MODELS FOR THE DEVELOPMENT OF HIGHER LEVEL THINKING SKILLS

A COMPARATIVE ANALYSIS
OF MODELS FOR THE DEVELOPMENT OF HIGHER LEVEL THINKING SKILLS:
A TEXTUAL ANALYSIS OF
PLATO'S REPUBLIC AND BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES.

By

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TITLE: A Comparative Analysis of Models for the Development of Higher Level Thinking Skills: A Textual Analysis of Plato's The Republic and Bloom's Taxonomy of Educational Objectives.

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Abstract

This project has been developed using a parallel strategy. The first part of this project uses the concept of a model, taken from M.I. Finley's book Ancient History Evidence and Models, as the basis of a philosophical inquiry into the development of higher level thinking skills found in two paradigmatic models: Plato's Republic and Benjamin Bloom's Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain. In analyzing, synthesizing, amalgamating and adapting some of the elements of these two models, the writer constructs a generic meta-model for the development of higher level thinking skills in students.

The second part of this project focusses on the development of 12 teacher-created lessons dealing with the topic of "Thinking About Thinking" for a Grade 8 Advisor class. The writer demonstrates how these lessons were implemented and provides samples of student work. She uses the "Student Development of Higher Level Thinking Skills Survey" as the basis of her interpretations and conclusions about the students' perception of the development of higher level thinking skills and the successes and weaknesses of the unit.

The rationale for this project stems from the writers personal and professional experiences in education and from the writer's belief that there is a need to assist our students to develop higher level thinking skills in order to meet the challenges of the future. There is a need to make education more responsive to the needs of society and to ensure that our students will be able

to face the challenges of the Twenty-First Century by being effective problem-solvers and effective thinkers. The project is written primarily for those educators and scholars interested in analyzing models of thinking and in developing models in the classroom to promote the development of higher level thinking skills among students.

Acknowledgements

In some ways I believe that the development of higher level thinking skills is like a journey in faith. It is a lifelong journey that we all travel in our own way. It is a journey which is inspired by noble goals. This project is a chronicle of my personal and professional journey into the nature and limits of personal knowledge and the development of higher level thinking skills. My journey was inspired by my desire to learn more about how humans develop higher level thinking skills and by my desire to teach my students something of the essence of thinking. In many ways this project represents only one small phase of my growth both as a student of learning and as an educator. I hope that my journey will inspire my colleagues and my students to continue to develop higher level thinking skills and to think about thinking.

I wish to acknowledge the assistance and support I have received from my project supervisors. The refinement of both my thinking processes and of my written work is the result of the outstanding mentoring and guidance I received from Dr. Catherine Beattie of the M.A.(T)-M.Sc.(T) Programme at McMaster University and Dr. Dan Geagan of the History Department at McMaster University. In many ways they have encouraged me to live up to the challenge of developing higher level thinking skills which I had set before my colleagues and students. I am grateful for the assistance I received from Dr. Beattie, Dr. Geagan and many of my previous teachers who inspired me to think about thinking.

I would also like to express my gratitude to my husband and family members who have always supported my desire to learn and who have encouraged me to further my studies. Jack, I thank you for your gentle patience this first year of our marriage. This has added much tranquility to my life and has given me the peace of mind to focus on the completion of my project. Without your loving encouragement this project would not have been realized. I would also like to thank my mother who has always inspired me to strive to reach new heights in both my personal and professional life. Ma, you have been the source of my strength from the moment you first nurtured me and it is your strength which has carried me this far. It is you who have taught me to think only of the best, to work only for the best and to expect only the best. I am very grateful for your continuing love and support. On a very personal and spiritual note I thank God for guiding me on this journey and helping me to find many of the answers to my teacher's prayer within myself.

Finally, I would like to thank the students of the 1997-1998 8B class at Beatty Fleming Senior Public School. These students have taught me much about thinking and without their input this project would not have been possible. This project is dedicated "to teachers willing to learn from children [and] to children who have so much to teach us about thinking and learning." (Ed Labinowicz, 1990, dedication.)

A Teacher's Prayer

I want to teach my students more
than lessons in a book;

I want to teach them deeper things
that people overlook,

The value of a rose in bloom,
its use and beauty, too,

A sense of curiosity to discover
what is true;

How to think and how to choose
the right above the wrong,

How to live and learn each day
and grow up to be strong;

To teach them always how to gain
in wisdom and in grace,

So they will someday make the world
a brighter, better place.

Lord, let me be a friend and guide
to give these minds a start

Upon their way down life's long road,
then I'll have done my part.

(Wolf, 1993, p. 34.)

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Introduction and Rationale for this Project

> *'Education is not about having the children see the world through our eyes but empowering them to see the world more fully through their own eyes.' (Quoted in Myers, 1994, p. 9. Original source not indicated.)*

As a professional educator and as a student, one of my central preoccupations has been to come to a better understanding of how to develop higher level thinking skills.[1] I believe that the fundamental question of how to assist students develop higher level thinking skills has relevance for all educators regardless of the subject or grade level being taught. The essence of teaching is not the development of an uncritical mass of students who are knowledgeable only in specific facts. The essence of teaching today must be the development of autonomous, critically thinking individuals who are able

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[1] According to S. Frost author of Basic Teachings of the Great Philosophers: "there are ten major problems which have always challenged thinking men and women...The eighth problem is that of *Man and Education.* What is education? Why do we have a system of education and why do we send our children to school? Who shall control education, the people or the state? Is education designed to make free men or to make men who will serve blindly an all-powerful state?...The ninth problem has to with *Mind and Matter.* Which is superior, mind or matter? Is matter a creation of mind, or is mind merely another kind of matter? Can mind be superior and free from matter, or is it so tied up with matter that it is doomed? Is matter the source of all evil in the universe? How can mind remain pure at the same time inhabit a body?...And the tenth problem is concerned with *Ideas and Thinking.* Where do we get our ideas? Are they inherent in the very nature of our minds, or do they come to us from outside the mind? What are the laws of thinking? How can we be sure that our thinking is correct? Is thinking significant in the universe or is it a mere sham?" (Frost, 1989, p. 3.) Any model for the development of higher level thinking skills tries to deal with these same pertinent questions.

to face the challenges of today and the Twenty-First Century.[2] Customarily the Master of Arts (Teaching) project focuses on the development of "a written work on the teaching of [a]...subject, or the design of a curriculum 'package.'" (McMaster University M.A.(T)-M.Sc.(T) Program "Project Requirement.") Due to the nature of my topic I have purposely chosen to orient my study to a generic curricular issue which I believe relevant in all academic subjects and levels, namely: what are higher level thinking skills and how can we as educators foster the development of these skills in our students. Although "it is customary [to describe]...the varieties of outcomes of school learning in term of subject matter...[for] logistical operations of school instruction, [such categories] are grossly inadequate." (Gage (ed.), 1976, p. 30.) Instead, models of cognitive development should be applied to all disciplines.

> Primary emphasis involving problem-solving and the facilitation of storage and retrieval of information for application and the ongoing study and enhancement of these processes can only benefit our ability to learn more efficiently and effectively. (Grider, 1993, p. 14.)

This project is written with a highly specialized audience in mind. It is written primarily for those educators and scholars interested in analyzing models of thinking and developing ways to apply such models (or parts of such models) in the classroom in order to promote the development of thinking skills among students.

