on what their different ways of knowing (reason, imagination, emotion,

intuition) are telling them. This integration of different ways of knowing is their inner

voice. If individuals are aware of their inner voice, they act with immediate insight into

the situation in which they find themselves.

For women to have scored higher than men on the subset of building caring

relationships is not an unexpected finding. Noddings (1984; 2003) believes that caring is

a feminine approach to ethics and moral education. It is "more typical of women than of

men." (p. 2). She explains that:

> An ethic built on caring is, I think, characteristically and essentially
> feminine – which is not to say, of course, that it cannot be shared by
> men, any more than we should care to say that traditional moral
> systems cannot be embraced by women. But an ethic of caring arises,
> I believe, out of our experience as women, just as the traditional
> logical approach to ethical problems arises more obviously from
> masculine experience (p. 8).

In our society, it is traditionally women who have assumed the role of caring for others

(Noddings, 1984; 2003).

Language and culture. Two unexpected findings from the quantitative data

analysis suggest that language and cultural background may play a role in thinking

stance. Students whose first language was not English had higher scores on the critical thinking subset of quality of supporting evidence compared to students whose first language was English. Students whose first language was not English may examine the evidence and source of evidence more closely to look for precision, relevance and completeness, observe cause and effect and address existing or potential consequences. Perhaps because English is not their first language, they were taking more time to check or verify the meaning of what they were reading and writing. It is unclear whether or not an awareness of another language and culture impacts the critical or constructive thinking process as the close-ended items require further refinement.

Students whose first language was not English also scored significantly higher on three out of the five subsets of constructive thinking: different ways of knowing, building caring relationships, and concepts benefiting society. Those students whose first language was not English thus seemed to internalize the importance of providing evidence to support their research as was emphasized in their classes, but cultural values may also have factored into their responses. Findings were different, however, when the critical/constructive thinking responses of national and international students were compared. A one-way ANOVA indicated that national students had higher scores on two subsets of critical thinking; problem/question at issue and conclusions/implicating consequences. This finding suggests that national students are more familiar with taking time to develop a thesis statement and formulating arguments based on research. Further in depth research to establish how thinking stance may be influenced by language and culture is required.

Integration of constructive thinking along with critical thinking in the 099.111 writing course and other selected disciplines. In exploring how constructive thinking could be translated from theory into practice in the 099.111 writing course comparisons were made between student and instructor questionnaire data and follow up instructor interviews for each course section.

There is still a question remaining as to whether these instructors influenced the thinking stance of their students. The quantitative findings did not indicate a significant statistical relationship between instructor/student thinking stance. This result was not unexpected. The instructor and student questionnaires were administered approximately midway into the course. Unfortunately, there was no end-of-course questionnaire administered to allow comparisons to determine growth or development in thinking stance over the course of instruction.

Based on the findings from both the open-ended questionnaire responses and the interview transcripts, instructors exhibited a particular thinking stance while teaching the process of writing, and these expectations were part of their instructional style. They emphasized critical thinking as part of the course curriculum.

The composition of each class section was different for each of the nine participating course sections and had different numbers of students with high critical and high constructive thinking scores. It was interesting to note that the instructor who had the highest constructive thinking score also had the second highest critical thinking score. He had the highest response rate for portfolio submissions among the group of eight instructors. On the extreme end, the instructor who had the lowest constructive thinking score had an average critical thinking score. Based on the number of students in his class,

he had the lowest number of portfolios submissions. Any findings from this data, however, would need to be substantiated in further studies with a larger number of participants.

Professors from selected disciplines wanted to balance elements of critical and constructive thinking in their instruction. They were able to distinguish the difference between both forms of thinking, and in doing so encouraged their students to: find optimal solutions to problems by working together with peers, realize that learning is an ongoing process that extends into their professional life, and know that they will ultimately be placed in situations where there is no immediate right or wrong answer. Students were given hypothetical real-life situations and asked to find optimal solutions. They also hoped to draw on student knowledge and experience and have them share their ideas as they studied course content. They believed that when students are not sure about answers or solutions to problems, they must, as active learners, find out more about the subject area and ask questions. Explaining "Why?" was perceived as particularly important to learning. The professors constructed a learning environment in which students had opportunities to discover how knowledge about a topic can be pieced together like a puzzle, with each student adding a dimension (Greene, 1995; Palmer, 1998; Thayer-Bacon, 2000). The professors also asked their students to go beyond the parameters of their classroom and apply their insight and creativity to imagine new possibilities in their own lives and in their community (Cunningham & Fitzgerald, 1996; DeBono, 2000; John-Steiner, 1997; Manzo, 1998).

For two professors, it was important that students learned to be humble, open to other perspectives and make learning a lifetime process. Students must know that it is

necessary to work with others. They are part of a system where every one is interconnected. By serving as role models, they wanted their students to become more aware of the needs of others as well as their own. According to Noddings (1992), there are four major components to moral education: modeling, dialogue, practice and confirmation. When students are shown and told that they matter and this is modeled while they learn, they feel valued for who they are and know what it means to be cared for. Through open-ended dialogue, students connect with each other as they search for common understanding, empathy, or appreciation and they build substantial knowledge from one another as they listen (Noddings, 1984, 1992, 1995, 2003).

All of the professors who were interviewed indicated that they were using constructive thinking in their disciplines. They felt critical thinking enabled them to create a solid technical knowledge base, whereas constructive thinking extended student learning to include building interpersonal relationships and applying their knowledge to real-life scenarios. This finding reinforces the difference between critical and constructive thinking by highlighting the need to build caring relationships as well as new concepts and ideas to benefit society (DeBono, 2000; Thayer-Bacon, 2000).

These professors also employed a variety of instructional formats, including lectures, small and large group discussion, use of films and artifacts, and individual interviews, films. In contrast to earlier studies (Goodlad, 1983; Karp, 1985), who reported finding minimal student-teacher interaction and little or no emphasis on higher-order thinking, professors described how important it was to consider the different abilities and interests of their students. These findings fit with the tenets of effective

teaching that encourage taking student diversity and the dynamic interplay of motivation

and cognition into account in college classrooms (Chism, 1998; Pintrich, 1998).

When the findings from interview transcripts were compared to the theoretical

characteristics of constructive thinking classrooms, as described in Chapter Two, there

were many similarities between practice and theory:

a) a safe, encouraging atmosphere for students to express themselves,
b) differentiate instruction that appeals to the diverse backgrounds and gifts of students,
c) time to share ideas, reflect, revise and edit work,
d) opportunities for students to choose topics that are intrinsically motivating
e) ongoing formative assessment, interaction, and conferences with peers, instructors/professors and others about what is being learned,
f) the development of self-efficacy,
g) lessons connected to students' lives and community and
h) a curriculum that is centered around caring.

When these characteristics were compared to professional practice as shown

through the interviews, almost all were evident. A curriculum that is centered around

caring, was perhaps, least developed, although three participants from the Faculty of

Nursing spoke about how essential caring is to their profession. From the transcript

analysis, three more characteristics emerged: creating a process for discovery, capturing

the "aha" moments, and drawing out students' interests, abilities, and experiences as

opposed to cramming in content.

Constructive thinking enables professors to draw upon student interests, abilities

and experience and engage them during the learning process by creating a community of

learners. If students are taught to value different ways of knowing and to build caring

relationships with others, the learning emphasis changes. Students are not just thinking

about attaining high grades but how they can help others and benefit society. Critical

thinking draws upon student intellect and individual performance. If critical and constructive thinking were partners in the learning process, students' caring side would begin to be nurtured. Constructive thinking asks students to think about how ideas and concepts can be applied in a progressive manner so that society as a whole benefits. If students were taught that constructive thinking was important at the university level, they could take what they learned and apply these principles in their career. They would be able to incorporate different ways of knowing into their practice, focus on caring, develop initiative, and balance deductive with inductive research.

Conclusions

The definition of constructive thinking used in this exploratory study is new. It is a synthesis of combined works and defined as a reflective and active process valuing experience that integrates different ways of knowing including reason, imagination, intuition, and emotion, builds caring relationships with others, and creates new ideas and concepts that benefit society (Hewlett, 2003). While the student/instructor questionnaire did differentiate between critical and constructive thinking on two dimensions (perspectives/position and caring relationships, and consequences and concepts benefiting society), further refinement of the questionnaire is required to capture the differences between problem/question at issue and reflective process valuing experience, assumptions and other ways of knowing, as well as quality of supporting data and active process valuing experience. While some participants felt the wording of the definition of constructive thinking was too "touchy, feely" and objected to the use of words having to do with emotion, intuition and caring, participants who supported the constructive thinking definition believed that it had merit. They appreciated the inclusion of other

ways of knowing, the ethic of caring as well as the progressive and humanistic direction of creating new ideas and concepts to benefit society.

Thirteen of the eighteen respondents, even those who had not seen the definition before being interviewed, were able to articulate how they applied critical and constructive thinking to their classroom practice and were able to distinguish the difference between both forms of thinking. When participants reviewed the definition, instructors and professors were able to explain how they applied strands of constructive thinking in their practice and assessment citing the importance of:

1) integrating different ways of knowing as part of the learning process,
2) demonstrating caring so that students in turn would model caring to others,
3) connecting student learning to real life scenarios so that students could see beyond the parameters of the classroom,
4) drawing on student abilities and strengths through differentiated instruction as opposed to cramming in content,
5) facilitating and valuing collaboration during class time,
6) modeling active listening during one-to-one conversations and class discussions,
7) discovering that learning is more than right or wrong answers that need to be justified but incorporates exploring new possibilities
8) looking at going beyond the analysis of a situation through action,
9) making an analogy between constructive thinking and inductive research,
10) creating ideas and concepts to benefit society and
11) valuing students for their experiences as well as for who they are, as opposed to valuing only their academic performance.

Even though the questionnaire data from students indicated that strands of constructive thinking were gender specific, with female scores higher on certain subsets, the qualitative data from the interviews seemed to suggest otherwise. Both women and men viewed either all or some of these constructive thinking strands as important and were integrating elements of constructive thinking into their classroom practice. The number of interviews was too small to make any inferences, however. Further research into gender and constructive thinking is required. Findings regarding

differences in thinking stance related to language and culture also opens new avenues for future research.

Participants who were interested in constructive thinking did not seem constrained by faculty. There appeared to be interest at the post secondary level in finding ways to balance critical and constructive thinking within instructional practice. Some participants mentioned that there was a particular challenge associated with using constructive thinking in undergraduate classrooms. They honored the development of a solid, technical base on critical thinking before introducing concepts related to constructive thinking. There were, however, two professors, recognized by the university as teachers of excellence, who did focus on constructive thinking at the undergraduate as well as the graduate level.

The overall question was: *Can constructive thinking, as defined in this study, be captured in a theoretically-based definition and applied to specific teaching and learning, for example, (a) in an undergraduate university course focusing on writing a research paper? and (b) in other courses in selected disciplines?* This study attempted to develop and assess an operational definition of constructive thinking. Constructive thinking is an abstract concept, that is challenging to quantify. The more efforts are made to talk to practitioners, and to link theory to practice, the more elements regarding constructive thinking arise from the subconscious to the conscious level. From a qualitative perspective, participants in this study believed that constructive thinking can be measured through dialogue, observations, journal entries, and individual interviews. These measures of constructive thinking require further study.

The rubric to assess the presence of constructive thinking in student writing portfolios also needs refinement.

Based on the findings from this study, there was overlap from constructive thinking theory to instructional practice in a variety of disciplines. The implications of these findings may (1) help students to extend their learning beyond critical thinking; (2) assist instructors in teaching students through new methods that embrace constructive thinking, and (3) guide future researchers in refining the assessment of critical thinking and constructive thinking. The challenge of future research is to continue and further identify the various components of constructive thinking and how these components apply or relate to student learning and instructional practice across levels and disciplines.

Implications for Classroom Instruction

When professors use constructive thinking, they are incorporating many teaching behaviors used by exemplary teachers. Parris and Block (2004) and Ruddell (2004) identify behaviors that characterize influential teachers from primary to secondary grade levels. In their view, exemplary teaching includes the ability to interact with students using a wide variety of instructional approaches and activities, incorporate critical thinking skills, ask questions, provide choice in negotiating assignments, and appeal to the diverse needs of learners.

Parris and Block (2004) and Ruddell (2004) emphasize the relationship between teachers and students and the importance of caring personally. They also cited as important qualities "being prepared and organized with a clear plan for achieving goals,

willing to take risks and experiment, being creative, and having high expectations of self, as well as fostering a love of learning" (Parris & Block, 2004, p. 20).

Implications for Future Research

There are many implications for further research that spring from this exploratory study. Three main areas to consider include refining the definition of constructive thinking to further delineate it from critical thinking, conducting an item analysis of each of the close-ended questionnaire items to establish construct validity and reliability, and developing better measures of student performance related to critical and constructive thinking. The portfolio rating rubric and in depth training of raters using exemplars from this study to establish better inter-rater reliability requires further exploration.

If critical and constructive thinking are interrelated but differ according to certain subset pairings (perspectives/position-caring relationships and consequences-concepts benefiting society), there are opportunities to explore further how these dimensions operate together, how they differentiate and how they can be measured. Critical thinking appears to be basic in the development of academic knowledge and is reinforced in a university setting. Constructive thinking, however, is challenging to measure. It is connected to different ways of knowing, experience, caring, and concepts that benefit society.

There may be other elements of constructive thinking that were not measured by the questionnaire. While the five subsets of constructive thinking used in this study were developed from a review of the literature, the fact that the final number of constructive thinking subsets in the definition was five was also governed by the need to correspond with the five subsets of critical thinking. Given the early developmental stage of the

definition and the questionnaire, the present items attempting to delineate and define constructive thinking are at best limiting. A thorough approach to construct validity and reliability is required through further item analysis that focuses on both the quality and number of test items, as well as administration procedures.

When critical and constructive thinking scores from the close-ended responses were analyzed, an interesting pattern emerged. The response range between critical and constructive thinking scores for the majority of student participants on the close-ended questionnaire items was from six to forty-six points. When students' scores were equal for both forms of thinking, research paper and the final grade performance differences were minimal. Questions that arise from this finding include: Does this range indicate an intangible related to performance? Is a quantitative methodology the best way to measure the presence/absence of constructive thinking? Perhaps more unobtrusive and long term forms of measurement would yield more definitive results by observing class interaction, by assessing writing for tone, by reading journal entries, or by evaluating long term relationships between instructors and students after graduation.

Based on the quantitative data, it appears that constructive thinking does not enhance grade performance. The question is, however, if instructors and professors were involved in an instructional intervention that emphasized the value of constructive thinking would conventional performance levels be improved? Questions that remain unanswered are: Do instructors with a constructive thinking stance influence students to become more constructive thinkers? Or, alternately, do critical thinking instructors influence students in that direction? Or does it matter? Will students adopt a particular

learning stance regardless and is their performance better when taught by a similar-minded instructor?

Further, if constructive thinking in addition to critical thinking were to be fostered and nurtured in the university setting, would students discover other aspects of themselves about which they were not aware? Would there be aptitude changes related to the drive for extrinsic rewards in the form of high grades to an appreciation of learning for the sake of learning?

Limitations

Construct Validity of Close-Ended Items on the Questionnaire

For this study to be replicated, the close-ended items on the questionnaire need to be re-examined. The replication would involve a further item analysis to determine whether items were measuring the respective critical and constructive subsets. If participant perceptions on each item were similar, then the item would be worth retaining. Each of the items needs to be reviewed separately to find out which items correlate and which items do appear to measure the subset pairings: problem/question at issue-reflective process valuing experience, assumptions-other ways of knowing, supporting data-active process valuing experience, perspectives/position-caring relationships, and consequences-concepts benefiting society. There were 46 participants out of the 165 who did not answer all of the questions. Those questions may have to be reworded or deleted from the questionnaire.

There were 21 unanswered questions that occurred during the administration of the close ended questionnaire items. These items need to be reviewed separately to discover whether they were worded in such a way that the question was difficult to

understand or whether students did not have sufficient experience writing research papers to respond. These items would have to be either deleted from the questionnaire or reworded. To find out if students do not know how to respond to a particular item, an "I don't know" response could be added to the Likert scale. Once the modifications of the questionnaire items were made, the questionnaire could be piloted further. Instructions would direct participants to respond to all items. Should the questionnaire contain a similar number of items after the item analysis, sixty minutes should be allotted to allow for completion. Questionnaire pilot testing in this study would have been extremely beneficial to improve construct validity and reliability.

Many of the questionnaire items are related to the quality of good research writing and have also been associated with critical thinking skills. Some of the items and associated values remain to be justified. As this was the first time the definition and the questionnaire were administered, there are still many areas of the questionnaire to revise.

Reversals. Reversals were included within each subset of the questionnaire to detect those respondents who were simply checking items without reading and thinking. Some items require further refinement due to a problem with reversal foils. For example, in the *Critical Thinking Subset: Problem/Question at Issue:* Item #7 "In writing their research papers, to what extent do you encourage your students to: arrive at a thesis immediately" was contrasted with Item #1 "In writing their research papers, to what extent do you encourage your students to: take the time to state the thesis." Item #7 was meant to reinforce the premise that time should be taken to "state clearly the thesis" and "to adjust their thinking regularly" (p. 128) from *Paul (1992) Intellectual Standards to Assess Student Thinking (*p. 127).

Another example occurred in item #8 in the *Critical Thinking Subset: Problem/Question at Issue*, "In writing their research papers, to what extent do you encourage your students to: focus on one main question?" was meant to be a foil or reversal for Item #3 "In writing their research papers, to what extent do you encourage your students to: break the question into sub-questions?" This item should be omitted. If it is reworded as a reversal, the item should capture the idea that the paper focuses only on one dimension. Washington State University's *Critical Thinking Rubric* (Kelly-Riley et al., 2001) indicates that for a substantially developed paper, the writer should include "subsidiary, embedded, or implicit aspects of the main problem."

Item #12 in the *Critical Thinking Subset: Assumptions*, "In writing their research papers, to what extent do you have your students: create an argument found in their research?" was meant to be a foil or reversal for item #18: "In writing their research papers, to what extent do you have your students: draw on information not available from assigned sources." This item attempted to capture the essence of Washington State University *Critical Thinking Rubric* regarding position or stance in a research paper, that is: "fails to clarify the established or presented position relative to one's own."

Further regarding item # 9, *Constructive Thinking Subset: Reflective Process Valuing Experience,* that stated, "In writing their research papers, to what extent do you encourage your students to: choose a topic that has limited research resources?" This item was not supposed to be a reversal, even though it is coded as such in the coding key.

Item #18 *Constructive Thinking Subset: Active Process Valuing Experience* read: "In writing their research papers, to what extent do you have your students choose an assigned topic?" This item was a foil or reversal for item #12 "In writing their research

papers, to what extent do you have your students choose a research topic that is meaningful to them." Even though it was meant to be a reversal for #12, it does not adequately reflect the scenario offered in the 099.111 writing course. The 099.111 students are allowed to choose from a variety of assigned topics or design a proposal to develop a topic that is more meaningful and purposeful to them. This item should be worded differently to reflect this scenario.

Many items may not be clearly related to the concept of constructive thinking such as two question items in the constructive thinking section that were reversals: "Focus on the research paper as a means to an end" (Item 49) and "View the research paper as a completed product" (Item 50). These items should be deleted from the questionnaire as they reflect attitude toward the assignment as opposed to interest in the subject.

The coding key also needed to indicate all of the reversals. Two items that did not show the reversal of critical thinking "to accept public information without question" (Item 26) and "automatically dismiss positions different from your own" (Item 34). Why should it be anti-constructive to choose a topic that has limited research resources (Item 9) or to choose an assigned topic (Item 18)? In addition, many items may not be clearly related to the concept of constructive thinking. These question items would have to be discussed, analyzed and evaluated in order to determine their relevance. In particular, there were two question items in the constructive thinking section that were reversals: "focus on the research paper as a means to an end" (Item 49) and "view the research paper as a completed product." For these problems to be addressed, dialogue among the 099.111 instructors would have to occur to create a more refined rubric to delineate the

differences between the two forms of thinking and how they would be represented in research writing.

Range of Scores Between High and Low Critical and Constructive Thinking

The low and high scores were demarcated by 1-12 > 13. The difference between 12 and 13 is questionable because there was little difference between the low and high ranges of critical and constructive thinking. The high and low levels were created to determine whether there was another way to examine student performance and instructor practice qualitatively. It was interesting to observe how many points there were between the critical and constructive thinking scores for each participant. As there are many concerns regarding the instrument used to measure critical and constructive thinking, the associated values remain to be justified. (See Appendix G.)

Portfolio Ratings

After revisions have been made to the constructive thinking rubric, it is imperative that all of the reviewers be trained on how to use the constructive thinking rubric. If the constructive thinking rubric is to develop better inter-rater reliability scores, it would be important to follow The Washington State University Writing Project model. Over the last three years, the Washington State University has provided its faculty with a one thousand dollar incentive to become involved in their writing project and refine the critical thinking rubric (Kelly-Riley, 2005). For faculty members to receive one thousand dollars, they must attend a two to three day workshop on how to use the critical thinking rubric with their students. Once training has been completed, participating faculty members instruct their students on the evaluation criteria used in the rubric and assess student research papers based on the rubric. These faculty members, however, do not

mark the research papers independently. They assess the papers using the critical thinking rubric together with exemplars with a group of faculty members until all of the student work has been graded. New exemplars of the critical thinking rubric are collected over each semester. Portfolio raters in any future study could be trained to identify critical and constructive thinking elements using exemplar portfolios from the current study. The Washington State University Writing Project also offers "brown bag" information sessions over lunch periods during the semester so that students and faculty can review the critical thinking rubric anchors, ask questions, clarify misunderstandings and receive feedback.

Instructor Feedback Related to Constructive Thinking Definition

Some of the instructors had difficulty with the definition of constructive thinking and reacted with surprise when asked how to respond. It would have been beneficial to hear more about what they had to say. Unfortunately the instructors only had time to react to the definition on paper during the interview. In Study Three, the responses were lengthier because the professors were already familiar with the concept.

Measurability of Constructive Thinking

A question remains as to whether or not constructive thinking needs to be formally measured by quantitative means. Perhaps more unobtrusive and long term forms of measurement would yield more definitive results. For example, a writing course instructor who was a participant in Study Two suggested that constructive thinking could not be quantified but could be measured qualitatively by observing relationships and by examining different ways of representing knowledge, such as art. Two felt that elements of constructive thinking could be analyzed by evaluating writing in terms of tone. One of

the professors in Study Three who believed he had unconsciously implemented strands of constructive thinking during his classroom practice over the years, knew himself to be successful when students sought him out after earning their university degrees in Engineering. Another professor from Soil Management wondered if it was necessary to measure constructive thinking at all as long as it was a choice of emphasis for teaching practitioners. One Nursing professor believed qualitative data (observation, dialogue, journal entries) reflected strands of constructive thinking.

Constructive thinking is an elusive concept. The most important question is whether or not further examination of the concept would be valuable. For students to be able to integrate different ways of knowing, build caring relationships, and create new ideas and concepts are, in and of themselves, important. Through constructive thinking, students learn that their inner voice plays an essential role in their lives and helps them to grow and develop as an intrinsic learner. What motivates and touches their hearts is what inspires them to want to learn and help others. The beauty that lies within each of the participants does not have to be measured, but nurtured. If post-secondary teachers instill these values, this exploratory study has investigated the heart of learning and teaching.

Epilogue

Many of the characteristics that exemplify influential teaching parallel the characteristics related to constructive thinking classrooms. When professors balance critical thinking with constructive thinking, they appeal not only to objective, scientific views of the world, but also incorporate humanistic elements related to teaching and learning. They are viewing student strengths and abilities from a holistic perspective.

So much of our world has disconnected us from our souls. Our growth and development is not through material gain, it is through the nourishment of students' minds, hearts, and bodies that we create an investment for the future and the next generation. When we are able to show caring in everything we say and do, we are conveying what everyone so desperately needs--a caring for the mind, body, and spirit of every living thing within the environment in which we live.

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APPENDIX A

Questionnaire For 099.111 Student

Section A: Demographics

Please circle the appropriate category:

1. How many credit hours are you taking this year? (Note: half courses = 3 credit hours, full courses = 6 credit hours)

    a) 3   b) 6   c) 9   d) 12   e) 15

2. If more than 15 credit hours, how many credit hours are you taking this year?

    a) 18   b) 21   c) 24   d) 27   e) 30 or more

3. Gender: a) Female   b) Male

Please answer 4 or 5:

4. Your age if between 17-26:

    a) 17-18 b) 19-20 c) 21-22 d) 23-24 e) 25-26

5. Your age if 27 or older?

    a) 27-30 b) 31-35 c) 36-40 d) 41-45 e) older than 45

6. Your grade point average (%) in your last year of high school:

    a) 50% or less   b) 51-55%   c) 56-60%   d) 61-65%   e) 66-70%

If higher than 70% go to the next question

7. Your grade point average (%) in your last year of high school:

    a) 71-75%   b) 76-80%   c) 81-85%   d) 86-90%   e) 91-100%

8. What percentage (%) do you expect to get in 099.111 Introductory to University at the end?

    a) 50 % or less   b) 51-55%   c) 56-60%   d) 61-65%   e) 66-70%

    If higher than 70% go to the next question

9. What percentage (%) do you expect to get in 099.111 Introductory to University at the end?

    a) 71-75%   b) 76-80%   c) 81-85%   d) 86-90%   e) 91-100%

Note: Questions 1-9 are from Dr. Schonwetter's Questionnaire FYE02X-1

Section B: How to Use Critical Thinking in the Process of Building A Research Paper

Problem/Question At Issue

When writing your research paper, to what extent did you:

		Never	Seldom...Sometimes...Often...Very Often			
1.	Take the time to state the thesis	1	2	3	4	5
2.	Try to be clear about the question you are attempting to settle	1	2	3	4	5
3.	Break the question into sub-questions	1	2	3	4	5
4.	Find solutions to the problem	1	2	3	4	5
5.	Be clear about the thesis	1	2	3	4	5
6	Have unanswered questions about the topic	1	2	3	4	5
7.	Arrive at the thesis immediately	1	2	3	4	5
8.	Focus on one main question	1	2	3	4	5
9.	Answer all questions about the topic	1	2	3	4	5
10.	Choose a significant problem to research	1	2	3	4	5

Assumptions

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
11.	Take the information source as truth	1	2	3	4	5
12.	Create an argument as found in the research literature	1	2	3	4	5
13.	Make reasonable assumptions	1	2	3	4	5
14.	Judge background facts	1	2	3	4	5
15.	Consider the evidence supporting your argument	1	2	3	4	5
16.	Spell out the implications of your reasoning in as clear and precise a way as possible	1	2	3	4	5
17.	Question the validity of the information source	1	2	3	4	5
	Draw on information not available from assigned sources	1	2	3	4	5
19.	Address pros and cons that underlie the issue	1	2	3	4	5
20.	Identify the key assumptions that underlie the issue	1	2	3	4	5

*: This questionnaire format will change when administered to the students. The critical and constructive thinking items will be randomized and subsets will not be indicated.

Quality of Supporting Data/Evidence

When writing your research paper, to what extent did you:

	Never	Seldom	Sometimes	Often	Very Often
21. Repeat information provided in research	1	2	3	4	5
22. Question the evidence for accuracy	1	2	3	4	5
23. Persuade your audience that your stance on the issue is well-supported	1	2	3	4	5
24. Focus on information relevant to the question at issue	1	2	3	4	5
25. Distinguish between fact and opinion	1	2	3	4	5
26. Accept public information without question	1	2	3	4	5
27. Add information not described in the research review	1	2	3	4	5
28. Create an argument based on opinion	1	2	3	4	5
29. Assimilate information in an organized manner	1	2	3	4	5
30. Deny evidence without adequate justification	1	2	3	4	5

Perspectives/Position

When writing your research paper, to what extent did you:

	Never	Seldom	Sometimes	Often	Very Often
31. Present your own perspective in the analysis of the issue	1	2	3	4	5
32. Support your perspective from experience	1	2	3	4	5
33. Try to persuade your audience that your position is right	1	2	3	4	5
34. Automatically dismiss positions different from your own	1	2	3	4	5
35. Discuss other possible perspectives in your research	1	2	3	4	5
36. Actively search for information contrary to your position	1	2	3	4	5
37. Exclude your point of view from the issue	1	2	3	4	5
38. Include academic research only	1	2	3	4	5
39. Focus on one point of view found in research	1	2	3	4	5
40. Address additional diverse perspectives drawn from outside information	1	2	3	4	5

Conclusions/ Implicating Consequences

When developing your conclusion, to what extent did you:

	Never	Seldom	Sometimes	Often	Very Often
41. See where the issue could create further problems	1	2	3	4	5
42. Draw all points of the argument together	1	2	3	4	5
43. Use facts to assert your argument	1	2	3	4	5
44. Study the implications of your research	1	2	3	4	5
45. Write your personal opinion	1	2	3	4	5
46. Discuss how the evidence supports the argument	1	2	3	4	5
47. Focus only on what is found in the research	1	2	3	4	5
48. Not connect research together	1	2	3	4	5
49. Mention possible ramifications	1	2	3	4	5
50. Explain the consequences of the issue	1	2	3	4	5

Section C: How to Use Constructive Thinking In The Process of Building A Research Paper

Reflective Process Valuing Experience

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
1.	Take time to plan the writing of your ideas in class	1	2	3	4	5
2.	Assess the quality of your writing as you are making your drafts	1	2	3	4	5
3.	Deepen your understanding about the topic from your readings	1	2	3	4	5
4.	Select a topic that has a broad range of information	1	2	3	4	5
5.	Choose a thesis that is already supported through a wide range of publications	1	2	3	4	5
6.	Come up with new questions to further research your topic	1	2	3	4	5
7.	Take time to plan the writing of your ideas outside of class	1	2	3	4	5
8.	Submit a final copy of your paper without having completed draft(s)	1	2	3	4	5
9.	Choose a topic that has limited research resources	1	2	3	4	5
10.	Focus on a research issue without asking questions	1	2	3	4	5

Active Process Valuing Experience

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
11.	Learn something new	1	2	3	4	5
12.	Choose a research topic that is meaningful to you	1	2	3	4	5
13.	Collect a variety of text references	1	2	3	4	5
14.	Build a logical argument	1	2	3	4	5
15.	Support your personal opinion	1	2	3	4	5
16.	Draw upon your personal experience to connect with your research topic	1	2	3	4	5
17.	Collect a variety of internet sources	1	2	3	4	5
18.	Choose an assigned research topic	1	2	3	4	5
19.	Focus only on facts from research	1	2	3	4	5
20.	Negotiate your topic to research	1	2	3	4	5

Different Ways of Knowing

When writing your research paper, to what extent do you:

	Never	Seldom	Sometimes	Often	Very Often
21. Hypothesized "What if?" or "Supposing That?"	1	2	3	4	5
22. Feel passionate about the issue	1	2	3	4	5
23. Listen to your intuition	1	2	3	4	5
24. Know the topic is right for you	1	2	3	4	5
25. Formulate a clear argument	1	2	3	4	5
26. Convey the feeling you have in the tone of your research paper	1	2	3	4	5
27. Remain factual about the issue	1	2	3	4	5
28. Make your approach to research creative	1	2	3	4	5
29. Choose a topic based on the amount of research available	1	2	3	4	5
30. Write personal opinion about the issue	1	2	3	4	5

Caring Relationships

When writing your research paper, to what extent do you:

	Never	Seldom	Sometimes	Often	Very Often
31. Share your research ideas with others	1	2	3	4	5
32. Receive feedback on your research paper from the instructor before you turned it in for grading	1	2	3	4	5
33. Listen respectfully to other points of view	1	2	3	4	5
34. Have a peer review your research paper	1	2	3	4	5
35. Appreciate the points of view of others	1	2	3	4	5
36. Discuss your research thesis with your peers during class time	1	2	3	4	5
37. Not share you research paper ideas with others	1	2	3	4	5
38. Submit your final paper without having had feedback	1	2	3	4	5
39. Submit your final paper without having had peer feedback	1	2	3	4	5
40. Not bother to collaborate with your peers	1	2	3	4	5

New Ideas and Concepts To Benefit Society

When writing your paper, to what extent did you create a research paper that helps:

	Never	Seldom	Sometimes	Often	Very Often
41. A family member	1	2	3	4	5
42. An organization	1	2	3	4	5
43. Someone	1	2	3	4	5
44. The environment	1	2	3	4	5
45. A community member	1	2	3	4	5
46. Society	1	2	3	4	5

To what extent was your motivation to:

	Never	Seldom	Sometimes	Often	Very Often
47. Obtain a higher grade	1	2	3	4	5
48. Reflect well-supported research	1	2	3	4	5
49. Focus on the research paper as a means to an end	1	2	3	4	5
50. View the research paper as a completed product	1	2	3	4	5

Section D: Open-Ended Questions

1. What did you know about writing a research paper before you began the 099.111 course?

2. What have you learned about writing a research paper while attending the 099.111 course?

3. What do you think is the most important thing about writing a research paper?

4. What factors or conditions help you to write your very best? Please describe in detail.

5. What do you hope to accomplish when you write a research paper?

6. What faculty are you hoping to attend next year after you complete the University One program? Please indicate why you wish to attend this particular faculty.

APPENDIX B

Coding Key for Questionnaire (099.111 Student)

Note: When each subset is scored, there will be a range of 10 to 50 points. For each reversal, a formula of (6 - x) = ___ will be used. (r) indicates a reversal.

Section A: Demographics

Please circle the appropriate category:

1. How many credit hours are you taking this year?
   (Note: half courses = 3 credit hours, full courses = 6 credit hours)

       a) 3   b) 6   c) 9   d) 12   e) 15

2. If more than 15 credit hours, how many credit hours are you taking this year?

       a) 18   b) 21   c) 24   d) 27   e) 30 or more

3. Gender: a) Female   b) Male

4. Your age if between 17-26:

       a) 17-18 b) 19-20 c) 21-22 d) 23-24 e) 25-26

5. Your age if 27 or older?

       a) 27-30 b) 31-35 c) 36-40 d) 41-45 e) older than 45

6. Your grade point average (%) in your last year of high school:

       a) 50% or less   b) 51-55%   c) 56-60%   d) 61-65%   e) 66-70%

If higher than 70% go to the next question

7. Your grade point average (%) in your last year of high school:

       a) 71-75%   b) 76-80%   c) 81-85%   d) 86-90%   e) 91-100%

8. What percentage (%) do you expect to get in 099.111 Introductory to University at the end?

       a) 50 % or less   b) 51-55%   c) 56-60%   d) 61-65%   e) 66-70%

   If higher than 70% go to the next question

9. What percentage (%) do you expect to get in 099.111 Introductory to University at the end?

       a) 71-75%   b) 76-80%   c) 81-85%   d) 86-90%   e) 91-100%

Note: Questions 1-9 are from Dr. Schonwetter's Questionnaire FYE02X-1

Section B: How to Use Critical Thinking in the Process of Building A Research Paper

Problem/Question At Issue

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
1.	Take the time to state the thesis	1	2	3	4	5
2.	Try to be clear about the question you are attempting to settle	1	2	3	4	5
3.	Break the question into sub-questions	1	2	3	4	5
4.	Find solutions to the problem	1	2	3	4	5
5.	Be clear about the thesis	1	2	3	4	5
6	Have unanswered questions about the topic	1	2	3	4	5
7.	Arrive at the thesis immediately (r)	1	2	3	4	5
8.	Focus on one main question (r)	1	2	3	4	5
9.	Answer all questions about the topic (r)	1	2	3	4	5
10.	Choose a significant problem to research	1	2	3	4	5

Assumptions

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
11.	Take the information source as truth (r)	1	2	3	4	5
12.	Create an argument as found in research (r)	1	2	3	4	5
13.	Make reasonable assumptions	1	2	3	4	5
14	Judge background facts	1	2	3	4	5
15.	Consider the evidence supporting your argument	1	2	3	4	5
16.	Spell out the implications of your reasoning in as clear and precise a way as possible	1	2	3	4	5
17.	Question the validity of the information source	1	2	3	4	5
18.	Draw on information not available from assigned sources	1	2	3	4	5
19.	Address pros and cons that underlie the issue	1	2	3	4	5
20.	Identify the key assumptions that underlie the issue	1	2	3	4	5

Quality of Supporting Data/Evidence

When writing your research paper, to what extent did you:

	Never	Seldom	Sometimes	Often	Very Often
21. Repeat information provided in your literature review (r)	1	2	3	4	5
22. Question the evidence for accuracy	1	2	3	4	5
23. Persuade your audience that your stance on the issue is well-supported	1	2	3	4	5
24. Focus on information relevant to the question at issue	1	2	3	4	5
25. Distinguish between fact and opinion	1	2	3	4	5
26. Accept public information without question (r)	1	2	3	4	5
27. Add information not described in your literature review	1	2	3	4	5
28. Create an argument based on opinion	1	2	3	4	5
29. Assimilate information in an organized manner	1	2	3	4	5
30. Deny evidence without adequate justification (r)	1	2	3	4	5

Perspectives/Position

When writing your research paper, to what extent did you:

	Never	Seldom	Sometimes	Often	Very Often
31. Present your own perspective in analyzing the issue	1	2	3	4	5
32. Support your perspective from experience	1	2	3	4	5
33. Try to persuade your audience that your position is right	1	2	3	4	5
34. Automatically dismiss positions different from your own (r)	1	2	3	4	5
35. Discuss other possible perspectives in your own research	1	2	3	4	5
36. Actively search for information contrary to your position	1	2	3	4	5
37. Exclude your point of view from the issue (r)	1	2	3	4	5
38. Include academic research only (r)	1	2	3	4	5
39. Focus on one point of view found in research (r)	1	2	3	4	5
40. Address additional diverse perspectives drawn from outside information	1	2	3	4	5

Conclusions/ Implicating Consequences

When developing your conclusion, to what extent did you:

	Never	Seldom	Sometimes	Often	Very Often
41. See where the issue could create further problems	1	2	3	4	5
42. Draw all points of the argument together	1	2	3	4	5
43. Use facts to assert your argument	1	2	3	4	5
44. Study the implications of your research	1	2	3	4	5
45. Write your personal opinion	1	2	3	4	5
46. Discuss how the evidence supports the argument	1	2	3	4	5
47. Focus only on what is found in the research (r)	1	2	3	4	5
48. Not connect research together (r)	1	2	3	4	5
49 Mention possible ramifications (r)	1	2	3	4	5
50. Explain consequences of the issue	1	2	3	4	5

Section C: How to Use Constructive Thinking In The Process of Building A Research Paper

Reflective Process Valuing Experience

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
1.	Take time to plan the writing of your ideas in class	1	2	3	4	5
2.	Assess the quality of your writing as you are making your drafts	1	2	3	4	5
3.	Deepen your understanding about the topic from your readings	1	2	3	4	5
4.	Select a topic that has a broad range of information	1	2	3	4	5
5.	Choose a thesis that is already supported through a wide range of publications	1	2	3	4	5
6.	Come up with new questions to further research your topic	1	2	3	4	5
7.	Take time to plan the writing of your ideas outside class	1	2	3	4	5
8.	Submit a final copy of your paper without having completed a draft(s) (r)	1	2	3	4	5
9.	Choose a topic that has limited research resources (r)	1	2	3	4	5
10.	Focus on a research issue without asking questions (r)	1	2	3	4	5

Active Process Valuing Experience

When writing your research paper, to what extent did you:

		Never	Seldom	Sometimes	Often	Very Often
11.	Learn something new	1	2	3	4	5
12.	Choose a research topic that is meaningful to you	1	2	3	4	5
13.	Collect a variety of text references	1	2	3	4	5
14.	Build a logical argument (r)	1	2	3	4	5
15.	Support your personal opinion	1	2	3	4	5
16.	Draw upon your personal experience to connect with your research topic	1	2	3	4	5
17.	Collect a variety of internet sources	1	2	3	4	5
18.	Choose an assigned research topic (r)	1	2	3	4	5
19.	Focus only on facts from research (r)	1	2	3	4	5
20.	Negotiate your topic to research	1	2	3	4	5

Different Ways of Knowing

When writing your research paper, to what extent do you:

	Never	Seldom	Sometimes	Often	Very Often
21. Hypothesized "What if?" or "Supposing That?"	1	2	3	4	5
22. Feel passionate about the issue	1	2	3	4	5
23. Listen to your intuition	1	2	3	4	5
24. Know the topic is right for you	1	2	3	4	5
25. Formulate a clear argument	1	2	3	4	5
26. Convey the feeling you have in the tone of your research paper	1	2	3	4	5
27. Remain factual about the issue (r)	1	2	3	4	5
28. Make your approach to research creative	1	2	3	4	5
29. Choose a topic based on the amount of research available	1	2	3	4	5
30. Write personal opinion about the issue	1	2	3	4	5

Caring Relationships

When writing your research paper, to what extent do you:

	Never	Seldom	Sometimes	Often	Very Often
31. Share your research ideas with others	1	2	3	4	5
32. Receive feedback on your research paper from the instructor before you turned it in for grading	1	2	3	4	5
33. Listen respectfully to other points of view	1	2	3	4	5
34. Have a peer review your research paper	1	2	3	4	5
35. Appreciate the points of view of others	1	2	3	4	5
36. Discuss your research thesis with your peers during class time	1	2	3	4	5
37. Not share your research paper ideas with others (r)	1	2	3	4	5
38. Submit your final paper without having had any feedback (r)	1	2	3	4	5
39. Submit your final paper without having had peer feedback (r)	1	2	3	4	5
40. Not bother to collaborate with your peers (r)	1	2	3	4	5

New Ideas and Concepts To Benefit Society

When writing your paper, to what extent did you create a research paper that helps:

	Never	Seldom	Sometimes	Often	Very Often
41. A family member	1	2	3	4	5
42. An organization	1	2	3	4	5
43. Someone	1	2	3	4	5
44. The environment	1	2	3	4	5
45. A community member	1	2	3	4	5
46. Society	1	2	3	4	5

To what extent was your motivation to:

	Never	Seldom	Sometimes	Often	Very Often
47. Obtain a higher grade (r)	1	2	3	4	5
48. Reflect well-supported research (r)	1	2	3	4	5
49. Focus on the research paper as a means to an end (r)	1	2	3	4	5
50. View the research paper as a completed product (r)	1	2	3	4	5

Section D: Open-Ended Questions

1. What did you know about writing a research paper before you began the 099.111 course?

2. What have you learned about writing a research paper while attending the 099.111 course?

3. What do you think is the most important thing about writing a research paper?

4. What factors or conditions help you to write your very best? Please describe in detail.

5. What do you hope to accomplish when you write a research paper?

6. What faculty are you hoping to attend next year after you complete the University One program? Please indicate why you wish to attend this particular faculty.