The importance of promoting higher level thinking skills in our

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[2] See also Benjamin Bloom's article "Mastery Learning" in which he states: "Finally, modern society demands continual learning throughout life. If the schools fail to promote adequate learning...the students will eventually reject learning...It is this continual learning that should be the major goal of modern education." (Bloom, 1971, pp. 61-62.)

students is not a new theme. It is discussed by Donald Barnes, Thomas Schroeder and Arlene Burgdorf in the teaching resource package, Cut to the Chase: Critical Thinking and Reading Skills. The authors identify the need to study and to promote the development of higher level thinking skills as a world wide phenomenon. Throughout their text, they refer to initiatives in the area of development of higher level thinking skills in Venezuela, Canada, the United Kingdom, Australia, New Zealand, Bulgaria, Malaysia, New Guinea, India and Israel. "It has become increasingly obvious to educators, not only in this country but also in other nations, that we are not effectively helping students identify, develop, and utilize the wide range of thinking and reasoning skills of which they are capable. This is, today, a truly worldwide concern." (Barnes, 1994, p. 1.) Richard Hernstein author of the article "Teaching Thinking Skills" also suggests that:

> Interest in classroom teaching of generally useful thinking skills has increased markedly. The prospects of improving intellectual competence have been discussed in several conferences and workshops, and intervention programs developed in several countries have recently been reviewed under the auspices of the American National Institute of Education. (Hernstein, 1986, p. 1279.)

As Larry Powell suggests in his article "Active Learning: Positive Impact for Schools and Democratic Society," teaching children higher level thinking skills is particularly important in a democracy whereby people are expected to think critically and participate in the decision making for the entire community. (Powell, 1989, p. 2.)[3]

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[3] It is interesting to note that although Plato's Republic was not a democratic system, he also felt education was an important element in developing a citizen's moral and civic life. (Beck, 1964, p. 199.)

This project stems from my own personal experience as a teacher new to the profession and from the realization that my experience teaching in a variety of subject and grade areas is common for many of my new colleagues. In order to remain employed in the teaching profession I have been very flexible in accepting a wide variety of teaching assignments. The fact that the recent number of teachers graduating and entering the teaching work force in Ontario exceeds the number of permanent teaching positions means that teachers like myself are being forced to accept many diverse assignments if their goal is to remain employed in the profession and possibly to obtain a permanent position.[4]

Since graduating from the University of Toronto Faculty of Education in 1992, my experience has included teaching students between the grades Senior Kindergarten and O.A.C.; teaching in English and French language programs; performing the duties of a teacher librarian; teaching in the traditional classroom setting and teaching students working on the television programs "Ready Or Not" and "Road to Avonlea." I am currently employed by the Peel Board of Education in a Middle School, teaching French as a Second Language despite the fact that my primary qualification is as a Secondary School History teacher. This year I am teaching Grade 8 French and serving as a Grade 8 Advisor in the Guidance Program at Beatty Fleming Senior Public School in

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[4] This current reality is contrary to Laverne Smith's prediction that "...teacher retirements alone will equal the present number of teacher education graduates by the mid 1990s." (Smith, 1989, p. 41.) Instead, recent graduates must be conscious of becoming what she refers to as "The 'Lost Generation' of Teachers." (Smith, 1989, p. 38.) With changes in government legislature and the allowance of the "85 factor" for early retirements Smith's prediction may materialize.

Brampton. Although the specific curricular requirements of each of my teaching positions have been significantly diverse, there has been one underlying essential component that has been common to all my teaching assignments, namely: assisting my students develop higher level thinking skills.

As educators working directly with students it is essential that we have an understanding of the theories of learning which promote the development of higher level thinking skills. I also believe that teachers should be sensitive to the fact that the choice of curriculum and teaching methodology used in the classroom has an impact on student performance. It is for this reason that I decided to analyze two well known models for the development of higher level thinking skills and to implement activities in my class which would promote this development. I believe that any analysis of educational theories must be translated into terms which are applicable and meaningful for both educators and students. The selection of the primary sources along with the decision to use the concept of the "model" as the basis of my comparative textual analysis and the decision to implement the topic of "Thinking About Thinking" as a component of my Grade 8 Advisor Program were among the most critical steps in pursuing this project and ensuring that it would be a valuable and practical tool for educators who share my goals.

Throughout this project I will use an interpretative or reflective methodology on the material evidence of The Republic and Taxonomy of Educational Objectives The Classification of Educational Goals Handbook I: Cognitive Domain. I will analyze, synthesize, amalgamate and adapt these two

paradigmatic models for the development of higher level thinking skills in order to provide my colleagues with an example of a workable generic meta-model to assist students develop higher level thinking skills. As subsequent chapters will demonstrate, the students of my Homeroom class 8B have been instrumental in assisting me develop and test a generic model of the development of higher level thinking skills. My goal is to inspire teacher interest in the area of higher order cognitive growth and learning in students. I hope that an understanding of my generic meta-model and a description of the activities I did with my class will inspire my colleagues to include teaching thinking skills in their own curriculum.

Chapter One
Rationale for the Selection of Plato's Republic and Bloom's Taxonomy as Models for the Development of Higher Level Thinking Skills

> *A good case can be made for intellectual crisis in both Plato's society and modern society. The sophists and the debate which they brought on and the conservative reaction to it has parallels in current postmodernism and conservative reaction. In both societies there is large scale breakdown of societal, intellectual, cultural and political tradition. Plato and Bloom are seeking a foundation to rebuild a stable society (or at least stable values in society). Maybe not [so much to] rebuild as to discover a stability they know to be present, but which eludes discovery. (Dr. Dan Geagan, History Department, McMaster University, Conference Notes.)*

In the preliminary stages of this project I faced justifying the selection of my primary sources as more than simply literary sources. I needed to justify these primary sources as documentary evidence of models for the development of higher level thinking skills written in a particular historical context which have continued relevance in a contemporary context. In selecting my primary sources I was greatly influenced by M.I. Finley's work, Ancient History Evidence and Models. I was particularly influenced by his warning that without clearly articulating the "theoretical grounded conceptual scheme" any available document "lends itself to manipulation in all directions, without any controls." (Finley, 1985, p. 18.) In writing this project I attempted to adhere to Finley's position that it is up to the individual researcher to ensure that he or she presents an accurate portrayal of any material evidence discussed. In the case of Plato's Republic, I had to accept the fact that I would be using a translation of the document and that any

translation of the document would be infused with the interpretative understanding of the translator and editor.[5]

I believe that both Plato and Bloom were cognitive theorists concerned with discovering "more about human learning and behavior." (Grider, 1993, p. 2.) It is important to realize that each theorist approached the issue of developing thinking skills from his own distinct perspective. Each model was developed and written at a distinct historical period for a distinct audience and each model was a product of the historical circumstances in which it was written. I agree with Dr. Geagan's analysis that both Plato and Bloom firmly believed that their society was in the middle of a crisis and that both men developed a model of cognitive development to deal with this crises. As Eliyahu Rosenow suggests: "the history of educational theory demonstrates that...an examination [of the basic assumptions of philosophy of education] usually comes as a result of a crisis in both philosophy and education...[that] the educational systems of Plato [and I would suggest Bloom as well]...were the upshot of such crises, which placed education and society at the crossroads." (Rosenow, 1993, p. 209.)