APPENDIX C

Questionnaire For 099.111 Instructor

Section A: How to Use Critical Thinking in the Process of Building A Research Paper

Problem/Question At Issue

In writing their research papers, to what extent do you encourage your students to:

		Never	Seldom	Sometimes	Often	Very Often
1.	Take the time to state the thesis	1	2	3	4	5
2.	Try to be clear about the question they are attempting to settle	1	2	3	4	5
3.	Break the question into sub-questions	1	2	3	4	5
4.	Find solutions to the problem	1	2	3	4	5
5.	Be clear about the thesis	1	2	3	4	5
6	Have unanswered questions about the topic	1	2	3	4	5
7.	Arrive at the thesis immediately	1	2	3	4	5
8.	Focus on one main question	1	2	3	4	5
9.	Answer all questions about the topic	1	2	3	4	5
10.	Choose a significant problem to research	1	2	3	4	5

Assumptions

In writing their research papers, to what extent do you have your students:

		Never	Seldom	Sometimes	Often	Very Often
11.	Take the information source as truth	1	2	3	4	5
12.	Create an argument found in research	1	2	3	4	5
13.	Make reasonable assumptions	1	2	3	4	5
14.	Fudge background facts	1	2	3	4	5
15.	Consider the evidence supporting their argument	1	2	3	4	5
16.	Spell out the implications of their reasoning in as clear and precise a way as possible	1	2	3	4	5
17.	Question the validity of the information source	1	2	3	4	5
18.	Draw on information not available from assigned sources	1	2	3	4	5
19.	Address pros and cons that underlie the issue	1	2	3	4	5
20.	Identify the key assumptions that underlie the issue	1	2	3	4	5

*This questionnaire format will change when administered to instructors. The critical and constructive thinking items will be randomized and subsets will not be indicated.

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Quality of Supporting Data/Evidence

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
21. Repeat information provided in their literature review	1	2	3	4	5
22. Question the evidence for accuracy	1	2	3	4	5
23. Persuade their audience that their stance on the issue is well-supported	1	2	3	4	5
24. Focus on information relevant to the question at issue	1	2	3	4	5
25. Distinguish between fact and opinion	1	2	3	4	5
26. Accept public information without question	1	2	3	4	5
27. Add information not described in their literature review	1	2	3	4	5
28. Create an argument based on opinion	1	2	3	4	5
29. Assimilate information in an organized manner	1	2	3	4	5
30. Deny evidence without adequate justification	1	2	3	4	5

Perspectives

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
31. Present their own perspective in the analysis of the issue	1	2	3	4	5
32. Support their perspective from experience	1	2	3	4	5
33. Try to persuade their audience that their position is right	1	2	3	4	5
34. Automatically dismiss positions different from their own	1	2	3	4	5
35. Discuss other possible perspectives of their issue	1	2	3	4	5
36. Actively search for information contrary to their position	1	2	3	4	5
37. Exclude their point of view from the issue	1	2	3	4	5
38. Include academic research only	1	2	3	4	5
39. Focus on one point of view found in their review of the research	1	2	3	4	5
40. Address additional diverse perspectives drawn from outside information	1	2	3	4	5

Conclusions/ Implicating Consequences

In developing their conclusions, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
41. See where the issue could create further problems	1	2	3	4	5
42. Draw all points of the argument together	1	2	3	4	5
43. Use facts to assert their arguments	1	2	3	4	5
44. Study the implications of their research	1	2	3	4	5
45. Write their personal opinion	1	2	3	4	5
46. Discuss how the evidence supports the argument	1	2	3	4	5
47. Focus only on what is found in the research	1	2	3	4	5
48. Not connect research together	1	2	3	4	5
49 Mention possible ramifications	1	2	3	4	5
50. Explain the consequences of the issue	1	2	3	4	5

Section B: How to Use Constructive Thinking In The Process of Building A Research Paper

Reflective Process Valuing Experience

In writing their research papers, to what extent do you encourage your students to:

		Never	Seldom	Sometimes	Often	Very Often
1.	Take time to plan the writing of their ideas in class	1	2	3	4	5
2.	Assess the quality of their writing as they are making their drafts	1	2	3	4	5
3.	Deepen their understanding about the topic from their readings	1	2	3	4	5
4.	Select a topic that has a broad range of information	1	2	3	4	5
5.	Choose a thesis that is already supported through a wide range of publications	1	2	3	4	5
6.	Come up with new questions to further research their topic	1	2	3	4	5
7.	Take time to plan the writing of their ideas outside of the classroom	1	2	3	4	5
8.	Submit a final copy without having completed a draft(s)	1	2	3	4	5
9.	Choose a topic that has limited research resources	1	2	3	4	5
10.	Focus on a research issue without asking questions	1	2	3	4	5

Active Process Valuing Experience

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
11. Learn something new	1	2	3	4	5
12. Choose a research topic that is meaningful to them	1	2	3	4	5
13. Collect a variety of text references	1	2	3	4	5
14. Build a logical argument	1	2	3	4	5
15. Support their personal opinion	1	2	3	4	5
16. Draw upon their personal experience to connect with their research topic	1	2	3	4	5
17. Collect a variety of internet sources	1	2	3	4	5
18. Choose an assigned research topic	1	2	3	4	5
19. Focus only on facts from research	1	2	3	4	5
20. Negotiate a topic to research	1	2	3	4	5

Different Ways of Knowing

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
21. Hypothesize "What if?" or "Supposing That?"	1	2	3	4	5
22. Feel passionate about the issue they are researching	1	2	3	4	5
23. Listen to their intuition	1	2	3	4	5
24. Know the topic is right for them	1	2	3	4	5
25. Formulate a clear argument	1	2	3	4	5
26. Convey the feeling they have in the tone of their research papers	1	2	3	4	5
27. Remain factual about the issue	1	2	3	4	5
28. Make their approach to research creative	1	2	3	4	5
29. Choose a topic based on the amount of research available	1	2	3	4	5
30. Include personal opinions about the issue	1	2	3	4	5

Caring Relationships

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
31. Share their research ideas with others	1	2	3	4	5
32. Receive feedback on their research paper from you before they turn it in for grading	1	2	3	4	5
33. Listen respectfully to other points of view	1	2	3	4	5
34. Have a peer review their research paper	1	2	3	4	5
35. Appreciate the points of view of others	1	2	3	4	5
36. Discuss their research thesis with their peers during class time	1	2	3	4	5
37. Not share their research paper ideas with others	1	2	3	4	5
38. Submit their final paper without having had your feedback	1	2	3	4	5
39. Submit their final paper without having had peer feedback	1	2	3	4	5
40. Not bother to collaborate with peers	1	2	3	4	5

New Ideas and Concepts To Benefit Society

To what extent do you encourage your students to create a research paper that helps:

	Never	Seldom	Sometimes	Often	Very Often
41. A family member	1	2	3	4	5
42. An organization	1	2	3	4	5
43. Someone	1	2	3	4	5
44. The environment	1	2	3	4	5
45. A community member	1	2	3	4	5
46. Society	1	2	3	4	5

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
47. Obtain a higher grade	1	2	3	4	5
48. Reflect well-supported research	1	2	3	4	5
49. Focus on the research paper as a means to an end	1	2	3	4	5
50. View the research paper as a completed product	1	2	3	4	5

Section C: Open-Ended Questions

1. Why do you teach writing?

2. What do you think is the most important thing about writing a research paper?

3. How do you develop your students' writing?

4. What factors or conditions help you to teach writing? Please describe in detail.

5. Describe the type of relationship you like to have with your students?

APPENDIX D

Coding Key for Questionnaire (099.111 Instructor)

Note: When each subset is scored, there will be a range of 10 to 50 points. For each reversal, a formula of (6 - x) = ___ will be used. (r) indicates a reversal.

Section A: How to Use Critical Thinking in the Process of Building A Research Paper

Problem/Question At Issue

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
1. Take the time to state the thesis	1	2	3	4	5
2. Try to be clear about the question they are attempting to settle	1	2	3	4	5
3. Break the question into sub-questions	1	2	3	4	5
4. Find solutions to the problem	1	2	3	4	5
5. Be clear about the thesis	1	2	3	4	5
6. Have unanswered questions about the topic	1	2	3	4	5
7. Arrive at the thesis immediately (r)	1	2	3	4	5
8. Focus on one main question (r)	1	2	3	4	5
9. Answer all questions about the topic (r)	1	2	3	4	5
10. Choose a significant problem to research	1	2	3	4	5

Assumptions

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
11. Take the information source as truth (r)	1	2	3	4	5
12. Create an argument found in their research (r)	1	2	3	4	5
13. Make reasonable assumptions	1	2	3	4	5
14. Judge background facts	1	2	3	4	5
15. Consider the evidence supporting their argument	1	2	3	4	5
16. Spell out the implications of their reasoning in as clear and precise a way as possible	1	2	3	4	5
17. Question the validity of the information source	1	2	3	4	5
18. Draw on information not available from assigned sources	1	2	3	4	5
19. Address pros and cons that underlie the issue	1	2	3	4	5
20. Identify the key assumptions that underlie the issue	1	2	3	4	5

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Quality of Supporting Data/Evidence

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
21. Repeat information provided in literature review (r)	1	2	3	4	5
22. Question the evidence for accuracy	1	2	3	4	5
23. Persuade their audience that their stance on the issue is well-supported	1	2	3	4	5
24. Focus on information relevant to the question at issue	1	2	3	4	5
25 Distinguish between fact and opinion	1	2	3	4	5
26. Accept public information without question	1	2	3	4	5
27. Add information not described in their literature review	1	2	3	4	5
28. Create an argument based on opinion	1	2	3	4	5
29. Assimilate information in an organized manner	1	2	3	4	5
30. Deny evidence without adequate justification (r)	1	2	3	4	5

Perspectives

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
31. Present their own perspective in the analysis of the issue	1	2	3	4	5
32. Support their perspective from experience	1	2	3	4	5
33. Try to persuade their audience that their position is right	1	2	3	4	5
34. Automatically dismiss positions different from their own	1	2	3	4	5
35. Discuss other possible perspectives in their own research	1	2	3	4	5
36. Actively search for information contrary to their position	1	2	3	4	5
37. Exclude their point of view from the issue (r)	1	2	3	4	5
38. Include academic research only (r)	1	2	3	4	5
39. Focus on one point of view in their review of the research (r)	1	2	3	4	5
40. Address additional diverse perspectives drawn from outside information	1	2	3	4	5

Conclusions/ Implicating Consequences

In developing their conclusions, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
41. See where the issue could create further problems	1	2	3	4	5
42. Draw all points of the argument together	1	2	3	4	5
43. Use facts to assert their arguments	1	2	3	4	5
44. Study the implications of their research	1	2	3	4	5
45. Write their personal opinion	1	2	3	4	5
46. Discuss how the evidence supports the argument	1	2	3	4	5
47. Focus only on what is found in the research (r)	1	2	3	4	5
48. Not connect research together (r)	1	2	3	4	5
49 Mention possible ramifications (r)	1	2	3	4	5
50. Explain the consequences of the issue	1	2	3	4	5

Section B: How to Use Constructive Thinking In The Process of Building A Research Paper

Reflective Process Valuing Experience

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
1. Take time to plan the writing of their ideas in class	1	2	3	4	5
2. Assess the quality of their writing as they are making their drafts	1	2	3	4	5
3. Deepen their understanding about the topic from their readings	1	2	3	4	5
4. Select a topic that has a broad range of information	1	2	3	4	5
5. Choose a thesis that is already supported through a wide range of publications	1	2	3	4	5
6. Come up with new questions to further research their topic	1	2	3	4	5
7. Take time to plan the writing of their ideas outside of the classroom	1	2	3	4	5
8. Submit a final copy without having completed a draft(s) (r)	1	2	3	4	5
9. Choose a topic that has limited research resources (r)	1	2	3	4	5
10. Focus on a research issue without asking questions (r)	1	2	3	4	5

Active Process Valuing Experience

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
11. Learn something new	1	2	3	4	5
12. Choose a research topic that is meaningful to them	1	2	3	4	5
13. Collect a variety of text references	1	2	3	4	5
14. Build a logical argument (r)	1	2	3	4	5
15. Support their personal opinion	1	2	3	4	5
16. Draw upon their personal experience to connect with their research topic	1	2	3	4	5
17. Collect a variety of internet sources	1	2	3	4	5
18. Choose an assigned research topic (r)	1	2	3	4	5
19. Focus only on facts from research (r)	1	2	3	4	5
20. Negotiate a topic to research	1	2	3	4	5

Different Ways of Knowing

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
21. Hypothesize "What if?" or "Supposing That?"	1	2	3	4	5
22. Feel passionate about the issue they are researching	1	2	3	4	5
23. Listen to their intuition	1	2	3	4	5
24. Know the topic is right for them	1	2	3	4	5
25. Formulate a clear argument	1	2	3	4	5
26. Convey the feeling they have in the tone of their research papers	1	2	3	4	5
27. Remain factual about the issue (r)	1	2	3	4	5
28. Make their approach to research creative	1	2	3	4	5
29. Choose a topic based on the amount of research available	1	2	3	4	5
30. Include personal opinions about the issue	1	2	3	4	5

Caring Relationships

In writing their research papers, to what extent do you have your students:

	Never	Seldom	Sometimes	Often	Very Often
31. Share their research ideas with others	1	2	3	4	5
32. Receive feedback on their research paper from you before they turn it in for grading	1	2	3	4	5
33. Listen respectfully to other points of view	1	2	3	4	5
34. Have a peer review their research paper	1	2	3	4	5
35. Appreciate the points of view of others	1	2	3	4	5
36. Discuss their research thesis with their peers during class time	1	2	3	4	5
37. Not share their research paper ideas with others (r)	1	2	3	4	5
38. Submit their final paper without having had your feedback (r)	1	2	3	4	5
39. Submit their final paper without having had peer feedback (r)	1	2	3	4	5
40. Not bother to collaborate with their peers (r)	1	2	3	4	5

New Ideas and Concepts To Benefit Society

To what extent do you encourage your students to create a research paper that helps:

	Never	Seldom	Sometimes	Often	Very Often
41. A family member	1	2	3	4	5
42. An organization	1	2	3	4	5
43. Someone	1	2	3	4	5
44. The environment	1	2	3	4	5
45. A community member	1	2	3	4	5
46. Society	1	2	3	4	5

In writing their research papers, to what extent do you encourage your students to:

	Never	Seldom	Sometimes	Often	Very Often
47. Obtain a higher grade (r)	1	2	3	4	5
48. Reflect well-supported research (r)	1	2	3	4	5
49. Focus on the research paper as a means to an end (r)	1	2	3	4	5
50. View the research paper as a completed product (r)	1	2	3	4	5

Section C: Open-Ended Questions

1. Why do you teach writing?

2. What do you think is the most important thing about writing a research paper?

3. How do you develop your students' writing?

4. What factors or conditions help you to teach writing? Please describe in detail.

5. Describe the type of relationship you like to have with your students?

APPENDIX E

Professor Interview Guide

Introduction

Thank you very much for taking the time to participate within this research project. Before we begin this interview, I just wanted to let you know that I will be taking the following measures to protect the confidentiality of your responses:

    -all individual interviews will be tape-recorded, transcribed
     and transcriptions returned to individuals for approval before
     being analyzed as data,
    -no citations that identify the individual participants will be used,
     pseduonyms will be used instead,
    -tapes will be destroyed upon completion of the study,
    -the tapes and transcripts will be stored in a secured filing cabinet
     within my office at home.

Any questions before we begin the interview?

Questions During The Interview

Note: Some prompting may be used to have the participant elaborate further

1. What are you currently teaching?
2. How long have you been teaching?
3. What is your philosophy of education?
4. What do you enjoy the most about teaching this course?
5. What do you least enjoy about teaching this course?
6. What do you use to assess your students?
7. Do you use formative assessment?
8. Do you use summative assessment?
9. When you are instructing, how do you meet the diverse needs of your students?
10. How do you give your students' feedback during the learning process?
11. Is social interaction important within the learning process? If so, why or Why not?
12. Do you encourage discussion and exchange of ideas? If so, how?
13. Do you lecture or do you have group activities?
14. What do you do when you have students who seem withdrawn?
15. Is it important to know the students' names and their personalities?
16. When you are teaching your students, do you focus on their strengths or their weaknesses? What do you consider effective instruction?
17. What do you do when you have a student who does not spell well or does not use grammar well but is very creative?
18. How would you describe the atmosphere within your classroom?
19. How would you describe your students?

20. Describe what kind of research papers you would like to see from your students?
21. How do you have your students use critical thinking within their research papers?
22. After reading the definition of constructive thinking*, do you think that constructive thinking can be used within the process of building a research paper?
23. After reading the definition of constructive thinking,* do you think that constructive thinking can be used within your discipline?

Definition of Constructive Thinking: is a reflective and an active process, that values experience, integrates different ways of knowing (reason, emotion, intuition, and imagination), builds caring relationships with others and creates new ideas and concepts to benefit society.

Conclusion

Once again, thank you very much for participating in this research study!

APPENDIX F

Letter of Consent For Students
For 099.111 Research Project

     This letter is called a consent form and its purpose is to ensure that you have voluntarily agreed to participate in this research knowing in general what it is about and what will be asked of you. There are three separate agreements regarding your participation in this study which includes: (1) completing a questionnaire which will take approximately 30 minutes of time, (2) sharing personal information including your high school grade point average and first term at university grade point average as well as releasing both your research paper and final course grades to the investigator and (3) agreeing to have your writing portfolios (peer-reviewed paper, self-reflection, and final graded paper with instructor feedback identified only by student numbers) photocopied by the University of Manitoba Copy Center without having to pay the cost of copying your work. Please read this form, and if you agree to participate, please sign it in the appropriate places before proceeding with the questionnaire.

Consent To Participate

Description of This Research Study

     I, Kim Hewlett, am conducting a study in partial fulfillment for my doctoral degree in *Language and Literacy* within the Faculty of Education. This research seeks to understand elements of critical and constructive thinking which are part of the process of writing a research paper. Once your responses to elements of thinking have been collected, the data from this research will be compared to see: (1). how they relate to each other, and (2) whether they are related in any way to the grades obtained, high school grade point average and first year grade point average. Your participation in this study will require you to complete the following questionnaire. Completing this questionnaire will require approximately 30 minutes of class time. After this course has been completed, I would also like to ask your permission to access your grades for your research paper and final grade from your 099.111 instructor.

     To examine how different ways of knowing and thinking influence the writing process itself, I would like to review a selected number of portfolios (N=6) chosen by either 099.111 instructor or by the 099.111 instructor and myself. These portfolios will be examined for what they reveal about the concept of writing as a process (drafts, re-drafts, revisions, and product). If you are interested in having the steps of completing the course research paper assignment monitored by me, please indicate at the bottom of the consent form that you give permission for me to look at your portfolio. Students who give permission to have their writing portfolio photocopied, may go to the University of Manitoba Copy Center. You will be able to have your writing portfolio photocopied without having to pay. The employee at the University of Manitoba Copy Center only requires your student number. You would white out your name before copying your

work. The student number is all that is required. Once your writing portfolio has been copied, the employee of the University of Manitoba Copy Center will put your writing portfolio into a sealed envelope and indicate your student number on the envelope. I will pick up the portfolios when the University of Manitoba Copy Center indicates that they are ready.

Your participation is completely voluntary. You may withdraw from this study at any time, without penalty of any kind. Be assured that all of the information you provide will be kept confidential, and used only by the researcher. The final results of this research will only be reported in aggregate form (e.g. average rating, general group trends, etc.). No individual student will ever be identified. Pseudonyms will be used and data will be handled in a way to protect the identity of individual participants. All of the data will be shredded upon completion of this study. An executive summary of the study will be posted in the main office in Room 205 Tier. If you have access to the Internet, you will also be able to view the results on the University 1 website. Results are usually posted approximately eight months after the study has been completed.

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researcher from their legal and professional responsibilities. You are free to withdraw without penalty from the study at any time, and/ or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

This research has been approved by the Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact me at , my advisor, Dr. Beverley Zakaluk at 474-7070 or the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

Sincerely,

Kim Hewlett

Please note that there are three separate consent forms. Sign only those facets of the project in which you agree to participate:

_____

OPTION TO CONSENT TO PARTICIPATE BY FILLING OUT THE QUESTIONNAIRE (please complete blank areas)

I, (please print name) _____, have read and understand the above description of the study, and agree to participate. I understand that I will be asked to fill out one questionnaire. This questionnaire should take approximately 30 minutes to complete during 099.111 class-time. I also understand that my identity and data that I provide to the researcher will be kept confidential, and that any reports of the finished research will report only aggregate results. I also understand that my participation is completely voluntary and that I may withdraw from the study at any time, without penalty, if I decide that I no longer wish to participate. The questionnaire will be shredded upon completion of the study.

Student Number _____ Date _____

OPTION TO CONSENT TO RELEASE 099.111 GRADES TO RESEARCHER

A very important aspect of the 099.111 Research Project is to determine the effects of different ways of knowing and thinking that are called into play while writing a research paper and how they are related to grades. Because of this, we are asking for your permission to obtain your 099.111 test scores and grades from your instructor at the end of the course. As with all other information collected, your grades will also be kept confidential, and any results reported only in aggregate form (e.g. class averages). Please indicate below as to whether you additionally consent to the researchers obtaining your 099.111 research paper and final course grades from your instructor.

I, (please print name) _____(circle only one) GRANT / DO NOT GRANT the researcher permission to obtain my 099.111 course grades from my 099.111 instructor.

Student Number: _____

Signature: _____

Name of My 099.111 Instructor: _____

Section Number of 099.111 Course: L_____

Date: _____

OPTION TO CONSENT TO RELEASE PORTFOLIOS FROM 099.111 COURSE WORK TO RESEARCHER

Students who are interested in having the steps they follow in completing the course research paper assignment monitored by the researcher, are invited to participate. A small number of students (N = 6) will be invited to submit copies of their research paper drafts and samples of some of their course work selected by the researcher. Students who participate in this area are able to take their writing portfolios to the University of Manitoba Copy Center and have their work photocopied without having to pay. The employee at the University of Manitoba Copy Center will ask that you give your student number and then the writing portfolio will be photocopied. You would white out your names and indicate only your student number for identification. The photocopied writing portfolio will be placed in an envelope, sealed and your student number will be placed on it. The researcher will pick up the photocopied writing portfolios from the University of Manitoba Copy Center. You will submit your copied portfolio to your course instructor. Your identity would be protected in the following ways:

      -pseudonyms will be used in reporting and,
      -no citations that identify individual participants will be used.

Please indicate as to whether you give additional consent to the researcher to obtain samples of your 099.111 course work from your instructor. Upon completion of the study, the copies of your portfolio will be shredded.

I, (please print your name) _____(circle only one) GRANT / DO NOT GRANT the researcher permission to obtain samples of my course work within 099.111 from my 099.111 instructor.

Student Number:_____

Signature: _____

Name of my 099.111 instructor: _____

Section Number of 099.111 course: L_____

July 6, 2003

Dear _____,
     (Name of Instructor)

     I am conducting an exploratory study in partial fulfillment for my doctoral degree in *Language and Literacy* in the Faculty of Education at the University of Manitoba. This research will investigate how the theory of constructive thinking can be put into practice within the context of the University 1 writing course. The purpose of the study is to define constructive thinking, compare critical thinking with constructive thinking, describe the role of constructive thinking in enhancing student engagement and determine if constructive thinking can be used as a predictor of student success. The research questions associated with this study are predicated at three levels:

Level One: Constructive Thinking Defined

1. What is constructive thinking?
2. How can constructive thinking be measured?

Supplementary Questions:
3. Is constructive thinking independent of critical thinking?
   How does constructive thinking compare with critical thinking?

Level Two: Constructive Thinking As A Predictor of Student Success

     Does constructive thinking enhance student success?

Level Three: Constructive Thinking Across Disciplines

     How are instructors or professors using constructive thinking within their courses?
     How is constructive thinking best taught? What are the challenges?

     To determine elements of constructive thinking and critical thinking during the research writing process, a questionnaire has been developed for you to complete. This questionnaire will be administered towards the end of February. It will take approximately 20 minutes to complete this questionnaire. Be assured that all of the information you provide will be kept confidential, and only used by the researcher. The final results of this research will be reported in aggregate form (eg. average rating, general trends, etc.). No individual participant will ever be identified, and data will be handled in a way to protect the identity of individual participants. Questionnaires will be shredded upon completion of the study.

Personal interviews will be scheduled for 30 to 45 minutes. These interviews will be audio-taped so that the transcripts can be used as the data. Notes will also be taken during the interview to ensure that your answers have been heard in case the audio-taping does not record adequately. You will have an opportunity to review your answers before the data is formally analyzed. Your identity will be protected in the following ways to ensure confidentiality:

    -all individual interviews will be audio-taped, transcribed and
    transcriptions, returned to individuals for approval before being analyzed as data
    member-check),
    -no citations that identify individual participants will be used,
    pseudonyms will be used instead,
    -audio-tapes will be destroyed upon completion of the study,
    -during the study, the tapes and transcripts will be stored in a secured
    filing cabinet within my office at home.

To augment the interview data, a copy of your course syllabus would be greatly appreciated. This syllabus would only be used to determine what kind of summative and formative assessment you are using with your students. It will be kept confidential and will be used only by the researcher.

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information. I may be reached by telephone at 832-6215. You might wish to contact my advisor Dr. Beverley Zakaluk at 474-7070.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researcher from her legal and professional responsibilities. You are free to withdraw from the study at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

This research has been approved by the Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

Yours sincerely,

Kim Hewlett

CONSENT FORM FOR A PERSONAL INTERVIEW

I agree to participate in an interview to explore Constructive Thinking from theory to practice.

_____

(Participant's Name – Please Print)   (Participant's Signature)   (Date)

_____

(Researcher's Name)   (Date)

- -

CONSENT FORM FOR COMPLETING A QUESTIONNAIRE

In addition, I agree to complete a questionnaire towards the end of the 099.111 course.

_____

(Participant's Name – Please Print)   (Participant's Signature)   (Date)

_____

(Researcher's Name)   (Date)

CONSENT FORM FOR SUBMITTING A COURSE SYLLABUS

In addition, I agree to submit a course syllabus of the 099.111 course.

_____

(Participant's Name – Please Print)   (Participant's Signature)   (Date)

_____

(Researcher's Name)   (Date)

Letter of Consent For Professors From Other Disciplines

July 6, 2003

Dear _____,
     (Name of Professor)

       I am conducting an exploratory study in partial fulfillment for my doctoral degree in *Language and Literacy* in the Faculty of Education at the University of Manitoba. This research will investigate how the theory of constructive thinking can be put into practice within the context of the University 1 writing course. You are being invited to take part because of your previous enrollment in the University Teaching Services (U.T.S.) workshop on *Transforming Critical Thinking to Constructive Thinking*. Interview data from you will help identify the issues and concerns that surround assuming a constructive thinking stance in your university teaching. The purpose of the study is to define constructive thinking, compare critical thinking with constructive thinking, describe the role of constructive thinking in enhancing student engagement and to determine if constructive thinking can be used as a predictor of student success. The research questions associated with this study are predicated at four levels.

Level One: Constructive Thinking Defined

1. What is constructive thinking?
2. How can constructive thinking be measured?

Supplementary Questions:

3. Is constructive thinking independent of critical thinking?
   How does constructive thinking compare with critical thinking?

Level Two: Constructive Thinking As A Predictor of Student Success

Does constructive thinking enhance student success?

Level Three: Constructive Thinking Across Disciplines

How are instructors or professors using constructive thinking within their
4. How is constructive thinking best taught? What are the challenges?

       Personal interviews will be scheduled for 30 to 45 minutes. These interviews will be audio-taped so that the transcripts can be used as data. Notes will also be taken during and directly following the interview. Your identity will be protected in the following ways to ensure confidentiality.

-all individual interviews will be auditio-taped, transcribed and
   transcriptions returned to individuals for approval before being
   analyzed as data (member-check),
-no citations that identify individual participants will be used,
   pseudonyms will be used instead,
-audio-tapes will be destroyed upon completion of the study,
-during the study, the tapes and transcripts will be stored in a secured
   filing cabinet within my office at home.

This consent form, a copy of which will be left with you for your records and
reference, is only part of the process of informed consent. It should give you the basic
idea of what the research is about and what your participation will involve. If you would
like more detail about something mentioned here, or information not included here, you
should feel free to ask. Please take the time to read this carefully and to understand any
accompanying information. I may be reached by telephone at   You might wish
to contact my advisor, Dr. Beverley Zakaluk at 474-7070.

Your signature on this form indicates that you have understood to your
satisfaction the information regarding participation in the research project and agree to
participate as a subject. In no way does this waive your legal rights nor release the
researcher from her legal and professional responsibilities. You are free to withdraw from
the study at any time, and/or refrain from answering any questions you prefer to omit,
without prejudice or consequence. Your continued participation should be informed. As
your initial consent, so you should feel free to ask for clarification or new information
throughout your participation.

This research has been approved by the Education/Nursing Research Ethics
Board. If you have any concerns or complaints about this project you may the Human
Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep
for your records and reference.

Yours sincerely,

Kim Hewlett

CONSENT FORM FOR A PERSONAL INTERVIEW

I agree to participate within an interview to explore Constructive Thinking from theory to practice.

_____

(Participant's Name – Please Print)   (Participant's Signature)   (Date)

_____

(Researcher's Name)   (Date)

CONSENT FORM FOR SUBMITTING A COURSE SYLLABUS

In addition, I agree to submit a course syllabus from my course.

_____

(Participant's Name – Please Print)   (Participant's Signature)   (Date)

_____

(Researcher's Name)   (Date)

APPENDIX G

Explanation of Appendix G Tables

To read the tables that indicate the differences in constructive and critical thinking, please note that the y-axis depicts the range of difference scores (ds) where ds = total critical thinking score – total constructive thinking score. The resultant matrix for each course section showed that low scores clustered within a range of one to 12, and the remaining scores, designated as high, ranged from 13 to 46. The x-axis, shows how M = males who completed the questionnaire scores were represented and compared to F = females who completed the questionnaire. The dividing line on the x-axis indicates a separation from those males and females who completed the questionnaire from those who had not completed the questionnaire.

Difference in Constuctive and Critical Thinking Student Scores in Cameron's Class

High

Low

30

25

20

15

13

10

5

0

M 17-18 35.99
M 17-18 55.77
M 17-18 86.14
M 19-20 64.82
M 19-20 64.96
M 19-20 93.7
M 21-22 61.75
M 21-22 68.41
M 27-30 0
M 45+ 60.49
F 17-18 65.21
F 17-18 72.28
F 19-20 63.64
F 21-22 66.31
F 21-22 67.97
M 19-20 64.06
M 19-20 86.7
M 21-22 75.09
M 31-35 0
F 19-20 69.43

Complete Student Responses

Incomplete Student Responses

● Difference Of Students' Scores
* Male (M)   ** Female (F)

Student Close Ended Questionaire Responses From
Cameron's Class

Complete Student Responses

Incomplete Student Responses

Scores

X-axis labels (Complete Student Responses):
M 17-18 35.99, M 17-18 55.77, M 17-18 86.14, M 19-20 64.82, M 19-20 64.96, M 19-20 93.7, M 21-22 61.75, M 21-22 68.41, M 27-30 0, M 45+ 60.49, F 17-18 65.21, F 17-18 72.28, F 19-20 63.64, F 21-22 66.31, F 21-22 67.97

X-axis labels (Incomplete Student Responses):
M 19-20 64.06, M 19-20 86.7, M 21-22 75.09, M 31-35 0, F 19-20 69.43

—▲— Critical Thinking —□— Constructive Thinking
* Male (M)   ** Female (F)

Difference in Constuctive and Critical Thinking Student Scores in Caterina's Class

High

Low

30
25
20
15
13
10
5
0

M 17-18 66.2
F 17-18 69
M 17-18 77
M 17-18 77.22
M 19-20 49.10
M 19-20 49.5
M 19-20 63.4
M 19-20 72.12
M 23-24 41.5
M 31-35 72.6
M 41-45 19.10
F 19-20 54.5
F 19-20 69.3
F 19-20 75.5
F 21-22 54
F 23-24 73.9
F 25-26 75.2
F 17-18 34.6
F 17-18 54.5

Complete Student Responses

Incomplete Student Responses

Difference Of Students' Scores
* Male (M)   ** Female

Student Close Ended Questionaire Responses From Caterina's Class

Scores

Complete Student Responses

M 17-18 66.2
M 17-18 77.0
M 17-18 77.22
M 19-20 49.5
M 19-20 49.10
M 19-20 63.4
M 19-20 72.12
M 23-24 41.5
M 31-35 72.6
M 41-45 19.10

Incomplete Student Responses

F 17-18 69
F 19-20 54.5
F 19-20 69.3
F 19-20 75.5
F 21-22 54.0
F 23-24 73.9
F 25-26 75.2

F 17-18 34.6
F 17-18 54.5

—▲— Critical Thinking —☐— Constructive Thinking

* Male (M)   ** Female (F)

Difference in Constuctive and Critical Thinking Student Scores in George's Class

High

30

25

20

15

13

10

5

Low

0

M 17-18 56   M 17-18 74   M 17-18 80.80   F 17-18 53.2   F 17-18 77.4   F 19-20 0   F 19-20 78.1   F 27-30 79.1   F 41-45 80.80   M 19-20 67   M 19-20 68.8   M 21-22 0   F 17-18 82.5   F 19-20 67.60   F 19-20 77.4

Complete Student Responses   Incomplete Student Responses

Difference Of Students' Scores
* Male (M)   ** Female (F)

Student Close Ended Questionaire Responses From George's Class
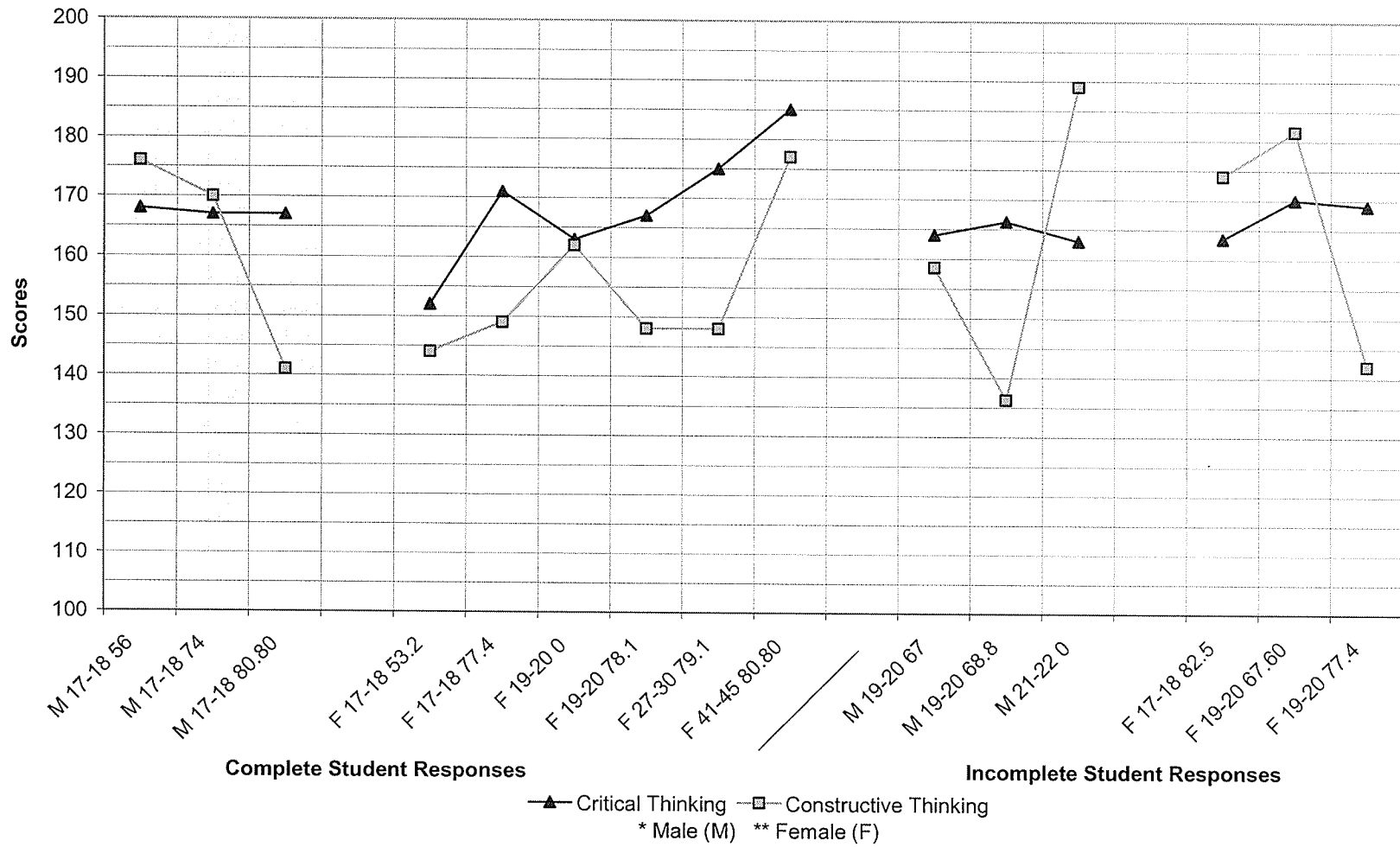
Scores

200
190
180
170
160
150
140
130
120
110
100

M 17-18 56 M 17-18 74 M 17-18 80.80 F 17-18 53.2 F 17-18 77.4 F 19-20 0 F 19-20 78.1 F 27-30 79.1 F 41-45 80.80 M 19-20 67 M 19-20 68.8 M 21-22 0 F 17-18 82.5 F 19-20 67.60 F 19-20 77.4

Complete Student Responses   **Incomplete Student Responses**

—▲— Critical Thinking ··□·· Constructive Thinking
* Male (M)   ** Female (F)

Difference in Constuctive and Critical Thinking Student Scores in Ricky's Class

Complete Student Responses

Incomplete Student Responses

—●—Difference Of Students' Scores
* Male (M)   ** Female (F)

Student Close Ended Questionaire Responses From
Ricky's Class

Scores

Complete Student Responses

Incomplete Student Responses

M 19-20 63.35   M 23-24 0   M 23-24 67.60   F 19-20 0   F 19-20 0   F 21-22 60.05   F 21-22 64.55   F 23-24 76.20   M 27-30 64.85   F 19-20 71.25

—▲— Critical Thinking   ··□·· Constructive Thinking

* Male (M)   ** Female (F)

Difference in Constuctive and Critical Thinking Student Scores in
(06) Robert's Class

High

Low

35
30
25
20
15
1
10
5
0

M 17-18 61.7
M 19-20 45
M 19-20 74.5
M 19-20 76.2
M 21-22 0
M 21-22 64.9
M 21-22 83.6
M 23-24 60.6
M 23-24 62.7

F 17-18 61.2
F 19-20 51
F 19-20 71.5
F 19-20 72.2
F 21-22 49.6
F 21-22 54.2
F 21-22 64.6
F 21-22 73.5

M 21-22 56.2
M 31-35 73.5

F 17-18 63.30
F 19-20 62.3
F 27-30 73.4

Complete Student Responses

Incomplete Student Responses

—●— Difference Of Students' Scores
* Male (M)   ** Female (F)
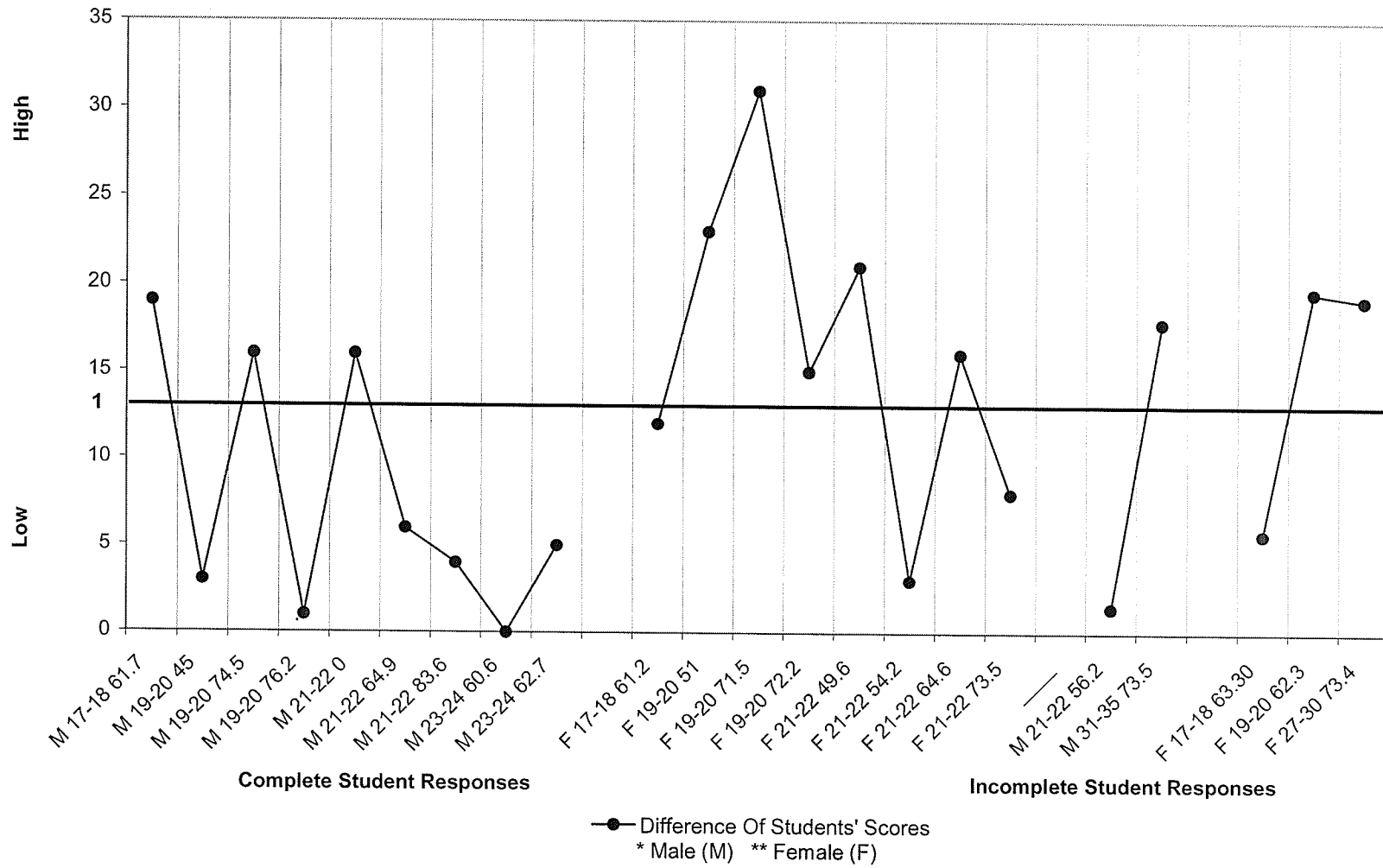
**Student Close Ended Questionaire Responses From
(06) Robert's Class**

Complete Student Responses

Incomplete Student Responses

Scores

X-axis labels:
M 17-18 61.7, M 19-20 45, M 19-20 76.2, M 19-20 74.5, M 21-22 0, M 21-22 64.9, M 21-22 83.6, M 23-24 60.6, M 23-24 62.7, F 17-18 61.2, F 19-20 51, F 19-20 71.5, F 19-20 72.2, F 21-22 49.6, F 21-22 54.2, F 21-22 64.6, F 21-22 73.5, M 21-22 56.2, M 31-35 73.5, F 17-18 63.30, F 19-20 62.3, F 27-30 73.4