The urgency and need for this kind of a project stems from my belief that our current educational system and society at large are at a crisis point.[6] As is suggested in the article, "What Relevance has Plato for Education Today?" David Carr states:

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[5] Upon the advice of Dr. Dan Geagan I selected the Sterling and Scott translation of The Republic.

[6] See William Cooney et al., 1993, pp. 12-13.

> Already familiar is the prevalent jargon [that] speaks of pupils and parents as consumers and clients, of heads and assistant head teachers as managers, of curriculum as something to be produced, packaged and delivered subject to client satisfaction...It is arguable that education and schooling in the context of our present day corporate-capitalist market economy, are more concerned with the production of consumer-oriented cleverness than with the promotion of wisdom. (Carr, 1988, pp. 125-126.)

This project also stems from my belief that we as educators, not only can do something about this crisis, but that by the very nature of our profession we are obligated to help our students cultivate the thinking skills necessary to cope with the reality of our world. As James Crooks, author of the article "Speaking in Our Own Voices: Plato's Protagoras and the Crisis of Education" states:

> The purpose of Plato's crisis...of all crises in education, is to animate the body of knowledge. Clearly, this is an affair as urgent for us in the 1990s as for the Greeks of the 4th Century. As teachers, researchers, and students at the university, our responsibility is...to respond to the challenge of the things that matter and to make ourselves responsible. In those moments, we come to the body of knowledge out of our own condition, knowing becomes for us an authentic affair, a way of living, which cannot possibly be commodified, bartered, sold, or in any way rendered extraneous...in responding to the address that arrives with the crisis of education, we cultivate what is truly ours, we speak in our own voices. (Crooks, 1994, pp. 13-14.)

I believe that the acuteness of this current crisis in education is particularly evident in light of the recent province-wide teacher protests over the Ontario Government Bill 160. This is a time when the re-evaluation of the importance and return to traditional wisdom is essential for all those educators concerned with the issues of how we can best assist our students in reaching the highest and most desirable level of thinking skills.

After much research and contemplation I came to the conclusion that both Plato and Bloom were revolutionary in their own time. Each man

developed a model which caused a gestalt shift in the way educators perceived the development of higher level thinking skills. Although the impact of either of these two models cannot be underestimated, I found that for my purposes neither model presented a completely satisfying generic model for the development of higher level thinking skills which I could use in my classroom. When I analyzed them comparatively, synthesized and adapted what I felt were the best components of each model, I found that the models complemented and strengthened the concept of the development of higher level thinking skills and transcended the historical period in which they were written. As Dr. Geagan suggested: "The comparison of the two models is in itself a test for what is valid over the long period of human history and what is historically conditioned." (Dr. Geagan, History Department, McMaster University, Revision Notes.)

The Republic by Plato is traditionally thought of as a political book dealing with the creation of a virtuous, moral and just society. The emphasis on the political nature of the book in some ways has overshadowed how significant it is as a founding work in Western literature on the theory of education and the development of thinking skills. I agree with J. Bowen and P. Hobsen and others when they suggest that Plato's significant innovation was that "he was the first person in the history of civilization to develop a systematic theory of education based upon a comprehensive philosophy." (Bowen and Hobsen (eds.), 1987, p. 20.)[7] The Republic by Plato is one of the

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[7] See also Clint Grider, 1993, p. 4 and William Cooney et al., 1993, pp. 19-31.

most comprehensive statements of this philosopher's understanding of cognition and for this reason it has been selected as the primary source material for this author. In his model, education and the development of higher level thinking skills are the main vehicles by which the just and moral society can be actualized. After all "the development of the highest possible higher level thinking skill was the ultimate political credential, [realized in] the Philosopher-King." (Dr. Geagan, Department of History, McMaster University, Revision Notes.)

According to Steve Hreha: "Plato's view on the nature of education preceded the development of his metaphysics and epistemology."[8] (Hreha, 1991, p. 42.) I strongly agree with Hreha's view that Plato's metaphysics developed out of his view on the nature of education. I believe that Plato fully recognized this and articulated these ideas in his work. Any scholar or researcher needs to be aware of his or her own ideological perspectives and the historical and ideological context which shaped the development of a particular theory or work. As Josiah Ober states:

> model choice and design is influenced by ideology [which] includes assumptions about human nature and behavior, opinions on morality and ethics, general political principles and attitudes toward social relations,... [therefore, since each model begins with a priori assumptions and analogies, one must accept that] historical models are derived from the experience and thought of an individual or a group

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[8] I disagree with Egan's statement: "That is, the educational scheme has to be considered in its own right; so we may consider Plato's educational scheme in its own right, abstracted from the epistemology." (Egan, 1981, p. 137.)

and no model is value free. (Ober, 1989, p. 134.)[9]

This is further articulated by Nettleship who states: "Anybody's conception of the method of knowledge must ultimately be determined by his conception of the form in which truth exists...And so Plato's conception of method is the reflex of his metaphysical conception of the nature of things." (Nettleship, 1963, p. 282.) Part of Plato's conception of method is how his educational model fits into his overall scheme. Sterling and Scott also reinforce this idea when they suggest:

> Plato sees the whole of this educational structure as the prime source of individual and social injustice. His intention is to dismantle it and replace it with another curriculum that will educate [humans] to be just...[for] a just [person]...freely chooses to govern himself [or herself] by reason. (Sterling and Scott, 1985, p. 15.)

In the subsequent chapter I will further articulate this point using M. I. Finley's work Ancient History Evidence and Models and Josiah Ober's article "Models and Paradigms in Ancient History."

Plato's analogy of The Divided Line (also known as the Four Stages of Cognition) and the Allegory of the Cave are examples of his hierarchial model for the development of higher level thinking skills. The four levels of cognition in The Republic are: *eikasia* or "conjecture;" *pistis* or "belief;" *dianoia* or "understanding;" and *episteme* or "science." Plato uses the Myth of the Metals as an analogy to explain the difference in natural ability among people. He suggests that the cultivation of higher level thinking skills is the process by which the ultimate Good can be actualized in an individual and true

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[9] See also Finley, 1985, p. 26 and p. 105.

or pure understanding and reason can be attained. Echoes of Plato's concept of the Four Stages of Cognition and the concept of stages in education are evident in current teaching practice. For example Plato's stages of education loosely correspond to our current system of primary, junior, intermediate, and senior education at the elementary, secondary and post secondary levels. Similarly Plato's discussion of the teaching methods employed at the various stages has had a significant impact on current teaching practices. For example there is still a strong emphasis on the importance of creative play at the primary level which is articulated by Plato as the primary teaching method for the first level of education in The Republic.

The Taxonomy remains one of the most influential models for the development of higher level thinking skills today. It continues to be used in teacher training programs and it is the model exemplar for teachers interested in creating activities or questions which target the development of higher level thinking skill in students. As Peter Airasian suggests:

> The major legacy of The Taxonomy has been in its definition of hierarchial levels of...learning. Since its publication [it] has become the model and exemplar used to convey the notion of higher-[level] and lower-level cognitive behaviors. It has become the glass through which educators view policies, objectives, instructional packages, and tests to determine the extent to which they emphasize both lower-and higher level thinking behaviors. (Airasian, 1994, p. 99.)

Since the 1950s The Taxonomy led to a gestalt shift in professional dialogue about the development of higher level thinking skills. It has been adopted by the professional community as a dominant paradigm in the field of teaching.[10]

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[10] As Josiah Ober suggests in his article "Models and Paradigms in Ancient History," a paradigm is "an integrated set of explanatory models," whereas a dominant paradigm is "a set of anointed models that remain in

It is commonly presented in core courses at the Faculty of Education at the University of Toronto as well as in courses dealing with cognitive development. When I was a student at the University of Toronto Faculty of Education in the Bachelor of Education Program in 1991-1992 and again when I was enrolled in the University of Toronto's Junior Basic Program in 1996, Bloom's Taxonomy was used as the model of cognitive development. In this regard I believe that The Taxonomy is a paradigmatic model for our current understanding of the development of higher level thinking skills. As Lorin Anderson and Lauren Sosniak, editors of Bloom's Taxonomy A Forty-Year Retrospective suggest:

> One of the most influential educational monographs of the past half century is The Taxonomy...nearly forty years after its publication in 1956...it remains a standard reference for discussions of testing and evaluation, curriculum development, and teaching and teacher education. A search of the most recent Social Science Citation Index (1992) revealed more than 150 citations to The Taxonomy...In a field marked by wide pendulum swings, the likelihood of finding an idea, concept, or point of view [or model] that has remained constant in its acceptance and application is small indeed. Without doubt, The Taxonomy is one of these rarities. (Anderson and Sosniak, 1994, p. i.)

In Bloom's model the development of thinking skills is broken down into a hierarchy of thinking skills ranging from Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The challenge for me in my project is to test Plato's model and Bloom's model "against the available evidence [and to come to terms with the] ideological presuppositions entailed in the dominant paradigms" in order to make them meaningful in the current

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general use over a long period of time." The significance of the paradigm is that it lends itself "to a heuristically meaningful understanding" of that which is being investigated. (Ober, 1989, p. 136.) According to this definition both Plato's model and Bloom's model are examples of paradigms.

context. (Ober, 1989, p. 137.) If we as educators do not challenge the dominant paradigms of our profession and test them against the realities of teaching we run the risk of failing in our most significant assignment, that of developing our own critical thinking skills. As part of my journey into this area I will outline the essential elements of my generic meta-model for the development of higher level thinking skills derived from Plato's model and Bloom's model and the lessons I developed for my class to incorporate thinking skills and the development of higher level thinking skills into my Advisor Program. I will also analyze and interpret the results of the "Student Development of Higher Level Thinking Skills Survey" used to determine the students' perceptions of the development of higher level thinking skills and the impact of the lessons. In doing so I hope to demonstrate how the theoretical models of thinking and developing higher level thinking skills can be used practically in the classroom and made meaningful and relevant for middle school students. I challenge my colleagues to follow my lead. I encourage them to infuse their curriculum with my generic meta-model for the development of higher level thinking skills and to adapt it in such a way as to complement their curriculum and to meet the needs of their students.[11] I believe that this generation of educators, more than ever, must strive to meet the mandate

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[11] As is stated in "Implications For Program Planning And Development" in The Common Curriculum Policies and Outcomes Grades 1-9: "The depth, breadth, and pace of learning must be adapted to the needs of students. Adaptations may need to be made in learning activities, the time and resources allocated to them, the teaching and learning strategies, the assessment and evaluation methods, and often the content." (Ontario Ministry of Education, The Common Curriculum Policies and Outcomes Grades 1-9, 1995, p. 30.)

found in the Ontario Premier's Council report *Yours, Mine and Ours: Ontario's Children and Youth, Phase One* (1994):

> It has always been important to acquire knowledge and information, and it will continue to be so. The challenge now is to ensure that the students who emerge from our educational systems are able to continue to acquire new skills and new learning to cope with a fast-changing world...The need for lifelong learning...represents...a key shift from the traditional focus on content-dominated curriculum to a much greater emphasis on *learning to learn.* (Ontario Ministry of Education, The Common Curriculum Policies and Outcomes Grades 1-9, 1995, p. 7.)

What better way to meet this mandate then to inspire our students to develop higher level thinking skills?

Chapter Two
The Concept of The Model: Theory and Practice

> ***A model has been defined as a simplified structuring of reality which presents supposedly significant relationships in a generalized form. Models are highly subjective approximations in that they do not include all associated observations or measurements, but as such they are valuable in obscuring incidental detail and in allowing fundamental aspects of reality to appear. The selectivity means that models have varying degrees of probability and a limited range of conditions over which they can apply. (Finley, 1985, p. 60.)***

The concept of the "model" as used in this research project is taken from M. I. Finley's revolutionary book, Ancient History Evidence and Models, and Josiah Ober's insightful article "Models and Paradigms in Ancient History." According to these works a model is an epistemological framework from which a scholar or researcher can approach a problem or area for investigation. It is an analytical tool which is employed by scholars to investigate a specific problem and it should be understood within the historical and material context from which it was derived. The term model is defined in A Dictionary of Social Science Methods as having "a range of meanings...It seems best described as a simplified representation of selected aspects of a phenomenon aiming to conceptualize it and allow explanations of relationships to be framed and tested." (Miller and Wilson, 1983, p. 72.) According to Finley the model can only be understood when there is an understanding of the ideological context in which the model was contrived. He suggests that a model's ideology refers to "'a system of ideas concerning phenomena, especially those of social life; the manner of thinking characteristic of a [group]...or an individual.'"

(Finley, 1985, p. 5.) He further suggests that the model has a bearing on what questions one asks, what evidence one seeks and finds and how that evidence is presented. A scholar must be conscious of his or her own "conceptual framework" in pursuing the model being employed and a scholar should articulate the justification for the use of a particular model. (Finley, 1985, p. 26.) According to Finley this process of model articulation has "been ignored because the traditional approach has failed to bring the essential data to the surface of consciousness." (Finley, 1985, p. 105.) Perhaps one reason for this lack of articulation is that when a scholar is explicit about his or her theoretical basis and a priori assumptions, the model becomes subject to testing by various critics. Despite the possibility of criticism this should be considered a positive feature of model articulation.

Consciousness and clear articulation of the model is particularly important since "it is inherent in model construction that there is a one-sided concentration on, and isolation of, certain factors to the neglect of others, relative or total." (Finley, 1985, pp. 84-85.) Only "self-awareness about the influence of ideology will help...[scholars] to understand the main constraints any given model entails." (Ober, 1989, p. 134.) Both Ober and Finley condemn many scholars for their lack of introspection. As Finley states: "one must infer their most fundamental presuppositions from their substantive accounts, since [scholars]...refuse to discuss methodological questions." (Finley, 1985, p. 105.) In analyzing a past phenomenon a scholar must also be conscious of the fact that his or her contemporary context may or may not necessarily be the same as the ideological context of the historical phenomenon being studied.