—▲— Critical Thinking   ⋯▫⋯ Constructive Thinking
* Male (M)   ** Female (F)
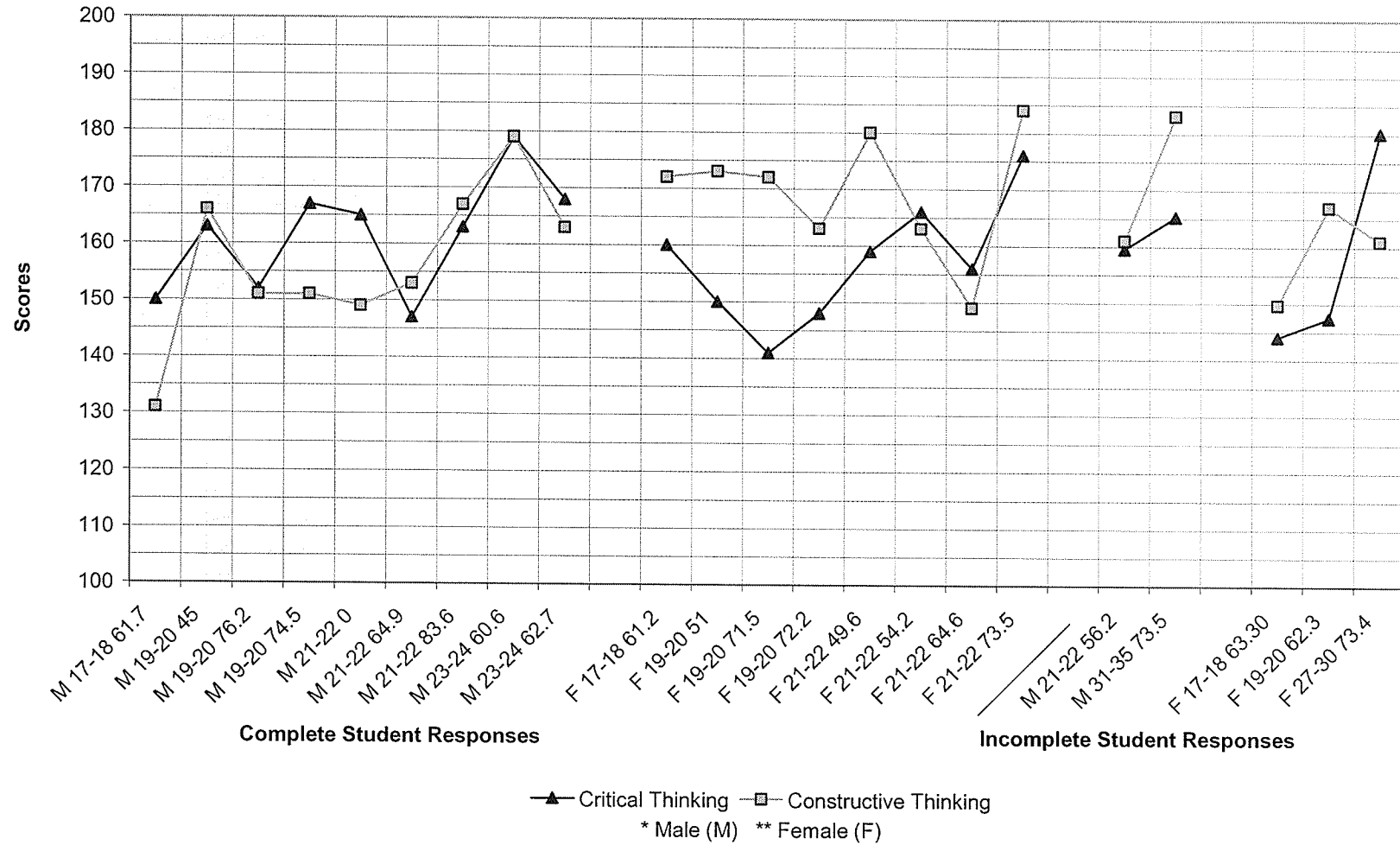
Difference in Constuctive and Critical Thinking Student Scores in (07) Robert's Class

High

Low

50
45
40
35
30
25
20
15
13
10
5
0

M 17-18 43.20
M 17-18 62
M 19-20 57.7
M 19-20 64.3
F 17-18 0
F 17-18 59.6
F 17-18 59.6
F 17-18 61.10
F 17-18 71.8
F 19-20 50.9
F 19-20 75.80
F 21-22 57.40
M 17-18 73.7
M 17-18 86.80
M 19-20 40.90
M 19-20 90.80
M 21-22 48
F 17-18 65.20
F 17-18 69.2
F 17-18 81.2
F 19-20 71.9

Complete Student Responses

Incomplete Student Responses

Difference Of Students' Scores
* Male (M) ** Female (F)
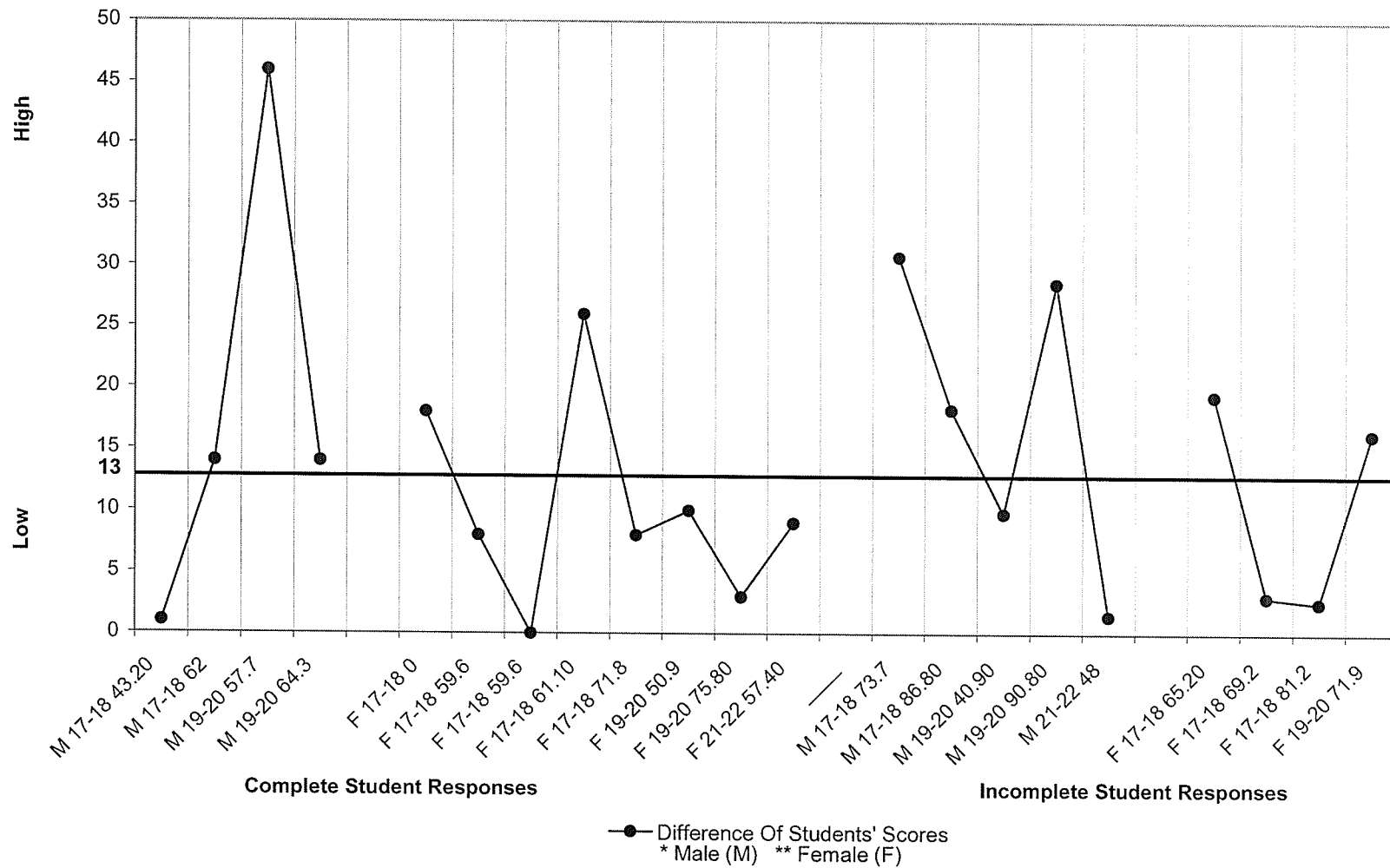
Student Close Ended Questionaire Responses From
(07) Robert's Class

Scores (y-axis): 100 to 200

Complete Student Responses x-axis labels:
M 17-18 43.20, M 17-18 62, M 19-20 57.7, M 19-20 64.3, F 17-18 0, F 17-18 59.6, F 17-18 59.6, F 17-18 61.10, F 17-18 71.8, F 19-20 50.9, F 19-20 75.80, F 21-22 57.40

Incomplete Student Responses x-axis labels:
M 17-18 73.7, M 17-18 86.80, M 19-20 40.90, M 19-20 90.80, M 21-22 48, F 17-18 65.20, F 17-18 69.2, F 17-18 81.2, F 19-20 71.9

Legend: —▲— Critical Thinking ---□--- Constructive Thinking
* Male (M) ** Female (F)
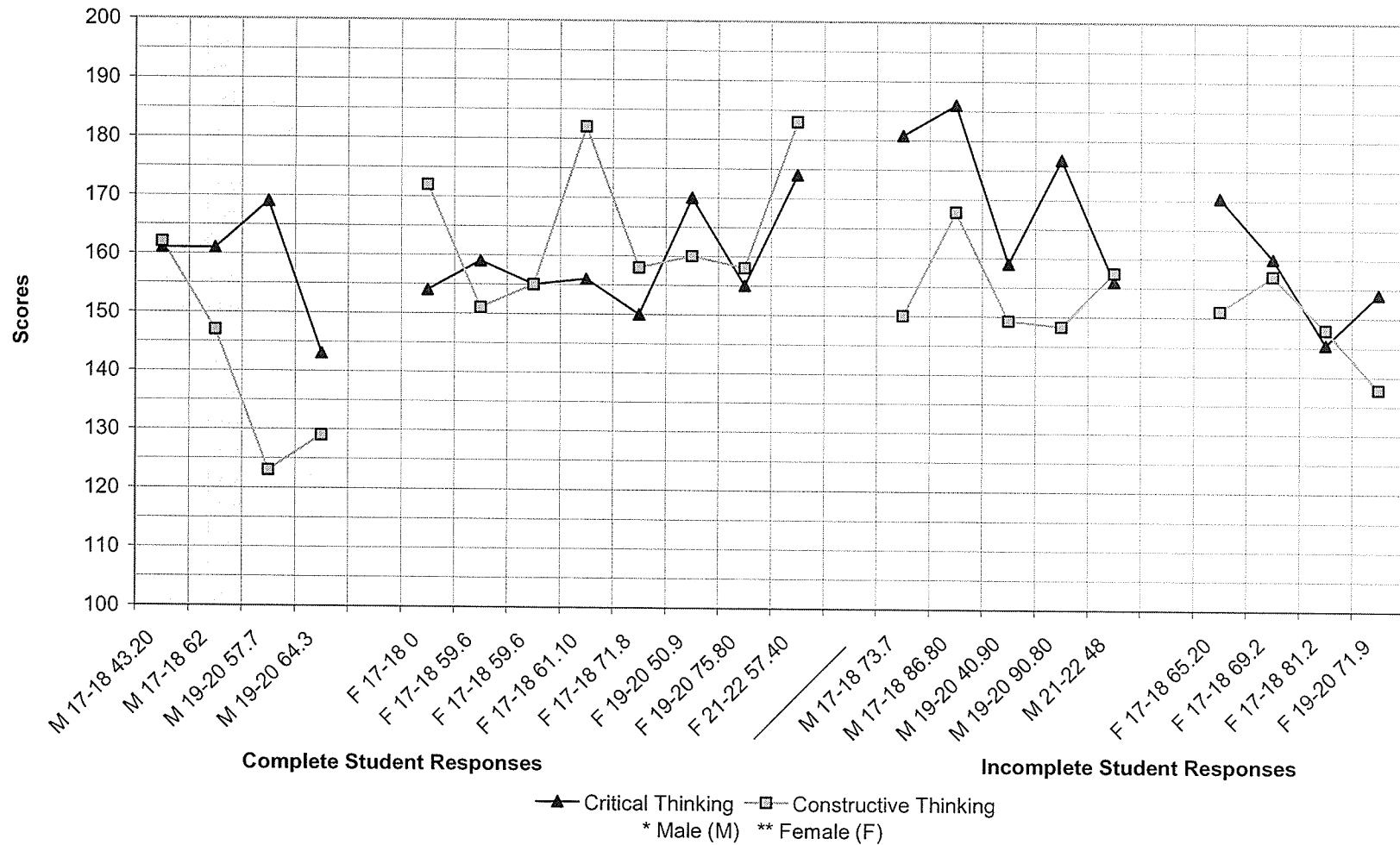
Difference in Constuctive and Critical Thinking Student Scores in Laura's Class

Difference Of Students' Scores
* Male (M)   ** Female (F)
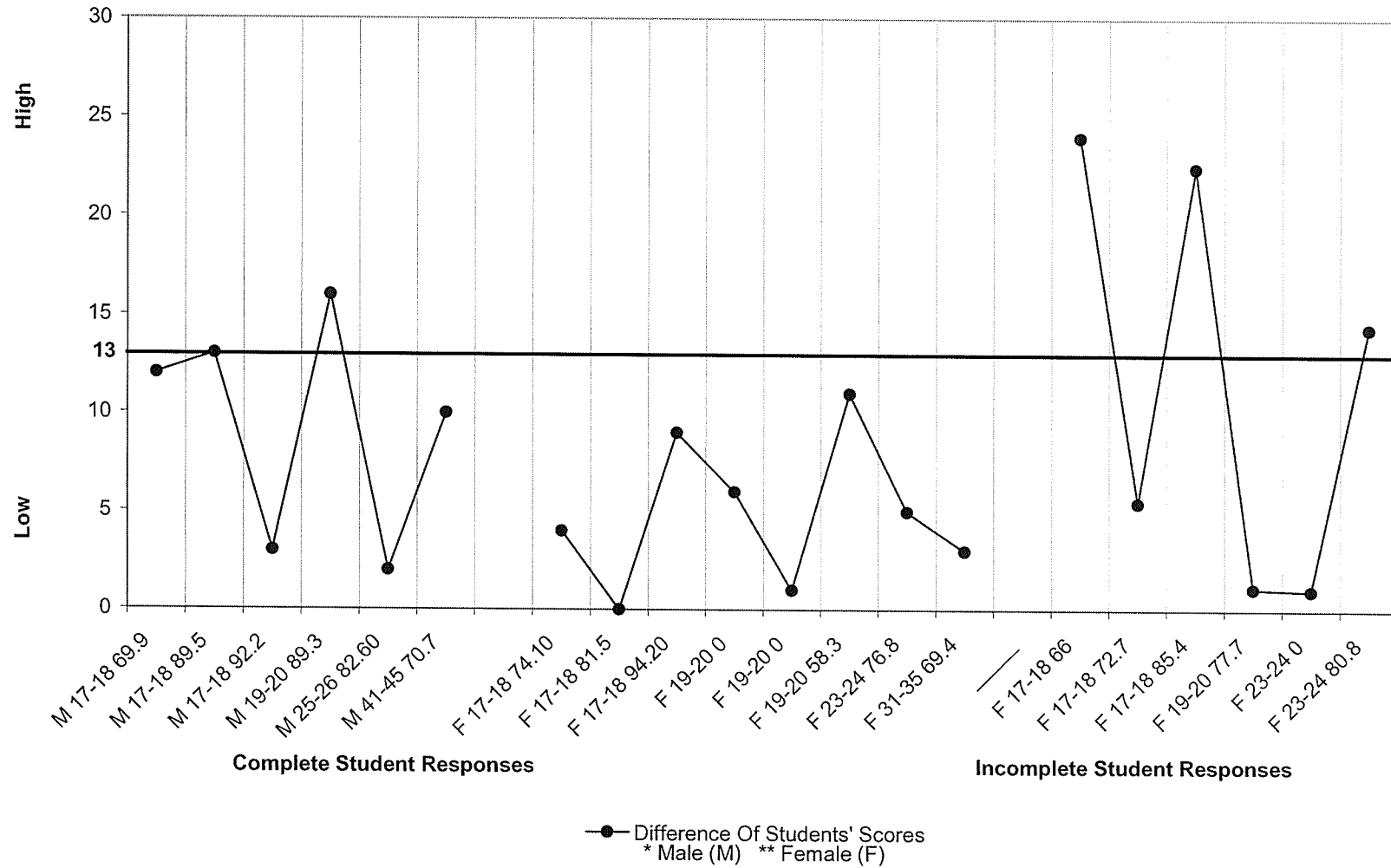
Student Close Ended Questionaire Responses From Laura's Class

Complete Student Responses   Incomplete Student Responses

—▲— Critical Thinking   ⸱⸱▫⸱⸱ Constructive Thinking

* Male (M)   ** Female (F)
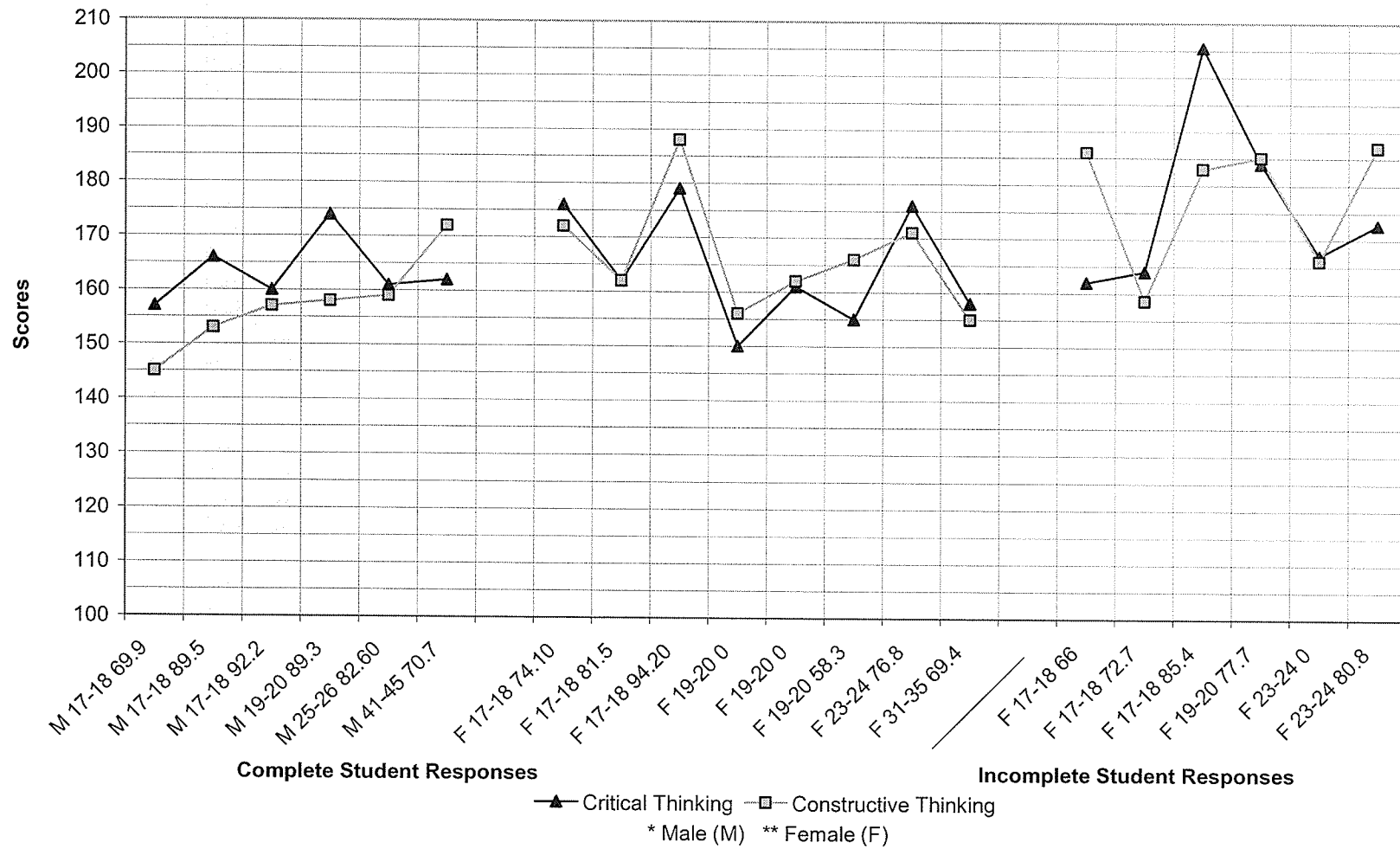
Difference in Constuctive and Critical Thinking Student Scores in Mark's Class
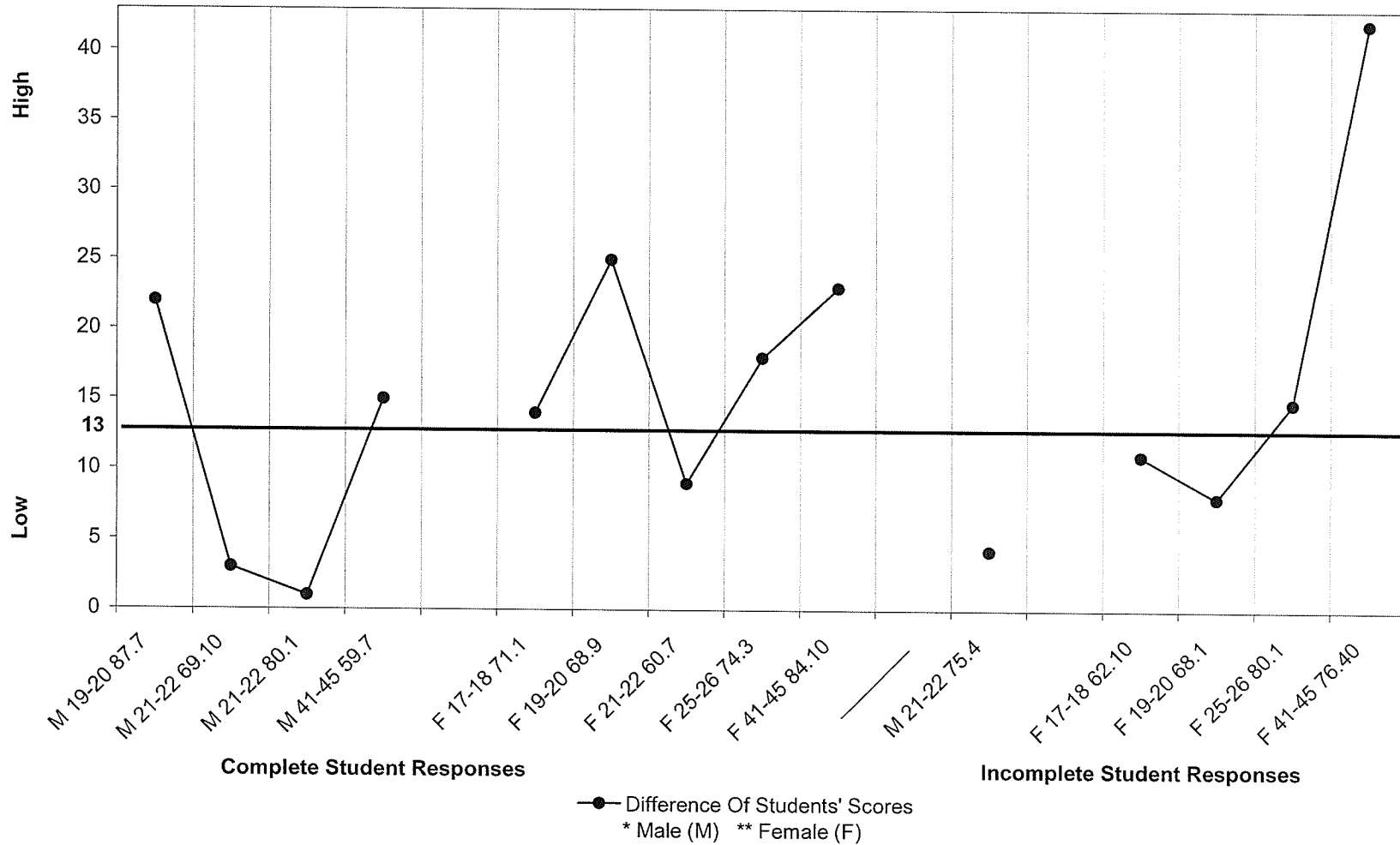
Student Close Ended Questionaire Responses From
Mark's Class