(Finley, 1985, p. 29.) The realization that this historical and material context may in certain cases limit the transferability of a model, without adaptation, to the current context must be realized and addressed when using a model. As educators we must not only have enough confidence in an original educational model as possessing fundamentally worthwhile ideas, but we must also have confidence in our own ability to adapt and apply these models in our own context. The process of model analysis, synthesis, adaptation and amalgamation in the subsequent chapters will offer new insights on how this process can be accomplished. By re-examining or cross examining a familiar model in education in light of a new context, educators can come to a deeper understanding of the enduring value of a particular model. In many ways this idea of model amalgamation and adaptation is central to the development of my project.

The fundamental value of the model lies in the ability of the person employing the conceptual or theoretical framework to adapt it and use it in part or in whole in various locations or subjects. (Finley, 1985, p. 26.) This is the challenge I place before my colleagues: to apply models for the development of thinking skills in a way which renders the model useful for teaching a particular curriculum and makes it real and meaningful for the students in the class. In education an analysis of a model for the development of higher level thinking skills is useful if the model is understood to be a generic tool which arises out of a particular historical experience and circumstance. In teaching the development of higher level thinking skills the model itself must be understood as the theoretical framework which

influences how the instructor and students interact in the process of applying the theory.[12] One cannot simply expect that as long as a model of thinking is accepted that it will naturally dictate the instructional procedures to be used and assure the desired learning expectations.

Cognitive models essentially deal with the thinking process as an internal mental process of the individual. Too often the external aspects which can influence the model formulation or success are neglected. (Gage (ed.), 1976, pp. 27-29.)[13] In any educational model one of the most significant external influences on the success of the model is the union between the theorists and the practitioners and the willingness and capability of practitioners to take the theory and apply it in meaningful real-life situations. (Hilgard (ed.), 1964, p. 412.) In order to be relevant a model must be malleable and the user of the model must be able to translate it into a viable tool for his or her own circumstances.

Finley encourages scholars and researchers to use new resources or to use traditional resources in new ways and "to ask the right questions in order to expand our understanding of life." (Finley, 1985, Jacket Cover.) Some of the fundamental questions he encourages are: what kind of document or evidence is being investigated?; who was a document written by?; who was a document

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[12] As Ernest Hilgard (ed.) suggests: "The relationship between learning theory and educational practices is that between any pure science and its technological applications. In the process of application something more than the theory is always involved...It is no different with education practices...[It is a faulty conjecture to assume that] 'once a learning theory is in order, the principles of instruction will flow from it.'" (Hilgard (ed.), 1964, pp. 402-403.)

[13] See also Benjamin Bloom, 1976, p. 9.

written for?; was it intended to be a private or public document?; and what was the purpose of the document or evidence? (Finley, 1985, pp. 31-38.) Finley's argument defies the historical school of thought which suggests "it is the duty of the historian to be self-effacing, to permit 'things' to 'speak for themselves.'" (Finley, 1985, p. 104.) After all "documents themselves ask no questions, though they sometimes provide answers." (Finley, 1985, p. 46.) Finley suggests that scholars "must know what they wish to seek; only then will they find something. One must question things correctly, then they give an answer." (Finley, 1985, p. 85.) It is the scholar's duty to ask the right questions and to examine critically the right sources in order to represent some aspect of the past in a way that is meaningful and useful.

> 'Meaningful' to the extent that it makes sense to readers and has heuristic value for them:...like a map- [it] should help the user/reader get from one point to another: diachronically from one point in past time to another or synchronically from one set of phenomena to a contemporary set of phenomena...The 'usefulness' criterion therefore allows for the testing of models and consequently for deciding that model A is better than model B...that is to say to the extent that it helps people to act in 'the real world' and to assess for themselves the significance and implications of their own and others' actions, by viewing those actions against a broader context. (Ober, 1989, pp. 135-136.)

The creation of a generic meta-model which can be applied in a variety of instances falls into Finley's category of "non-mathematical models" as opposed to "cliometric models [which] are restricted to quantitative data." (Finley, 1985, p. 66.) Since I explicitly encourage the synthesis and adaptation of models my generic meta-model is best described as being at the cross between a "universalist model" and a "circumstantial model." It has elements of universal value for educators in various positions when adapted and applied

to particular curricular circumstances. According to Ober "some models claim universal and exclusive validity" while others "do not assume explanatory exclusivity... [but rather] are defended on the basis of suitability." (Ober, 1989, p. 134.) These non-mathematical and circumstantial models on the other hand "have few if any limits to their usefulness...[and] there is virtually nothing that cannot be conceptualized and analyzed by non-mathematical models" or universalist models. (Finley, 1985, p. 66.)[14]

Too often a model "that remain[s] in general use over a long period of time" becomes enshrined by a professional community as a "dominant paradigm... emphasizing the importance of certain categories of past social activity and cultural products, while obscuring others." (Ober, 1989, p. 136.) When challenged by a set of new circumstances, the paradigm that does not meet the new conditions is discarded and replaced by a new model.[15] Completely discarding one model for another runs the risk of placing too much faith in absolutism. I have a greater appreciation for the fact that models have limited value for unadapted transfer from the original

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[14] For a more detailed explanation of models refer to the works of Ober and Finley.

[15] In this project the concept of paradigm and paradigm shift is somewhat different than the use of the terms in Thomas Kuhn's work, The Structure of Scientific Revolutions. In Kuhn's analysis when observation of nature no longer confirms an established paradigm, the scientific community begins to develop a new paradigm which will in effect replace the old paradigm. Therefore in Kuhn's estimation of science the existing paradigm remains intact until a new paradigm emerges which is able to reconcile the observable phenomenon with what is already known.

circumstance to a secondary situation.[16] Had I taken a more simplistic approach to this project I would have suggested that one model for the development of higher level thinking skills is superior to that of the other. In doing so I would have run the risk as Ober suggests of forgetting "that the paradigms we use rest on ideologically-based models." (Ober, 1989, p. 137.) As Finley suggests ideologies are constantly reformulated depending on how they are interpreted, adapted and applied. (Finley, 1985, p. 5.)

Thus far my discussion of models has dealt with the theoretical aspects of models. I believe that as professionals, educators must be willing to think critically about how we use models in the teaching and learning environment. As educators it is our responsibility to be knowledgeable about the dominant models or paradigms for the development of higher level thinking skills. This knowledge alone is not sufficient. I believe that we must challenge these models. In the case of this project it is my goal to carry over the concept of a model from history to education as the basis of my comparative textual analysis. In particular I will analyze two significant historical texts which present a model for the development of higher level thinking skills, namely that of Plato's theory of education as expressed in The Republic and Bloom's theory of education as expressed in The Taxonomy. I will synthesize the most significant elements of Plato's and Bloom's model and adapt features of these two dominant models into a generic meta-model and articulate the means by

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16 As Finley states: "It is in the nature of models that they are subject to constant...adjustment, correction, modification or outright replacement...any hypothesis can be modified, adjusted or discarded when necessary." (Finley, 1985, p. 66.)

which I implemented and evaluated this meta-model in a typical middle school classroom. I will take from Finley and Ober the theoretical aspects of model creation and explain the practical application in a real life situation. Finley and Ober tend to suggest that the creation of a model is done by the researcher and scholar. I believe that as a professional teaching in the classroom, teachers need to use what they learn through courses or through their own research in a very practical way, as researcher and practitioner. I encourage my colleagues to join me in this journey of the "ongoing process of paradigm reformulation" by challenging dominant paradigms in education or traditional models taught in teacher training courses like Plato's model and Bloom's model. (Ober, 1989, p. 137.)

> Models of learning thus make possible a conceptual frame of reference...the essential task of the teacher is to arrange the conditions of the learner's environment so that the processes of learning will be activated, supported, enhanced, and maintained. Thus the teacher needs to be aware of what the processes of learning are and of the specific influences he [or she] can exert on them in order to provide successful instruction. (Gage (ed.), 1976, pp. 42-43.)

Educators as scholars need to have a firm understanding of the theory of educational models, and educators as practitioners must be willing to put such theoretical models to the test through the practical application and constant reformulation of such models. This self-proclaimed mandate is what I am seeking to accomplish by adapting and applying a synthesized model of Plato's model and Bloom's model in my own particular context. Educators and those most directly involved with helping students develop higher level thinking skills "must not only be willing to test their own and their colleagues' models against the available evidence, but they must think long

and hard about the ideological presuppositions entailed in their dominant paradigms. If we do not challenge ourselves, we will simply become irrelevant" and reduced simply to spewing meaningless professional jargon and rhetoric. (Ober, 1989, p. 137.)

Chapter Three
An Interpretation of Plato's Model for the Development of Higher Level Thinking Skills based on an analysis of The Republic

> *'Knowledge is capable of being its own end. Such is the constitution of the human mind that any kind of knowledge... is its own reward...But education is a higher word: it implies an action upon our mental nature, and the formation of character; it is something individual and permanent, and is commonly spoken of in connection with religion and virtue.' (John Henry Newman, The Idea of a University, quoted in Murray, 1994, p. 390.)*

In light of the fact that the epistemological concept of the nature, limits and criteria of human knowledge are elusive at best, theories which try to articulate and expand our understanding of this phenomenon are extremely important. Many educators and philosophers acknowledge the position of eminence played by Plato in this regard. As J. Bowen & P. Hobsen suggest: "in a real sense, he established the ground rules from which all educational and philosophical thought has developed." (Bowen and Hobsen (eds.), 1987, p. 20.) Eliyahu Rosenow suggests: "Plato's impact on educational theory has been so profound that his conception of education can be considered as the educational paradigm *par excellence*." (Rosenow, 1993, p. 211.) Although there are elements of Plato's model which have been challenged and "would be judged unacceptable today"[17] many of the basic features of the Platonic model for the development of higher level thinking skills are still apparent in our

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[17] Dr. Catherine Beatty, M.A.(T)-M.Sc.(T) Department, McMaster University, Revision Notes.

contemporary educational system.[18] Much like Plato who challenged the educational authorities of his time, known as the Sophists, educators today must also be willing to challenge traditional educational models and, when necessary, adapt these models for application within a meaningful contemporary context.

Plato is truly revolutionary in this sense. He went against the "status quo of the Greek establishment" and he aimed to "replace... governments and reorder societies...by introducing a new order, one governed by wisdom, in the name of brotherhood, in humility, and with honesty and reason." (Sterling and Scott, 1985, p. 14.) Plato is also revolutionary in the sense that he was one of the earliest philosophers to articulate a comprehensive philosophy of the cognitive developmental stages humans undergo in the process of the development of higher level thinking skills. As James Crooks suggests: "no one...has been more astute than he [Plato] in recognizing the obstacles we face in the acquisition of knowledge, nor more profound in responding to them...Plato calls on us as readers, and as students, to decide how we ourselves will think and philosophize." (Crooks, 1994, pp. 5-6.)

The Platonic model for education and the development of higher level

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[18] One example of a the Platonic model still apparent in our contemporary educational context is the concept of age appropriate placements in school. Much like the Platonic model of cohort progression from one level to another, students today are placed or transferred from one grade level to another according to age. The significant difference in the contemporary context is that students do not have to successfully complete all aspects of the curriculum for a particular grade if transferred to the following grade. This is different from the Platonic model in which students moving in cohorts from one stage to another were weeded out if they did not successfully meet the requirements for promotion to the next level.

thinking skills rests upon the theoretical underpinnings of Plato's philosophy and his goal to create a just and moral society as well as his metaphysical understanding of the soul.[19] Plato sought to create an educational model which would result in the development of what he believed was a moral, just and desirable individual and society. The relationship between Plato's metaphysical and educational philosophy are well articulated in Steve Hreha's book review of Plato's Metaphysics of Education. He states:

> Plato's view on the nature of education preceded the development of his metaphysics and epistemology. Plato's view on education... emerged, in part, as a deeply felt reaction to the burgeoning influence of the Sophists in Fifth Century Athens...Plato was, thus, led to formulate an alternative set of metaphysical and epistemological hypotheses. These alternative hypotheses became the ground of his educational theory. (Hreha, 1991, p. 42.)

William Rohwer and Kathryn Sloane further articulate the point. They suggest:

> Education objectives must be related to a psychology of learning...The use of a psychology of learning enables the faculty to determine the appropriate placement of objectives in the learning sequence, helps them discover the learning conditions under which it is possible to attain an objective, and provides a way of determining the appropriate interrelationships among the objectives. (Rohwer and Sloane, 1994, p. 43.)

One of the key components of Plato's model for the development of higher

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[19] Plato's model can be cited as a precursor to logical positivism and Socialist-Marxist society which place social and intellectual restrictions upon the individual...by determining that all intellectual pursuits must provide some demonstrable socio-political benefit for the state.

level rational thinking skills in both men and women[20] is that knowledge has the potential to lead to *arete* , or what can loosely be translated to mean "virtue," "moral goodness," and "successful or excellent action." (Eisele, 1987, p. 499.) An essential component of Plato's educational model is his perspective that "virtue is not acquired genetically; rather, it...is culturally inherited... from the...familial and societal practices and institutions into which we are born and within which we grow up...[and it develops our] capacity for judgement and action." (Eisele, 1987, pp. 500-501.) For Plato the primary vehicle by which this just and moral state can be actualized is through the development of higher level thinking skills particularly "in the individuals who are the guardians of the state."[21] In this model the entire system of education must be designed to provide an opportunity for each human to at least attempt to free his or her soul from the material weight of the world so it can reach the heights of reason and intellect. It is through education and the cultivation of reason and intellect that humans can be transformed and transcend their natural limitations or inclinations. In Plato's model natural ability is only a potentiality, but intellect is the means by which this potentiality is actualized. The essential tension between natural ability and environmental determinism is at the center "of The Republic, with its stress on

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[20] Plato's model affords both males and females the opportunity to reach the higher levels of thinking. He suggests: "if women are to do the same things as men, we must also teach them the same things...we must conclude that sex cannot be the criterion in appointments to government position. No office should be reserved for a man just because he is a man or for a woman just because she is a woman." (Plato, The Republic, 451 e-455 d.)