Scores

Complete Student Responses — Incomplete Student Responses

X-axis labels (left to right):
M 19-20 87.7, M 21-22 69.10, M 21-22 80.1, M 41-45 59.7, F 17-18 71.1, F 19-20 68.9, F 21-22 60.7, F 25-26 74.3, F 41-45 84.10, M 21-22 75.4, F 17-18 62.10, F 19-20 68.1, F 25-26 80.1, F 41-45 76.40

Complete Student Responses   **Incomplete Student Responses**

—▲— Critical Thinking   ⬚ Constructive Thinking

* Male (M)   ** Female (F)

Difference in Constuctive and Critical Thinking Student Scores in Larry's Class

High

Low

40
35
30
25
20
15
13
10
5
0

M 17-18 63.50
M 17-18 76.8
M 17-18 87.35
M 17-18 89.2
M 21-22 53.75
M 21-22 73.2
M 21-22 89.7
M 23-24 61
M 45P 0

F 17-18 64.89
F 17-18 84.70
F 19-20 66.90
F 19-20 81.25
F 19-20 84.15
F 21-22 75.90

M 17-18 65.30
M 21-22 63.49
M 41-45 84

F 17-18 63.35
F 17-18 64.2
F 17-18 74.80
F 23-24 74.2
F 31-35 68.75

Complete Student Responses   **Incomplete Student Responses**

──●── Difference Of Students' Scores

* Male (M)   ** Female (F)

Student Close Ended Questionaire Responses From
Larry's Class

Complete Student Responses   **Incomplete Student Responses**

—▲— Critical Thinking ··□·· Constructive Thinking
* Male (M)   ** Female (F)

X-axis labels (left group): M 17-18 63.50, M 17-18 76.8, M 17-18 87.35, M 17-18 89.2, M 21-22 73.2, M 21-22 89.7, M 21-22 53.75, M 23-24 61, M 45p 0, F 17-18 64.89, F 17-18 84.70, F 19-20 66.90, F 19-20 81.25, F 19-20 84.15, F 21-22 75.90

X-axis labels (right group): M 17-18 65.30, M 21-22 63.49, M 41-45 84, F 17-18 63.35, F 17-18 64.2, F 17-18 74.80, F 23-24 74.2, F 31-35 68.75

Y-axis: Scores (100 to 200)

High Critical Thinking Scores Profile Based On Open-Ended Responses

Student No.	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope To Accomplish/ Future Interests
Section 1								
1	15	64.06	125	106	-	-	-	-
2	16.7	86.7	159	146	-	-	-	-
3	-	-	161	146.5	-	-	-	-
4	17.5	93.7	156	135	4	7	14	5-21
Section 2								
5	13.4	77	149	132	4	5	5/8	6-7
6	15.6	73.9	167	149	2	4	6	--9
Section 3: High Critical Thinking Scores								
7	11	59	140	125	-	-	-	-
8	14	68.9	159	134	-	-	-	-
9	16	84	162	139	1	-	-	-
10	14.5	71.1	164	150	2	8	5/1	6-12
11	16	80.1	193	178.22	1	10	8/7	10-12
12	16.5	87.7	164	142	2	1	14	9-7
Section 4: High Critical Thinking Scores								
13	17	89.5	166	153	4	1	11	14-7
14	17.5	85.4	205.44	183	4	2	7	5/10-12
15	19	89.3	174	158	-	-	-	-
Section 5: High Critical Thinking Scores								
16	18.5	80.8	167	141	1	21	1	14-14
17	17	78	167	148	4	1	11	12/6-12
18	19.3	79	175	148	2	1	1	6/5-7
19	13.8	68.8	166.25	136.22	1	1	6	6/5-7
20	15.5	77.4	169	142	4	5	11	5/14-31/1
21	15.5	77.4	171	149	4	1	11	14-10
Section 6: High Critical Thinking Scores								
22	8	61.7	150	131	1	2	3	6-27
23	12.6	64.6	156	149	1	20	3	3-10
24	-	-	165	149	1	6	4	6-7
25	13.6	74.5	167	151	4	2	3	4-11
26	16	73.4	180.11	161	4	3	12	4/6-6/1

Student No.	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope To Accomplish/ Future Interests
Section 7: High Critical Thinking Scores								
27	13.60	57.7	169	123	4	2	10/22	6-7
28	14	64.3	143	129	1	2	20	6/3-12
29	14.6	71.9	154	137.78	1	17	3	N/a-7
30	19	90.8	176.78	148.22	1	8	3	3/7-24
31	18	73.7	180.78	150.03	4	17	1	6-8
32	18	86.8	186	167.78	5	22	20	¾--
33	12	65.20	170.33	151	1	22	3	3-12
34	12	62	161	147	2	6	3	3/7-6
Section 8: High Critical Thinking Scores								
35	12.4	63.35	170	149	1	20	12/1	6-7
36	10.4	60.05	157	143	1	-	-	-
37	12.4	67.6	166	152	-	-	-	-
38	12		181	166	1	17/2	16	-7
Section 9: High Critical Thinking Scores								
39	16.4	65.3	158	117	1	7	4	6-14
40	12	64	153	135	1	5	-	6-23
41	17	65.3	155.70	124	1	1	4	6-7
42	17	89.2	190	169	4	1	3	6/4-7

High Constructive Thinking Scores Profile

Section 1: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope To Accomplish/ Future Interests
01	12.6	72.78	141	169	4	5/6	2/13	3/5/6-18
02	16.8	86.14	169	145	-	-	-	-
03	12.1	64.96	155	173	-	-	-	-

Section 2: High Constructive Thinking Scores

04	10.20	49.10	139	158	4	1	8	7-14
05	14	54.5	156	170	4	1	1/2	1-6/1
06	11.8	41.5	156	180	2	1	7	3-7
07	12	72.12	163	178	2	1	3	4/5-14
08	14.4	63.4	169	199	-	-	-	-

Section 3: Constructive Thinking Scores

09	14.5	76.4	154.11	196.11	1	16	1	5-16
010	12	74.3	133	151	1	4/1/11	1	6-15

Section 4: High Constructive Thinking Scores

011	15.5	80.8	172.67	187	1	3	1	14/10-9
012	13	66	162	186	1	17	15	6-1

Section 5: Constructive Thinking Scores

013	-	-	163	189	4	17	9	6-24

Section 6: High Constructive Thinking Scores

014	16.6	72.2	148	163	1	17	1	6-7
015	12	71.5	141	172	5	2	1	6/5-7
016	12	51	150	173	1	2	16	6/3-4
017	13.6	62.3	147.44	167	2	1	15	3-24
018	16	73.5	165.22	183	-	-	-	-
019	12	49.6	159	180	-	-	-	-

Section 7: High Constructive Thinking Scores

020	-	-	154	172	1	22	4/20	N/a-14
021	12	61	156	182	1	22/6	13	6-11

Section 9: High Constructive Thinking Scores

022	15.8	63.35	149	174	4	1	12	5-20/1
023	16.4	74.2	153	169	2	15	4	2-10
024	-	75.9	161	189	2	20	20	N/a-7

APPENDIX H

Open-Ended Responses From The Questionnaire

What did you know about writing a research paper before you began the 099.111 course?

When these students were asked about their prior knowledge of writing a research paper, they replied often with "very little," "not much," "some," "the basics," a "strong" background. These responses were coded to a Likert scale from one to five to represent their prior knowledge. One represented very little prior knowledge and five identified a strong background. These values were entered into a table to correspond with student numbers to develop a profile of the student with his/her peers in a particular course section.

What have you learned about writing a research paper while participating in the 099.111 course?

The second question, on the open-ended items of the questionnaire, asked the students to indicate what they had learned about writing a research paper. Responses were varied, there were being 21 themes derived. These 21 themes were assigned a specific number as in:

1. Citing references,
2. Organizing thoughts into a specific format,
3. Gathering information for academic research,
4. Developing an awareness of different styles of writing,
5. Expanding on prior knowledge about writing a research paper,
6. Receiving peer feedback about research paper,

7. Wanting more direction from the instructor,
8. Developing an awareness of how to use the internet for research sites,
9. Finding sources from the library,
10. Writing a research paper for the first time/ completing the task,
11. Improving grammar,
12. Developing a formal tone of writing,
13. Selecting a topic,
14. Developing research questions,
15. Writing an outline for the research paper,
16. Learning a lot,
17. Going through the process of writing a research paper,
18. Editing,
19. Developing a love for the topic,
20. Creating a thesis statement,
21. Writing an abstract and,
22. Managing time to go through the steps of writing an research paper.

These number codes were assigned to each of the student numbers on a table to

learn more about how the students viewed themselves as they were learning how to write

a research paper in the 099.111 course.

What do you think is the most important thing about writing a research paper?

The third question the students answered related to what they thought was the

most important thing about writing a research paper. Their responses varied but were

very similar to the themes found in question two. There were 22 themes that emerged

from responses to question three and they were given a specific number for coding as

follows:

1. Enthusiastic about topic,
2. A desire to learn more,
3. A solid argument,
4. Current information from research,
5. A paper that matters/ is viewed as authentic,
6. A variety of references,

7. Persuasive stance – reaches the audience,
8. Peer/professor feedback,
9. Good grammar,
10. High mark,
11. Organization of information,
12. Clear thesis statement,
13. Awareness of writing a research paper, the process itself,
14. Editing drafts,
15. Understanding of the research,
16. Written in own words,
17. Discussion of ideas,
18. Read extensively,
19. Help others,
20. Stay focused,
21. Manage time effectively to accomplish steps in writing a research paper and,
22. Create quality work.

These number codes were placed by the students' numbers to learn about what they viewed as important during the writing process.

What factors or conditions help you to write your very best? Please describe in detail.

The fourth question asked the students what kind of conditions they needed to write well. Of the 137 students who replied, 65 required a quiet place without any distractions, a good night's sleep and plenty of time to write. Fifteen students indicated that they had to have an interest in the topic. Thirty students believed writing an outline or creating webs when brainstorming proved to be helpful.

What do you hope to accomplish when you write a research paper?

When asked what the students wanted to accomplish when they wrote a research paper, their responses were not as varied as in questions two and three. There were 14 themes that developed from their responses. A number was assigned to each of these themes to code students' answers:

1. Good thesis,
2. Thorough research,
3. Persuasive stance – reach the audience,
4. Strong argument,
5. A desire to learn something new,
6. High mark,
7. Understanding of the issue,
8. Beneficial research,
9. Completion of writing a research paper,
10. Educate others,
11. Reference properly,
12. Write in an organized manner,
13. Feedback on writing style and,
14. Improvement of writing skills.

The number codes were placed by the student numbers in a table to obtain a profile of what students wanted to accomplish when writing their research paper.

What faculty are you hoping to attend next year after you complete the University One program? Please indicate why you wish to attend this particular faculty.

The final question asked students to indicate what faculty they hoped to attend in the future. There were 28 different interests identified from their answers. These interests were assigned a specific number for coding:

1. Profession that would help people,
2. Profession involving social interaction,
3. Marketing,
4. Arts,
5. Nursing,
6. Faculty of Social Work,
7. Faculty of Management,
8. Faculty of Science,
9. Pharmacy,
10. Human Ecology,
11. Agriculture,
12. Education,
13. Wants to be motivated to learn in whatever field he or she chooses,
14. Not sure,
15. Faculty of Medicine
16. Courses of personal interest,
17. Red River,
18. Dental Hygiene,
19. Physical Education,
20. Law,
21. Computer Science,
22. Recreation Studies,
23. Psychology,
24. Architecture,
25. Writing Courses,
26. Occupational Therapist,
27. Environmental Design and
28. Forensic Science

APPENDIX I
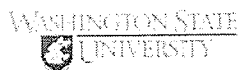
WASHINGTON STATE
UNIVERSITY

Critical Thinking Project

The Critical Thinking Rubric
printer friendly version

1) Identifies and summarizes the **problem/question** at issue (and/or the source's position).

Scant	Substantially Developed
Does not identify and summarize the problem, is confused or identifies a different and inappropriate problem.	Identifies the main problem and subsidiary, embedded, or implicit aspects of the problem, and identifies them clearly, addressing their relationships to each other.
Does not identify or is confused by the issue, or represents the issue inaccurately.	Identifies not only the basics of the issue, but recognizes nuances of the issue.

2) Identifies and presents the STUDENT'S OWN **perspective and position** as it is important to the analysis of the issue.

Scant	Substantially Developed
Addresses a single source or view of the argument and fails to clarify the established or presented position relative to one's own. Fails to establish other critical distinctions.	Identifies, appropriately, one's own position on the issue, drawing support from experience, and information not available from assigned sources.

3) Identifies and considers OTHER salient **perspectives and positions** that are important to the analysis of the issue.

Scant	Substantially Developed
Deals only with a single perspective and fails to discuss other possible perspectives, especially those salient to the issue.	Addresses perspectives noted previously, and additional diverse perspectives drawn from outside information.

4) Identifies and assesses the key **assumptions**.

Scant	Substantially Developed
Does not surface the assumptions and ethical issues that underlie the issue, or does so superficially.	Identifies and questions the validity of the assumptions and addresses the ethical dimensions that underlie the issue.

5) Identifies and assesses the quality of **supporting data/evidence** and provides additional data/evidence related to the issue.

Scant	Substantially Developed
Merely repeats information provided, taking it as truth, or denies evidence without adequate justification. Confuses associations and correlations with cause and effect.	Examines the evidence and source of evidence; questions its accuracy, precision, relevance, completeness. Observes cause and effect and addresses existing or potential consequences.
Does not distinguish between fact, opinion, and value judgments.	Clearly distinguishes between fact, opinion, & acknowledges value judgments.

6) Identifies and considers the influence of the **context** * on the issue.

Scant	Substantially Developed
Discusses the problem only in egocentric or sociocentric terms. Does not present the problem as having connections to other contexts-cultural, political, etc.	Analyzes the issue with a clear sense of scope and context, including an assessment of the audience of the analysis. Considers other pertinent contexts.

7) Identifies and assesses **conclusions, implications and consequences**.

Scant	Substantially Developed
Fails to identify conclusions, implications, and consequences of the issue or the key relationships between the other elements of the problem, such as context, implications, assumptions, or data and evidence.	Identifies and discusses conclusions, implications, and consequences considering context, assumptions, data, and evidence. Objectively reflects upon the their own assertions.

Contexts for Consideration

1. Cultural/Social
   Group, national, ethnic behavior/attitude

2. Scientific
   Conceptual, basic science, scientific method

3. Educational
   Schooling, formal training

4. Economic
   Trade, business concerns costs

5. Technological

APPENDIX J

CONSTRUCTIVE THINKING RUBRIC

1) Reflective Active Process Valuing Experience

Scant   Substantially Developed

Able to solve the problem   Identifies optimal solutions to
using one approach   problems

2) Building Caring Relationships

Scant   Substantially Developed

Does not value the input   Seeks and values feedback from
of others   others. Shares ideas with the
                                               reader and the reader is
                                               persuaded to take action.

3) Different Ways of Knowing

Scant   Substantially Developed

Cold, objective voice   Warm, engaging, interesting to
                                               read. Demonstrates unique
                                               perspective, creativity.

4) Active Process Valuing Experience

Scant   Substantially Developed

Able to solve the problem   Identifies optimal solutions to
using one approach   problems

5) Benefiting Society

Scant   Substantially Developed

Focuses on what has been found   Identifies ideas and concepts that
to be proven   benefit society

APPENDIX K

Scoring Key for Writing Portfolios

Topic: _____

Student Number: _____

Rubric For Critical and Constructive Thinking

Scant	Poor	Below Average	Average	Good	Very Good	Substantially Developed
1	2	3	4	5	6	7

Critical Thinking Rubric

1. problem/questions   _____/7
2. perspectives   _____/7
3. assumptions   _____/7
4. supporting evidence   _____/7
5. conclusions/implications   _____/7

Total =   _____/35

Constructive Thinking Rubric

*1. reflective process valuing experience   _____/7
2. caring relationships   _____/7
3. different ways of knowing   _____/7
*4. active process valuing experience   _____/7
5. concepts benefiting society   _____/7

Total =   _____/35

When evaluating #2 for constructive thinking, this information helps to identify if the student had input **before** submitting the final research paper

Peer review _____
Instructor Feedback _____
or No Feedback _____

*Note: For constructive thinking, items #1 and #4 should have the same value _____out of 7.