[21] Dr. Catherine Beattie, M.A.(T)-M.Sc.(T) Department, McMaster University, Revision Notes.

the power of education to transform...[and it is clear that Plato] believes in the potency of environmental influences and the efficacy of deliberate nurture to develop a particular kind of nature." (Barrow, 1976, pp. 30-32.)[22]

Plato's model for the development of higher level thinking skills is based upon the triad of the intellect, the spirit and the appetite. According to Plato each human being innately possesses all three of these faculties. The degree to which each of these faculties is manifested can attest to the level of virtue and cognitive ability possessed by a particular person. The intellect, symbolized by the head, is the primary agent of intelligence and prudence. The spirit, symbolized by the heart, is the primary agent of courage and fortitude. The appetite, symbolized by the stomach, is the primary agent of temperance. According to the Platonic model, only when the intellect is properly trained and controls the other two elements, can humans reach true peace and harmony.[23] Plato uses the concept of a tripartite individual to further explain his understanding of the classes of society. He suggests that

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[22] The idea that the environmental conditions can influence learning is also found in Bloom's work although his analysis of this relationship leads him to different conclusions. For example he states: "Individual differences in learners is a more esoteric notion. It frequently obscures our efforts to deal directly with educational problems in that it searches for explanation in the person of the learner rather than in the interaction between individuals and the educational and social environments in which they have been placed...much of the variation is attributable to the environmental conditions in both the home and the school. Much of individual differences in school learning may be regarded as man-made and accidental rather than as fixed in the individual at the time of conception." (Bloom, 1976, pp. 8-9.)

[23] "If the souls are rightly trained, they bring grace. If not, they bring the contrary...I think that goodness of soul develops excellence in the body's capabilities...after properly training the mind, [it would] also be proper to place it in charge of all the details concerning care of the body." (Plato, The Republic, 401 e-403 d.)

the prevalence of one of these faculties is the main feature which characterizes one's designation into a particular class of people. For example the industrial producer whose main focus is on the accumulation of wealth, displays the faculties of appetite; the soldier whose main concern is the pursuit of honor, displays the faculty of courage and strength; and the philosopher whose main concern is the pursuit of knowledge, displays the faculty of wisdom and intellect.[24]

In the first four books of The Republic Plato describes the educational system which is the foundation for his model for the development of higher level thinking skills. A cursory examination of these stages of development is necessary in order to understand Plato's model. Plato's educational theory is a function of his understanding of human development, development of the

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[24] In certain cases these elements of Plato's works have been used to condemn him as being elitist or even as having totalitarian tendencies. As Robin Barrow suggests in his article, "Plato, Utilitarianism and Education," Plato has been severely criticized by the likes of K. Popper, B. Russell and R.H.S. Crossman and "his work has been variously termed a totalitarian tract." (Barrow, 1975, p. 214.) As Robert Beck reflects on the question of whether Plato was an elitist or not, he states: "The answer would seem to be both 'yes' and 'no'. There is every reason to think that Plato thought that those who could become serious about and dexterous in doing dialectic were few in number. On the other hand there would have been little reason for the dialogues if Plato did no think that many people could lead morally sound lives. The two beliefs are compatible. It is only necessary that there be a leadership, an elite, that could help provide the precepts, the laws, the beliefs, even the mythology that would set the feet of the masses of mankind on the correct path." (Beck, Spring 1995, p. 120.) These issues are not one dimensional. At best Plato's concept of elites is unique in the sense that "The society envisioned is not coercive or militaristic like Sparta's, since each member is fit for the role of achieving and maintaining communal...harmony; all work together for the common good--not for their own interests--much as the intellect, will and appetite are harmonized within the healthy individual psyche. (Schafer and Amenta, 1992, p. 6.)

soul, and his social psychology of the stages of physical development. "In Plato we do find certain ideas of human development worked out in the context of his educational theory. Indeed, one might say that his conception of human development is an education theory." (Chambliss, 1979, p. 97.) In particular human social, psychological and physical development are all tied into the development of the soul. "The soul is reached at different stages of its growth by different agencies and through different media." (Nettleship, 1963, p. 80.) For Plato this serves to explain why there is different curricular content at each stage in education and why different teaching styles are advocated at the various stages. Both the content and style of teaching must be appropriate for the students at a particular stage in development. Even today this principle is widely accepted and followed, albeit not because of an understanding of the development of the soul, but rather because of an understanding of child psychological development. For example Doreen Norris and Joyce Boucher, authors of Observing Children Through Their Formative Years, a teacher training manual used in the University of Toronto's Primary/Junior Qualification program state:

> It is now generally agreed that all human beings pass through four stages of intellectual development...While these may vary among children...these stages of development follow in similar sequence... As teachers observe the behavior of individual children, it is expected that they will attempt to match the students' observed behavior with the characteristics of stages of development outlined in this booklet. (Norris and Boucher, 1980, p. 44.)

As a noted earlier, Plato's levels of education correspond to our current

system of elementary, secondary and post secondary education.[25]

> In [our contemporary] process of schooling, students tend to be classified by age or grade level with some assumptions that what is to be learned and the ways in which it is to learned are appropriate to the age-grade level of the students. There is also an assumption that the teachers at a particular level are sensitive to the special characteristics of the students at that level and to the content and objectives of the instructional materials and processes to be learned at that level. (Bloom, 1976, pp. 7-8.)

Although there is a significant correspondence between our contemporary system of education and that suggested by Plato in terms of the idea that age appropriate curriculum and teaching techniques should be used, Plato would not support the contemporary position of authors such as Lipman who "urge that philosophy is an appropriate study for young children."[26] As Benjamin Bloom suggests, those who accepts Plato's view "believe that because some youngsters have difficulty learning the lower mental process that we shouldn't give them anything that involves problem-solving or even thinking. But once you begin to teach the mental processes we find that virtually all of the students can learn to think very well and can master the higher mental processes."[27]

Throughout the first mandatory educational stage in Plato's model the

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[25] Robert Brumbaugh in the article "Plato's Philosophy of Education: The Meno Experiment and The Republic Curriculum" states: "The Republic provides three levels of public education, a common elementary school,...a secondary school with selective admission, and a 'state university' with admission still more selective." (Brumbaugh, 1987, p. 215.)

[26] Dr. Catherine Beattie, M.A.(T)-M.Sc.(T) Department, McMaster University, Revision Notes.

[27] Bloom quoted in Koerner (ed.), 1986, p. 59.

focus of the curriculum is on physical training and developing a grounding in *mousike* or the arts, literature, music and mathematics.

> Until twenty, everyone [male and female] follows the same curriculum: body care until three; mythico-religious narration from 3-5; gymnastics 6-9; reading and writing 10-13; poetry and music 14-16; mathematics 17-18; military training 19-20. (Schafer and Amenta, 1992, p. 6.) [28]

The goal of this first developmental stage is to provide for a minimum level of physical and intellectual education for all necessary to live a happy and virtuous or just life. Plato places great emphasis on this first developmental stage as setting the groundwork from which his model for the development of higher level thinking skills can be applied. He suggests that "he most important part of any work is its beginning. This is especially true for the education of young children. (Plato, The Republic, 377 b.) Plato has great faith in the importance of poetry, music and gymnastics in developing a harmonious soul and he suggests that it is essential for all children to have a grounding in these areas. As well he seems to indicate that children at this developmental stage best respond to learning through activities such as music, games, songs and reading poetry.

> That is why education in poetry and music [of a certain sort] is first in importance, Glaucon. Rhythm and harmonies have the greatest influence on the soul; they penetrate into its inmost regions and there hold fast. (Plato, The Republic, 401 e.)