APPENDIX L

Section 1: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score On Questionnaire
*2 English first Male, 19-20	16.7/86.7 Topic: Mneumonics Rating: 5/6	Yes	26 K 20 J 19 T 33 P	28 K 19 J 20 T 28 P	159	146 (-13)
U1	12.1/72 Topic: Technology Rating: 4/6	No	4 K 18 J 23 T 8 P	13 K 20 J 19 T 12 P	-	-
*L1 English not Male, 21-22	13.4/75 Topic: Time Management Rating: 5/6	Yes	25 K 25 J 26 T 32 P	25 K 19 J 23 T 24 P	188	182.67
4 English first Male, 19-20	17.5/93 Topic: Sleep Rating: 5/6	Yes	15 K 28 J 31 T 23 P	26 K 30 J 33 T 19 P	156	135
E1 English not, Female, 21-22	13.4/67.9 Topic: Keys To Success Rating: 5/6	No	5 K 24 J 20 T 25 P	12 K 19 J 20 T 25 P	151	151
L2 English not, Female, 19-20	15/63.6 Topic: Cheating on Tests	Yes	33 K 22 J 20 T 26 P	24 K 21 J 14 T 16 P	156	153
01 English first, Female, 17-18	12.6/72.7 Topic: Common First Year Issues	Yes	21 K 20 J 20 T 23 P	14 K 18 J 14 T 12 P	141	169

Student No.	Instructor Feedback/ Grade	Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
2	16.7/86.7 Topic: Mneumonics Rating: 5/6				-	-
U1	12.1/72 Topic: Technology Rating: 4/6				-	-
L1	13.4/75 Topic: Time Management Rating: 5/6				-	-
4	17.5/93 Topic: Sleep Rating: 5/6					
E1	13.4/67.9 Topic: Keys To Success Rating: 5/6					
L2	15/63.6 Topic: Cheating on Tests					
01	12.6/72.7 Topic: Common First Year Issues	4	5/6	2/13	3/5/6	18

Section 2: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
U2	10.4/54.5 Topic: Insomnia Rating: 4/6	No	11 K 25 J 17 T 9 P	14 K 17 J 19 T 9 P	---	158
L3 English first Male, 17-18	14.6/66.2 Topic: Video Games and Society Rating: 3/6	No	12 K 24 J 23 T 16 P	21 K 25 J 21 T 20 P	171	165

Student No.		Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
U2	-	-	-	-	-	-
L3	-	-	-	-	-	-

Section 3: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
9 English first, Female, 41-45	16/84 Topic: Scholarly Research in Higher Education Rating: 5/6	From Proposal	31 K 28 J 28 T 29 P	31 K 27 J 29 T 26 P	162	139
U3	Topic: Academic Race Rating: 5/6	From Proposal	18 K 26 J 30 T 26 P	30 K 28 J 29 T 23 P	-	-
U4	Topic: Goal Setting Rating: 5/6	From Proposal	23 K 20 J 23 T 20 P	26 K 15 J 15 T 20 P	-	-

Student No.	Instructor Feedback/ Grade	Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
9		1	-	-	-	-
U3					-	-
U4	-	1	2	-	5/10	-

Section 4: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
LCON1 English first, Male, 41-45	13/70 Topic: Alcoholism Rating: 2/6	No	9 K 21 J 20 T 11 P	18 K 18 J 17 T 17 P	162	172

Student No.	Instructor Feedback/ Grade	Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
LCON1		1	17	5	6/5	18

Section 5: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
17 English first Female, 19-20	17/78 Topic:Dance, Education and Youth Rating: 5/6	No	17 K 30 J 23 T 22 P	20 K 30 J 22 T 21 P	167	141

Student No.	Instructor Feedback/ Grade	Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
17		4	1	11	12/6	12

Section 6 Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
LCON2 English not Male, 21-22	13.6/64.9 Topic: Public versus Private Schools Rating: 3/6	No	23 K 17 J 20 T 26 P	25 K 18 J 21 T 28 P	147	153
E2 English not Male 23-24	11/60 Topic: Cost of Working While Attending Higher Ed. Rating: 3/6	No	19 K 18 J 20 T 9 P	20 K 18 J 20 T 10 P	179	179
U5	Topic: Academic Freedom Rating: 3/6	No	27 K 21 J 22 T 19 P	22 K 22 J 21 T 24 P	-	-
018 English first Male, 31-35	16.4/75.8 Topic: Writing an Above Average Paper Rating: 3/6	No	33 K 23 J 27 T 32 P	36 K 24 J 22 T 30 P	176	184

Student No.	Instructor Feedback/ Grade	Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
LCON2		-	-	-	-	-
E2		4	2	3	4	11
U5		-	-	-	-	-
018		-	-	-	-	-

Section 7: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
*29 English first, Female, 19-20	14.6/71.9 TopicDefining ADHD Rating: 3/6	No	10 K 25 J 24 T 25 P	20 K 26 J 25 T 29 P	154	137.78
*30 English first, Male, 19-20	19/90 Topic: Validity of the Mozart Effect Rating: 3/6	No	27 K 31 J 32 T 33 P	35 K 29 J 35 T 35 P	176.78	148.22

Student No.		Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
29	–	1	17	3	–	7
30		1	8	3	3/7	24

Section 8: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
U6	13.6/74.9 Topic: Mental Health Rating: 4/6		16 K 21 J 24 T 30 P	25 K 23 J 21 T 13 P	-	-
U7	14.4/65.6 Topic: Stress of International Students Rating: 4/6		15 K 25 J 27 T 30 P	25 K 21 J 23 T 27 P	-	-

Student No.		Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
U6						
U7						

Section 9: Portfolios

Student No.	Instructor Feedback/ Grade	Peer/ Professor Review	Constructive Thinking Score on Essay	Critical Thinking Score on Essay	Critical Thinking Score on Questionnaire	Constructive Thinking Score on Questionnaire
U8	Topic: Destination Success	No	9 K 21 J 21 T 8 P	20 K 22 J 20 T 7 P	-	-

Student No.	Instructor Feedback/ Grade	Prior Knowledge	Gained	Importance	Hope to Accomplish	Future Interests
U8						

APPENDIX M

Why These Instructors Teach Writing

George	Laura	Ricky	Cameron	Caterina	Robert	Larry	Mark
-important way of commu-nicating. Students that I teach come with various skills and competencies. It is up to me to build on these skills and competencies	-writing is a form of communica-tion needed by educated people. I want my students to develop these skills and strategies so that they can share their ideas and communicate clearly.	-honestly because it was assigned to me.	-very important commu-nication and learning skill	-on the curriculum and most students need to develop their skills in writing. My years of experience equip me to teach it.	-I think it's significant for people to be able to effectively express their thoughts, feelings and emotions. Today, it's more crucial than ever for people to be able to critically analyze our lives in general and the lives of those around us. Misunderstandings and confusion occur far too easily, and the consequences are now, more than ever, potentially catastrophic	-to get students to explore how they think; critically analyze their thinking and others; develop argumentative skills; show how to be disciplined in their thinking	-to provide students with a skill that helps them with any writing task that is found at university.

What Instructors Believe Is Important in Writing Instruction

George	Laura	Ricky	Cameron	Caterina	Robert	Larry	Mark
-doing the research of the topic of their choice, planning and organizing and then sitting down to create, edit, review, and come up with a final copy.	-the process for first year students	-the process is what is being taught, not the content, the methods, skills and thought process necessary to think outside the box. With international students, they seem to work backwards starting with the research and developing the thesis to agree with their research findings.	-is the thoughtful evaluation and analysis of a particular idea along with the ability to present that analysis to others via the paper	-that the writer develops a thesis, examines a body of evidence and advances the knowledge base on a particular subject/ topic.	-is the ability to state in writing what precisely the author is thinking. The medium of writing requires a unique skill that enables the author to express to an audience his/her specific thoughts on a topic	-developing a strongly supported argument – having an organized paper that illustrates the major points of an issue with coherent well researched supporting statements	-is obtaining appropriate research sources that can be used in the formulation of their ideas and to use their ideas with that of others into a well-written paper.

How Writing Is Developed

George	Laura	Ricky	Cameron	Caterina	Robert	Larry	Mark
-students are encouraged to read the book, lectures on thesis writing, using the forms in the BASS book, sample pages of previous research papers and review by peer, friend, educator, or someone from the LAC center.	-by teaching writing as a process, providing examples, and answering questions.	-we offer the writing workshop-editing, spotting errors, formulating solutions to mistakes, and the most common errors.	-teach students to ask significant questions to which they attempt to respond to. I try to demonstrate the various steps good writers use to produce good papers. I also make sure that I interact with their papers and show them how they can improve their writing.	-it is a long process consisting of many stages that result n a finished set of projects on a selected topic.	-by categorizing some of the most important characteristics of a research paper. By laying out these characteristics in a direct manner, students are then able to use these as a template for subsequent writings.	-small assignments 1) answers and writing can range from two sentences to long paragraphs. My feedback is given to the students. 2) long answer questions for each chapter of the book. Answers are given feedback and marked as a pass/fail. Feedback and assessment is either by me or a fellow student.	-is developed along several stages. I have students complete a research proposal to include a topic, research questions, main idea, thesis statement, and paper outline. I also have students gather some initial sources and to document it in APA style.

Factors or Conditions That Help Teach Writing

George	Laura	Ricky	Cameron	Caterina	Robert	Larry	Mark
-the new essential writing textbook and the BASS outlines. The use of previous papers on the overhead to review abstract, introduction, how to cite and references section. Appendix at the back of the paper.	a) students who are willing to learn b) through the availability of approp-riate courses c) the provision of support and guidance d) classes small enough to provide individual feedback e) time to meet with students	-have been quite dependent on my supervisor and a colleague for help. Help in lesson planning, exercises, marking schemes, syllabi, and scheduling	-need to have smaller classes and be able to give students immediate feedback on their writing. I would also like to be involved in all aspects of the writing process on an individual basis.	-my years of experience in teaching it; my constant study of the best ways to teach it- experimenting and changing what does or does not work; the support for it at the U of M and the 099.111 course; support from the library system; Bison and Netdoc. My editing of books on writing methods.	a) my recollection of being a new university student with relatively weak writing skills and having few resources to fall back upon b) a level of satisfaction I derive having from current and former students who have acquired a level of comfort in writing as a result of previous lectures.	-specific examples are brought to class from outside sources to illustrate ideas. Examples are hand outs and discussions on supporting statements in a paragraph, annotated bibliographies, argument analysis. Students email multiple examples of their writing through long and short type questions.	-teacher training support (99.111) monthly meetings to discuss issues related to the writing course

Type of Relationship With Students

George	Laura	Ricky	Cameron	Caterina	Robert	Larry	Mark
-I try to develop a friendly atmosphere in the class where students are encouraged to ask questions. Students work in pairs as well as a group of four to do a Powerpoint presentation on a faculty "Success breeds more success"	-one of mutual respect. We learn from each other.	-would like a professional relationship …will do anything in my power to help them succeed, often this amounts to helping them help themselves.	-warm relationship where students feel free to engage me in conversations, both about their work and their life in general.	-a relationship of trust and confidence that I will facilitate their learning	-I like having a friendly relationship with my students. I derive great satisfaction when my students come to see me in order to further discuss some of their ideas. I am particularly pleased when I see my students critically analyzing something that in the past they may not have bee more accepting toward.	-have a friendly relationship that still maintains a professional separation between student and instructor. The relationship is one where hopefully I can be seen as a facilitator to build their knowledge about the course material and how it can be applied in the future.	-focuses on student centered learning. I recognize that students have varying learning styles and I must accommodate my teaching style and evaluation methods accordingly.

APPENDIX N

Overall Profiles of Class Sections

Cameron's Class

Class makeup. There were 6 females and 14 males that responded to the close-ended items on the questionnaire. They ranged in age from 17 to 22 as shown in Appendix K. There was one student who was older than 45. The high school grade point average for Cameron's class ranged from 56 to 90 percent. There were four students (all male) who had high critical thinking scores. Their research paper grades ranged from 15 to 17.5 out of 20. Seven students (two females, five males) had low critical thinking scores with research paper grades that ranged from 12.8 to 15.8 out of 20. Five students (two females and three males) had low constructive thinking scores. Their research paper grades ranged from 13 to 16.2 out of 20. Three students (one female, two males) had high constructive thinking scores and their research paper grades ranged from 12.1 to 16.8 out of 20. There was one female student who had equal scores on both types of thinking. She received a mark of 13.4 out of 20 on her research paper. Of the eight students whose language was not English, four had low to high constructive thinking scores.

Portfolios. A point of interest was that Cameron had the highest number of portfolios returned. There were seven portfolios mailed to the investigator from his section of 20 students. All of the portfolios included instructor feedback, and five out of seven had examples of research paper peer feedback.

Of the seven students who submitted portfolios from Cameron's class, four completed all of the critical and constructive thinking questionnaire items and, therefore, had total scores. Only one of these four students had a high score on constructive thinking. She also was the only student who completed the open-ended items on the questionnaire to triangulate her stance and thereby create a profile of herself.

She was a native speaker of English and was 17-18 years of age. She had an extensive background in writing research papers before entering the 099. 111 course, but believed that she had expanded her knowledge, and found that having a peer review her paper was very helpful. When asked what was important to her about writing a research paper, she indicated that she wanted to learn more and review the writing process. In writing her research paper, she hoped to persuade the reader, learn something new about the topic, and attain a high mark. Her research paper grade was 12.6 out of 20, and her final grade was 72.7 percent. She hoped to attend the Faculty of Dentistry as a student in Dental Hygiene.

In contrast, one of Cameron's students who turned in his portfolio had high critical thinking questionnaire scores. His first language was English and he was 19 to 20 years of age. He received a research paper grade of 17.5 out of 20, and a final grade of 93 percent. He did not, however, complete the open-ended questionnaire responses. As a result, a profile of this student could not be developed.

Section 01: Cameron's Class: Students Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
4	m	19-20	86-90	17.5	93.7	156	135	-21	X	
E1	f	21-22	-	13.4	67.97	151	151	-	-	
CAM1	m	21-22	81-85	15.8	68.41	160	151	-9	-	
L2	f	19-20	76-80	15	63.64	156	153	-3	-	
CAM2	m	17-18	-	-	35.99	157	153	-4	X	
CAM03	m	21-22	81-85	13.2	61.75	147	154	10	-	
CAM4	m	27-30	71-75	-	-	165	154	-11	X	
CAM05	m	19-20	66-70	15.6	64.82	158	160	2	X	
CAM6	m	45plus	-	13.8	60.49	172	161	-11	-	
CAM07	f	21-22	-	16.8	66.31	162	164	2	X	
CAM08	m	17-18	66-70	13	55.77	169	165	4	X	
CAM9	f	17-18	71-75	12.8	65.21	175	167	-8	X	
01	f	17-18	66-70	12.6	72.28	141	169	28	X	
03	m	19-20	61-65	12.1	64.96	155	173	18	X	
02	m	17-18	-	16.8	86.14	169	185	16	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
3	4	1	6	1	15

01: Cameron's Class: Not Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
1	m	19-20	56-60	15	64.06	125	106	-19	X	
2	m	19-20	81-85	16.7	86.7	159	146	-13	X	
3	m	31-35	56-60	-	-	161	146.5	-14.5	X	
CAM010	f	19-20	-	16.2	69.43	145	157.25	12.25	-	
L1	m	21-22	-	13.4	75.09	188	182.67	-5.33	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	1	-	1	3	5

Complete Profile of Cameron's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
3	5	1	7	4	20

Section 1: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Knowledge	Gained Knowledge	Impor-tance	Hope To Accomplish/ Future Intersts
01	12.6	72.78	141	169	4	5/6	2/13	3/5/6-18
02	16.8	86.14	169	145	-	-	-	-
03	12.1	64.96	155	173	-	-	-	-

Section 1: High Critical Thinking Scores

1	15	64.06	125	106	-	-	-	-
2	16.7	86.7	159	146	-	-	-	-
3	-	-	161	146.5	-	-	-	-
4	17.5	93.7	156	135	4	7	14	5-21

Caterina's Class

Classroom makeup. There were nine females and ten males that responded to the close-ended items on the questionnaire in Caterina's class. They ranged in age from 17 to 26. There were two students who were older than the rest of the students in the class and their age was between 31 to 45. Two students (one female and one male) had high critical thinking scores. Their research paper grades ranged from 13.4 to 15.6 out of 20. Six students (four females and one male) had low critical thinking scores and their research paper grades ranged from 10.4 to 14.6 out of 20. There were also six students (three females and three males) who had low constructive thinking scores. Their research paper grades ranged from 10 to 16.8 out of 20. Five students (one female and four males) had high constructive thinking scores and their research paper grades ranged from 10.2 to 14.4. Of the seven students whose first language was not English, five students had low constructive thinking scores.

Portfolios. There were only two student portfolios submitted from Caterina's class, both containing instructor feedback on draft versions along with the research paper itself. Of the two portfolios that were turned in, one participant had not totally completed either the closed or open-ended items on the questionnaire. As a result, there were no critical or constructive thinking total scores or qualitative data available with which to create a profile. The other student had low critical thinking scores on the close-ended items, receiving a grade of 14.6 out of 20 on his research paper and a final grade of 66.2 percent. His first language was English and he was 17 to 18 years of age.

02 Caterina's Class: Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
5	m	17-18	91-100	13.4	77	149	132	-17	X	
CAT1	f	21-22	56-60	-	54	153	147	-6	X	
6	f	23-24	61-65	15.6	73.9	167	149	-18	X	
Cat2	m	41-45	61-65	-	19.10	150	152	2	X	
04	m	19-20	66-70	10.2	49.10	139	158	19	X	
CAT03	f	19-20	71-75	11.60	69.3	152	164	12	X	
CAT04	f	19-20	76-80	16.2	75.5	164	165	1	-	
L3	m	17-18	81-85	14.6	66.2	171	165	-6	X	
CAT5	m	17-18	91-100	13.2	77.22	171	167	-4	-	
06	f	19-20	76-80	14	54.5	156	170	14	X	
CAT06	f	17-18	76-80	14.6	69	174	170	-4	X	
CAT07	m	31-35	51-55	16.8	72.6	173	174	1	-	
CAT9	f	25-26	66-70	14.6	75.2	183	175	-8	X	
07	m	19-20	76-80	12	72.12	163	178	15	X	
CAT010	m	19-20	66-70	10	49.5	166	178	12	-	
06	m	23-24	66-70	11.8	41.5	156	180	24	-	
08	m	19-20	76-80	14.4	63.4	169	199	30	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
5	5	-	5	2	17

02 Caterina's Class: Not Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
CAT11	f	17-18	81-85	10.4	54.5	166.11	158	-8.11	-	
CAT012	f	17-18	76-80	-	34.6	163	164.43	1.43	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	1	-	1	-	2

02 Overall Profile of Caterina's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
5	6	-	6	2	19

Section 2: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope to Accomplish/ Future Interests
04	10.20	49.10	139	158	4	1	8	7-14
05	14	54.5	156	170	4	1	1/2	1-6/1
06	11.8	41.5	156	180	2	1	7	3-7
07	12	72.12	163	178	2	1	3	4/5-14
08	14.4	63.4	169	199	-	-	-	-

Section 2: High Critical Thinking Scores

5	13.4	77	149	132	4	5	5/8	6-7
6	15.6	73.9	167	149	2	4	6	--9

Mark's Class

Class makeup. In Mark's class, there were nine females and five males who responded to the close-ended items on the questionnaire. Their age ranged from 17 to 26. There were also three students from this group who were older and their ages ranged from 41 to 45. The high school grade point average for this group ranged between 66 and 100. Five students (three females and two males) had high critical thinking scores. Their research paper grades ranged from 11 to 16 out of 20. Four students (three females and one male) had low critical thinking scores and their research paper grades ranged from 9 to 13. Two male students had low constructive thinking scores, with research paper grades of 16 and 16.9 respectively out of 20. There were also two students who had high constructive thinking scores and their research paper grades were respectively 12 and 14.5 out of 20. There were four students in this class whose first language was not English. Three of them had low to high critical thinking scores and one had a high constructive thinking score.

Three portfolios were received from this class. These portfolios included research proposals, outlines and instructor feedback along with copies of final research papers. Of these three participants, there was only one student who had totally completed the close-ended questionnaire items. He had a high critical thinking score. His research paper mark was 16 out of 20 and his final grade in the course was 84 percent. There were no open-ended responses to complete a profile for this student.

03 Mark's Class: Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
7	m	41-45	86-90	11	59.7	140	125	-15	X	
8	f	19-20	61-65	14	68.9	159	134	-25	X	
9	f	41-45	91-100	16	84.10	162	139	-23	X	
M1	m	21-22	71-75	12.5	69.10	143	140	-3	-	
12	m	19-20	91-100	16.5	87.7	164	142	-22	X	
10	f	17-18	71-75	14.5	71.1	164	150	-14	X	
010	f	25-26	61-65	12	74.3	133	151	18	X	
M2	f	21-22	76-80	13	60.7	168	159	-9	-	
M03	m	21-22	81-85	16	80.1	163	164	1	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total	
1	1	-	2	5	9	

03 Mark's Class: Not Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
M4	f	17-18	76-80	9	62.10	156	145	-11	X	
M05	m	21-22	25-26	16.9	75.4	145	149.22	4.22	X	
M6	f	19-20	76-80	11	68.1	168	160.11	-8.00	-	
11	f	25-26	66-70	16	80.1	193	178.22	-14.78	X	
09	f	41-45	66-70	14.5	76.40	154.11	196.11	42	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total	
1	1	-	2	1	5	

Overall Profile of Mark's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	2	-	4	6	14

Section 3: Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope to Accomplish/ Future Interests
09	14.5	76.4	154.11	196.11	1	16	1	5-16
010	12	74.3	133	151	1	4/1/11	1	6-15

Section 3: High Critical Thinking Scores

7	11	59	140	125	-	-	-	-
8	14	68.9	159	134	-	-	-	-
9	16	84	162	139	1	-	-	-
10	14.5	71.1	164	150	2	8	5/1	6-12
11	16	80.1	193	178.22	1	10	8/7	10-12
12	16.5	87.7	164	142	2	1	14	9-7

Laura's Class

Class makeup. There were 14 females and 6 males that responded to the close-ended items on the questionnaire from Laura's class, with ages ranging from 17 to 26. There were two older students. One fell between the age range of 31 to 35 and the other, from 41 to 45. The high school grade point average of students in this class varied from 56 to 100. Three students (one female, two males) had high critical thinking scores and their research paper grades ranged from 17 to 19 out of 20. Eight students (five females and four males) had low critical thinking scores. Their research paper grades ranged from 12 to 18 out of 20. Six students (five females, one male) had low constructive thinking scores. Their research paper grades ranged from 13.5 to 18.5 out of 20. Two students

(both females) had high constructive thinking scores with their research paper grades being 13 and 14.5 respectively out of 20. There were five students whose first language was not English. Two had high and one a low constructive thinking score.

Portfolios. There was one portfolio received from Laura's class. This student had a low constructive thinking score. His open-ended responses showed that he had had very little previous experience writing a research paper. He learned the process of how to write a research paper in the 099.111 program. He believed that it was important to write a research paper that mattered, that was authentic. He hoped that the readers would gain an understanding of the issue he wrote about, and that he would be given a high mark. His actual research paper mark was 13 out of 20 and his final grade was 70 percent. His area of interest was Dentistry, in particular Dental Hygiene.

04 Laura's Class: Completed Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	Interna
LA1	m	17-18	61-65	12.5	69.9	157	145	-12	X	
13	m	17-18	81-85	17	89.5	166	153	-13	X	
LA2	f	31-35	71-75	12.5	69.4	158	155	-3	X	
LA03	f	19-20	76-80	-	-	150	156	6	-	
LA4	m	17-18	86-90	18	92.2	160	157	-3	X	
15	m	19-20	86-90	19	89.3	174	158	-16	-	
LA5	m	25-26	91-100	17	82.60	161	159	-2	X	
LA06	f	19-20	61-65	-	-	161	162	1	X	
LAE7	f	17-18	81-85	15.5	81.5	162	162	-	X	
LA08	f	19-20	56-60	13.5	58.3	155	166	11	X	
LA9	f	23-24	-	15.5	76.8	176	171	-5	X	
LCON 1	m	41-45	-	13	70.7	162	172	10	X	
LA10	f	17-18	81-85	12	74.10	176	172	-4	X	
LA011	f	17-18	86-90	18.50	94.20	179	188	9	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	5	1	6	2	14

04 Laura's Class: Not Completed Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
LA12	f	17-18	81-85	14.5	72.7	164	158.56	-5.44	X	
LA13	f	23-24	76-80	-	-	167	166	-1	-	
011	f	23-24	76-80	15.5	80.8	172.67	187	14.33	X	
14	f	17-18	91-100	17.5	85.4	205.44	183	-22.44	X	
LA014	f	19-20	81-85	14.5	77.7	184	185.11	1.11	-	
012	f	17-18	61-65	13	66	162	186	24	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	1	-	2	1	6

Overall Profile of Laura's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	6	1	8	3	20

Section 4: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope to Accomplish/ Future Interests
011	15.5	80.8	172.67	187	1	3	1	14/10-9
012	13	66	162	186	1	17	15	6-1

Section 4: High Critical Thinking Scores

13	17	89.5	166	153	4	1	11	14-7
14	17.5	85.4	205.44	183	4	2	7	5/10-12
15	19	89.3	174	158	-	-	-	-

George's Class

Class makeup. There were nine females and six males that responded to the close-ended questionnaire items. Their age range was between 17 and 22. There were two mature students whose age ranged from 27 to 30 and from 41 to 45. The high school grade point average of students in this class was between 56 and 100 percent. Six

students (three females and two males) had high critical thinking scores. Their research paper grades ranged from 13.8 to 18.5 out of 20. Four students (three females and one male) had low critical thinking scores, and their research paper grades ranged from 10 to 17. 5 out of 20. There were also four students who had low constructive thinking scores (two females and two male). They had a similar range for research paper grades, from 10 to 17. There was one male student who had a high constructive thinking score. Unfortunately, his research paper mark was unavailable. Of the seven students whose first language was not English, three students had low to high constructive thinking scores.

Portfolios. Only one student from George's class submitted his or her writing portfolio, complete with research paper draft and instructor feedback. Her native language was English and she was 19 to 20 years of age. She had completed both the close- and open-ended responses on the questionnaire with a high critical thinking score. While she had an extensive background in writing informative papers before enrolling, she noted that in the course she had learned how to cite references in A.P.A. style. In order to obtain a good grade, she wanted to write a paper that contained correct grammar and had a clear thesis statement. She would like to attend the Faculty of Education after completing her Arts degree. She received 17 out of 20 on her research paper, and 78 percent for her final grade.

05 George's Class: Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
16	m	17-18	56-60	18.50	80.80	167	141	-26	X	
G1	f	17-18	61-65	10	53.2	152	144	-8	-	
17	f	19-20	86-90	17	78.1	167	148	-19	X	
G2	f	27-30	-	19.3	79.1	175	148	-27	-	
G3	f	17-18	71-75	15.5	77.4	171	149	-22	X	
G4	f	19-20	66-70	-	-	163	162	-1	-	
G05	m	17-18	76-80	17	74	167	170	3	-	
G06	m	17-18	76-80	10	56	168	176	8	-	
G7	f	41-45	66-70	17.5	80.80	185	177	-8	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	2	-	3	4	9

05 George's Class: Not Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
G8	m	19-20	81-85	13.8	68.8	166.25	136.22	-30.03	X	
G9	f	19-20	71-75	15.5	77.4	169	142	-27	X	
G10	m	19-20	71-75	13.8	67	164	158.56	-5.44	-	
G011	f	17-18	76-80	15.5	82.5	163.44	174	10.56	X	
G012	f	19-20	71-75	12.5	67.60	170	181.49	11.89	X	
013	m	21-22	91-100	-	-	163	189	26	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
1	2	-	1	2	6

Overall Profile of George's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
1	4	-	4	6	15

Section 5: Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope to Accomplish/ Future Interests
013	-	-	163	189	4	17	9	6-24

Section 5: High Critical Thinking Scores

16	18.5	80.8	167	141	1	21	1	14-14
17	17	78	167	148	4	1	11	12/6-12
18	19.3	79	175	148	2	1	1	6/5-7
19	13.8	68.8	166.25	136.22	1	1	6	6/5-7
20	15.5	77.4	169	142	4	5	11	5/14-31/1
21	15.5	77.4	171	149	4	1	11	14-10

Robert 06 Class

Class makeup. There were an equal number of female and male students in Robert's 06 section, ranging in age from 17 to 24 that responded to the close-ended questionnaire items. Their high school grade point average ranged from 61 to 90 percent. There were five students (two females and three males) who had high critical thinking scores. Their research paper grades ranged from 8 to 16 out of 20. Three students (one female and two males) had low critical thinking scores and their research paper grades ranged from 8 to 15.2 out of 20. Seven students (three female and four male) had low constructive thinking scores. Their research paper grades ranged from 10 to 16 out of 20. Six students (five females and one male) had high constructive thinking scores. Their research paper grades ranged from 12 to 16.6 out of 20. There was one male student who had equal scores on both types of thinking. He received 11 out of 20 on his research paper. Of the nine students whose first language was not English, six students had high and low constructive thinking scores.

Portfolios. The 06 class returned four portfolios, the second highest response rate of all of the sections. These portfolios included instructor feedback. Of the four students

who turned in their portfolios, three had completed the close-ended items on the questionnaire. There were two who had low constructive thinking scores and one with equal scores. Unfortunately, only one out of the three students completed the open-ended questionnaire responses, the student who had equal critical/constructive thinking scores on constructive and critical thinking. He was a native speaker of English and was 23 to 24 years of age. This student had a strong background in writing. He indicated that in the course he had learned how to organize an academic paper. When asked what he viewed as important about writing a research paper, he believed that the paper should create a solid argument. He hoped that his research paper would have current information. His research paper grade was 11 out of 20, and his final mark was 60 percent. The faculty he was most interested in was Agriculture.

06 Robert's Class: Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
22	m	17-18	66-70	8	61.7	150	131	-19	X	
23	f	21-22	76-80	12.6	64.6	156	149	-16	X	
R1	m	21-22	86-90	-	-	165	149	-16	-	
R2	m	19-20	76-80	15.2	76.2	152	151	-1	X	
25	m	19-20	81-85	13.6	74.5	167	151	-16	X	
LCON2	m	21-22	81-85	13.6	64.9	147	153	6	-	
014	f	19-20	86-90	16.6	72.2	148	163	15	-	
R3	f	21-22	81-85	8	54.2	166	163	-3	X	
R4	m	23-24	81-85	12	62.7	168	163	-5	-	
R05	m	19-20	61-65	10	45	163	166	3	-	
R06	m	21-22	86-90	16	83.6	163	167	4	X	
015	f	19-20	76-80	12	71.5	141	172	31	X	
R07	f	17-18	66-70	14	61.2	160	172	12	X	
016	f	19-20	71-75	12	51	150	173	23	-	
E2	m	23-24	-	11	60.6	179	179	-	-	
019	f	21-22	61-65	12	49.6	159	180	21	X	
R08	f	21-22	86-90	16	73.5	176	184	8	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
4	5	1	3	4	17

06 Robert's Class: Not Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	
R09	f	17-18	71-75	13.60	63.30	144	149.67	5.67	X	
R010	m	21-22	81-85	10	56.2	159.56	161	1.44	-	
26	f	27-30	71-75	16	73.4	180.11	161	-19.11	X	
017	f	19-20	66-70	13.6	62.3	147.44	167	19.56	X	
018	m	31-35	76-80	16	73.5	165.22	183	17.78	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	1	-	1	1	5

Overall Profile of 06 Robert's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
6	6	1	4	5	22

Section 6: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Knowledge	Gained Knowledge	Impor-tance	Hope to Accomplish/ Future Interests
014	16.6	72.2	148	163	1	17	1	6-7
015	12	71.5	141	172	5	2	1	6/5-7
016	12	51	150	173	1	2	16	6/3-4
017	13.6	62.3	147.44	167	2	1	15	3-24
018	16	73.5	165.22	183	-	-	-	-
019	12	49.6	159	180	-	-	-	-

Section 6: High Critical Thinking Scores

22	8	61.7	150	131	1	2	3	6-27
23	12.6	64.6	156	149	1	20	3	3-10
24	-	-	165	149	1	6	4	6-7
25	13.6	74.5	167	151	4	2	3	4-11
26	16	73.4	180.11	161	4	3	12	4/6-6/1

Robert's 07 Class

Class makeup. There were 9 males and 12 females that responded to the close-ended items in Robert's 07 section, with an age range of 17 to 22. Their high school

grade point average ranged from 61 to 90 percent. There were eight students (six males and two females) who had high critical thinking scores. Their performance on the research paper ranged from 13.6 to19 out of 20. The three students (one female and two males) who had low critical thinking scores received research paper grades that ranged from 12 to 13.6 out of 20. One male student had equal scores on both types of thinking. He received a grade of 11 out of 20 on his research paper. There were seven students (three females and four males) who had low constructive thinking scores. They received 10 to 16 out of 20 on their research papers. Six students (five females and one male) had high constructive thinking scores. Their research paper marks ranged from 12 to 16 out of 20. There were three students (two females and one male) whose first language was not English. They had low constructive thinking scores and their research paper grades ranged from 8 to 13.4 out of 20.

Portfolios. Two portfolios were submitted from section 07. These portfolios also included instructor feedback. These native speakers of English, did not, however complete all of the close-ended items on the questionnaire. Their subset scores were added and averaged according to the number of responses with both students having high critical thinking scores. One female student, age 19 to 20, had very little background in writing a research paper. She believed that she had learned about the process of writing a research paper by attending the class. When asked what she thought was the most important thing about writing a research paper, she wanted to create a solid argument. She hoped to go into the Faculty of Management after she completed University 1. The other student was a male, a native speaker of English, 19 to 20 years of age. He also had had very little background in writing a research paper before enrolling in the 099.111

course. He reported that he learned how to conduct research by attending the 099.111 class. He also felt it was very important to create a solid argument. He hoped that his final research paper contained a solid argument and that he was able to get his point across to the audience. His future goal was to be admitted to the Faculty of Architecture.

Section 07: Robert's Class: Completed Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	intern
27	m	19-20	86-90	13.6	57.7	169	123	-46	X	
28	m	19-20	66-70	14	64.3	143	129	-14	X	
34	m	17-18	66-70	12	62	161	147	-14	X	
ROB1	f	17-18	81-85	13	59.6	159	151	-8	X	
ROBE2	f	17-18	81-85	13	59.6	155	155	-	X	
ROB03	f	17-18	81-85	13	71.8	150	158	8	X	
ROB04	f	19-20	86-90	13.4	75.80	155	158	3	-	
ROB5	f	19-20	71-75	13	50.9	170	160	-10	X	
ROB06	m	17-18	71-75	12	43.20	161	162	1	X	
020	f	17-18	86-90	-	-	154	172	18	X	
021	f	17-18	81-85	12	61.10	156	182	26	X	
ROB07	f	21-22	86-90	10	57.40	174	183	9	-	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	4	1	2	3	12

Section 07: Robert's Class: Did Not Complete Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con		
29	f	19-20	86-90	14.6	71.9	154	137.78	-16.22	X	
ROB08	f	17-18	76-80	16.4	81.2	145.36	147.89	2.53	X	
30	m	19-20	71-75	19	90.80	176.78	148.22	-28.56	X	
ROB9	m	19-20	71-75	12	40.90	159	149.22	-9.78	X	
31	m	17-18	81-85	18	73.7	180.78	150.03	-30.75	X	
33	f	17-18	81-85	12	65.20	170.33	151	-19.33	X	
ROB010	m	21-22	81-85	8	48	156	157.44	1.44	-	
32	m	17-18	86-90	18	86.80	186	167.78	-18.22	X	
ROB11	f	17-18	81-85	13.6	69.2	160	157	-3	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	2	-	2	5	9

Overall Profile of Robert's 07 Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	6	1	4	8	21

Section 7: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope to Accomplish/ Future Interests
020	-	-	154	172	1	22	4/20	N/a-14
021	12	61	156	182	1	22/6	13	6-11

Section 7: High Critical Thinking Scores

27	13.60	57.7	169	123	4	2	10/22	6-7
28	14	64.3	143	129	1	2	20	6/3-12
29	14.6	71.9	154	137.78	1	17	3	N/a-7
30	19	90.8	176.78	148.22	1	8	3	3/7-24
31	18	73.7	180.78	150.03	4	17	1	6-8
32	18	86.8	186	167.78	5	22	20	¾--
33	12	65.20	170.33	151	1	22	3	3-12
34	12	62	161	147	2	6	3	3/7-6

Ricky's Class

Class makeup. Six females and four males responded to the close-ended student questionnaire, all international students placed in this separate course section. Their ages ranged from 19 to 24. They were learning English as a Second Language. Their grade point average before entering the 099.111 course was from a low of 76 to a high of 90 percent. Four students (two females and two males) who had high critical thinking scores received research paper grades that ranged from 10.4 to 12.4 out of 20. There were three students (two females and one male) who had low critical thinking scores. Their research paper grades were 12 out of 20, except for one student whose grade was 15.6 out of 20.

Three students (two females and one male) had low constructive thinking scores. Their research paper grades ranged from 13.2 to 13.6 out of 20, and their final grades were 65.6 and 74.9 percent, respectively.

Portfolios. Only two students from Ricky's class responded to the request for portfolios. Their portfolios included detailed instructor feedback plus final research papers, but they had not fully completed the close and open-ended responses on the questionnaire. The degree to which they valued critical and constructive thinking could, therefore, not be determined.

08 Ricky's Class: Completed Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	Intern
36	f	21-22	81-85	10.4	60.05	157	143	-14	-	Y
35	m	19-20	91-100	12.4	63.35	170	149	-21	-	Y
37	m	23-24	81-85	12.4	67.60	166	152	-14	-	Y
RI1	m	23-24	86-90	-	-	161	153	-8	-	Y
RI2	f	21-22	81-85	12	64.55	164	155	-9	-	Y
RI3	f	23-24	-	15.60	76.20	169	160	-9	-	Y
38	f	19-20	76-80	12	-	181	166	-15	-	Y
RI04	f	19-20	91-100	-	-	162	171	9	-	Y

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	1	-	3	4	8

08 Ricky's Class: Did Not Complete Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	-	Y
RI05	f	19-20	81-85	13.20	71.25	165	173.25	8.25	-	Y
RI06	m	27-30	86-90	13.20	64.85	167.25	174	6.75	-	Y

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	2	-	-	-	2

Complete Profile of Ricky's Class: Combined

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
-	3	-	3	4	10

Section 8: High Critical Thinking Scores

35	12.4	63.35	170	149	1	20	12/1	6-7
36	10.4	60.05	157	143	1	-	-	-
37	12.4	67.6	166	152	-	-	-	-
38	12		181	166	1	17/2	16	-7

Larry's Class

Class makeup. There were 11 females and 12 males that responded to the close-ended items on the questionnaire from Larry's class. The average age of this group ranged from 17 to 24 years of age. There was one student who was older than 45. The grade point average of these students was between 56 to 100 percent. Four students (four males) had high critical thinking scores and their research paper grades ranged from 12 to 17 out of 20. There were ten students (five females and five males) who had low critical thinking scores. Their research paper grades fell between 12.2 to 17.6. Six students (4 females and 2 males) had low constructive thinking scores. Their research paper grades ranged from 15.8 to 18.4.

Three female students had high constructive thinking scores and their research paper grades were between 15.8 to 16.4. Of the nine students whose first language was not English, six had low to high constructive thinking scores. There was one student who submitted a portfolio that included instructor feedback together with the research paper.

This participant had not fully completed the closed or open-ended items on the questionnaire. As a result, a profile could not be completed.

09 Larry's Class: Completed Questionnaire

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	intern
39	m	17-18	81-85	16.4	76.8	158	117	-41	X	
40	m	17-18	71-75	12	63.50	153	135	-18	X	
LAR1	m	21-22	56-60	14	73.2	157	151	-6	-	
LAR2	f	19-20	76-80	16.8	66.90	163	153	-10	X	
LAR3	m	23-24	66-70	16	61	157	155	-2	-	
LAR4	m	21-22	-	18	89.7	159	155	-4	X	
LAR5	f	17-18	91-100	17.6	84.70	161	158	-3	X	
LAR06	f	19-20	81-85	15.8	84.15	151	163	12	-	
LAR7	m	21-22	61-65	12.2	53.75	154.22	146	-8.22	X	
LAR08	m	45p	86-90	-	-	147	148	1	-	
LAR9	m	17-18	81-85	17	89.2	190	169	-21	X	
LAR010	f	19-20	81-85	17.4	81.25	180	176	4	-	
LAR011	m	17-18	91-100	18	87.35	173	183	10	X	
024	f	21-22	86-90	-	75.90	161	189	28	-	
LAR012	f	17-18	86-90	18.4	64.89	185	189	4	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
1	5	-	6	3	15

09 Larry's Class: Not Completed

ssn	M/F	age	hsgpa	paper	f-grade	critical	con	cri/con	Eng-1	intern
41	m	17-18	71-75	17	65.30	155.7	124	-31.70	X	
LAR13	f	17-18	81-85	15.8	74.80	149.89	149	-.89	X	
LAR14	m	21-22	86-90	16	63.49	162	159.33	-2.67	-	
LAR015	f	31-35	71-75	13.8	68.75	152	164.61	12.61	-	
023	f	23-24	81-85	16.4	74.2	153	169	16	-	
LAR16	f	17-18	86-90	15.8	64.2	139	136	-3	X	
LAR17	m	41-45	86-90	19.2	84	179.22	173.11	-6.11	X	
022	f	17-18	76-80	15.8	63.35	149	174	25	X	

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
2	1	-	4	1	8

Overall Profile of Larry's Class

High Constructive Thinking Scores	Low Constructive Thinking Scores	Equal Scores	Low Critical Thinking Scores	High Critical Thinking Scores	Total
3	6	-	10	4	23

Section 9: High Constructive Thinking Scores

	Research Paper Grade	Final Grade	Critical Thinking Score	Constructive Thinking Score	Prior Know-ledge	Gained Know-ledge	Impor-tance	Hope to Accomplish/ Future Interests
022	15.8	63.35	149	174	4	1	12	5-20/1
023	16.4	74.2	153	169	2	15	4	2-10
024	-	75.9	161	189	2	20	20	N/a-7

Section 9: High Critical Thinking Scores

39	16.4	65.3	158	117	1	7	4	6-14
40	12	64	153	135	1	5	-	6-23
41	17	65.3	155.70	124	1	1	4	6-7
42	17	89.2	190	169	4	1	3	6/4-7

APPENDIX O

TEACHING PHILOSOPHY	JEREMY	POPE	MARTIN	PETER	JOHN	ROGER	KELLY	CORINNA	RAQUEL	JESSICA
student centered		X	X		X				X	
taught by mentors	X		X		X		X	X	X	
believes in learning process	X	X	X	X	X	X		X	X	X
nurtures life long learning	X	X	X			X	X	X	X	X
developed own philosophy	X	X	X	X		X		X	X	X
puts personal philosophy into practice		X	X	X		X		X	X	X
problem solving/ case study approach	X	X	X			X		X	X	X
believes in being current	X	X	X	X	X	X	X	X	X	X
believes in performance and final product			X	X						
achieves credibility through being objective	X						X			
sees the value of the whole person			X		X				X	X
appreciates diversity	X	X	X	X	X	X	X	X	X	X
wants to develop the art of empathy			X				X			X
has a desire to use his heart to educate			X							X
believes that learning is a continuum moving from novist to expert	X		X	X	X	X	X	X	X	X
thrives on aha moments		X				X			X	X
relationship building		X	X			X		X	X	X
to think about the material they are learning	X	X	X	X	X	X	X	X	X	X
to advance the effort that is necessary for them to learn/ an enabler						X				
wants them to demonstrate creativity					X	X			X	
understanding of authority						X				
importance of debating	X	X	X	X	X	X	X	X	X	X
strives for active engagement	X	X	X	X	X	X	X	X	X	X
to learn the importance of being humble						X			X	
frustrated with the view that learning is always about finding the correct answer	X	X	X	X	X	X	X	X	X	X
wants to create open ended assignments	X	X	X	X	X	X	X	X	X	X
seeks truth	X		X	X				X		

TEACHING PRACTICE	JEREMY	POPE	MARTIN	PETER	JOHN	ROGER	KELLY	CORINNA	RAQUEL	JESSICA
strategy-oriented	X			X		X	X	X		
questions his/her practice	X	X		X	X		X	X	X	
has students develop questions	X	X	X	X	X	X	X	X	X	X
develops rapport with students		X				X				X
direct instruction	X	X	X	X	X	X	X	X	X	X
active listener		X	X			X			X	X
empathy			X					X	X	X
recognizes students' strengths	X	X	X		X	X	X			
original teaching style/ risk takes		X	X			X			X	
original assessment		X				X			X	
differentiated instruction			X		X				X	
professionally develops	X	X	X	X	X	X	X	X	X	X
gathers tried methods	X					X				
facilitator	X	X	X						X	
wants optimal solutions	X									
learns from students		X				X				X
importance of social interaction	X	X	X	X	X	X	X	X	X	X
group oriented	X					X		X	X	
draws out students' experience, abilities	X	X	X	X	X	X	X	X	X	X
importance of earning credibility	X						X			
keeps current	X						X			
open-minded	X	X	X	X	X	X	X	X	X	X
feels time constraints	X		X	X	X		X	X	X	X
creates a sense of wonder		X		X		X		X	X	X
wants to make a difference in student lives		X				X				X
gives feedback to students	X	X	X	X	X	X	X	X	X	X
uses peers to review assignments	X	X		X		X		X	X	X
feels physical constraints				X			X			
tries to make content interesting	X	X	X	X	X	X	X	X	X	X
wants them to understand implications		X	X			X			X	
makes connections to real life scenarios	X	X	X	X	X	X	X		X	X
wants to know what student feedback is		X				X				
goes beyond technical information	X	X	X	X	X	X	X	X	X	X
tries to have students ask why	X	X	X	X	X	X	X	X	X	X
takes risks by trying something new	X	X			X			X	X	X
makes time to discuss content		X				X			X	X