In this first developmental stage Plato advocates the use of play as a means of

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[28] See also Plato The Republic, 537 a-537 e.

educating children.[29]

> The natural tendency of young creatures is to move about, to dance, and to enjoy games [it can also be an opportunity for training.] Children, then, are not to be taught to dance and sing because they are naturally active creatures; this natural activity makes it possible for them to learn those pleasures and pains which are in conformity with the rational account of goodness that, later, they can come to understand. (Chambliss, 1979, p. 99.)

Plato also suggests that which is learned through compulsion has little lasting impact, but rather if learning becomes pleasurable to the child, then it is more naturally and spontaneously pursued.

> But the instruction must not be compulsory...the mind will not retain anything that it is forced to learn...Then my friend, we must not keep the children at their studies by force. Instead we must make learning fun. With this method it will also be easier for us to recognize the natural bent of each. (Plato, The Republic, 536 d- 536 e.)

The importance of natural learning and curiosity at this level is also found in many modern educational documents. For example The Ministry of Education Document Shared Discovery: Teaching and Learning in the Primary Years, states: "'children arrive in school with open, inquiring minds. They are already familiar with the inquiry process through their experiences with play, and their most important need in the Primary years is to have opportunity to continue their natural inclination towards inquiry learning.'" (Ontario, Ministry of Education document, Provincial Standard, Mathematics, Grades 1-9, 1995, Field Test Version, p. 14.) It is also suggested that: "like many other aspects of the child's development, imagination is active in the early

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[29] This is reinforced in other works by Plato such as the Laws 643. "'The sum and substance of education is the right training which effectually leads the soul of the child at play on to the love of the calling in which he will have to be perfect...when he is a man.'" (Plato quoted in Mavrogenes, 1980, p. 696.)

years and unless it is nurtured, it can too easily fade or become stunted." (Myers, 1994, p. 9.) Although Plato accepts that there is a natural curiosity in each child, he strongly suggests that the regulation of this curiosity is the responsibility of the society and teachers. He uses play as a means to determine the areas which children should naturally pursue. "It is not play for its own sake, nor for the sake of recreation, but part of a method, and the teacher must direct the play towards the development of those tendencies which will ultimately be socially useful." (Beck, 1964, p. 218.)

Plato makes a clear distinction between the cognitive ability of children and adults to comprehend one of his central concepts, the Idea of Goodness.[30] He suggests that Goodness is a phenomenon which occurs naturally in children, but can only be fully conceptualized and realized in adulthood. The child can understand the nature of Goodness in things such as songs and stories[31] but the adult who has reached the highest level of understanding can understand the Idea of Goodness in a more abstract sense. The soul of the child is imitative and for this reason the child must be surrounded by positive influences to imitate. "The whole function of education is not to put knowledge into the soul, but to bring out the best things that are latent in the

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30 "The child has not yet developed powers of reflection and logical reasoning, and responds to the world mainly in imaginative and emotional terms. Consequently, the curriculum cannot be based on appeals to rational ability which the child lacks, but must be one which stimulates, persuades, and conditions [the child]...but it must nevertheless present the child with a subconscious acceptance of true principles." (Egan, 1981, pp. 129-130.)

31 It is for this reason the Plato advocates the censorship of songs and stories particularly around children. He suggests that these elements have an enormous impact on character formation in children.

soul, and to do so by directing it to the right objects." (Nettleship, 1963, p. 78.) Only later in life will a child be able to use intellect to distinguish between what is Good and what is not Good.[32] Education and the cultivation of the higher level of thinking skills is the process by which the ultimate Good can be actualized in each individual and true or pure Knowledge attained. Education then becomes the process by which the ultimate Good can be actualized, particularly in a few select individuals whom he calls philosopher-kings. The end result of Goodness is in fact of the utmost importance and the process of education as a means of achieving this ultimate end cannot be underestimated in Plato's model.[33]

In Plato's model a series of physical and moral tests are used to determine which students should move on to the next developmental stage.[34]

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[32] For Plato this is level of rational maturity can only be reached upon completion of the various stages of education. This suggests that those persons who do not reach the highest stage of education may never be able to fully distinguish what is truly good or just.

[33] "Thus there is no difficulty in the assertion that goodness comes, first, to children who cannot understand and, later, to adults who have grasped a rational account of it. The goodness which 'springs up rightly in the souls' of children is not understood by them in the way in which they will understand it later, after grasping the rational account of it...Education is the process of drawing and guiding children towards that principle...the emphasis is not merely upon the ultimate end-the true principle-but also upon the process of guiding children towards that end." (Chambliss, 1979, p. 99.)

[34] As Frederick Beck suggests: "Plato attached great importance to the physical aspect of education. Games and sport, however, were to serve the practical purposes of the state and were not, as with modern sport, to be ends in themselves...But probably of even greater importance is the conception that physical training aids in the development of character." (Beck, 1964, p. 211.) This idea is also suggested by Egan who states: "Physical education is seen as contributing to self-control, hardiness and courage...It is given so prominent a

Today we still have "at each stage or level in the schools, some measure of attainment...used to determine the students' status...as a basis for decisions about the further opportunities for learning to be provided for the students in subsequent stages." (Bloom, 1976, p. 8.) The significant difference is that in Plato's model a student who did not successfully complete the requirements of a particular developmental stage did not move on to the next level with the cohort. As students progressed to the next level in Plato's model, between the ages of 20-30, the focus of the curriculum was on mathematics, geometry and astronomy in preparation for the cultivation of abstract thinking skills. Those students who at the completion of the first stage had demonstrated greater physical ability joined the warriors of society where they worked on the development of physical strength and ability and intellectual ability to discern between right and wrong. Those students who did not demonstrate neither the skill of mathematics nor the skill of strength were left to join the mass of society. According to Plato this group of people would become the future producers and artisans of society. He suggest that they would find some happiness in this position and they would be knowledgeable enough to allow themselves to be guided by the members of society who had the moral and cognitive ability to reach the higher levels of cognitive development.

At 30 years of age those people who had demonstrated an ability in

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role in Plato's curriculum not simply because it produces healthy bodies, but because of what it can contribute to the development of a strong character." (Egan, 1981, p. 129.)

abstract thinking and science[35] went on to the highest developmental stage of education. At this level these students contemplated the eternal philosophical questions and truths and decided how to properly guide the masses. According to Plato after at least 5 years of study at this level, these students would be ready to begin a 15 year career in public service and serious contemplation of the Good. (Nettleship, 1963, pp. 291-292.) These individuals become the guardians of society and from this elite group, the Philosopher- Kings was chosen. Plato believed that through this system of selection each person could find fulfillment and contentment which would contribute to the overall contentment of the entire community.

Plato's model for the development of higher level thinking skills is further articulated between Books V to X of The Republic. According to J. Bowen and P. Hobsen the essence of Plato's epistemology is based on his belief that "*noumena* or Ideas are more than mental constructions-they have a real and timeless existence." (Bowen and Hobsen (eds.), 1987, p. 22.) Along with this central idea, it must be understood that Plato had a firm belief in the power of contemplation. He believed that through philosophical contemplation it was possible to come to know the Ideas and to come to understand the universal truth behind the Ideas. As G. Grube suggests in his book Plato's Thought: "the object of the supreme knowledge is clearly the Ideas. And a knowledge of the Ideas means not only an understanding of Truth, of the structure of the world, but also of the moral and aesthetic

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[35] According to Nettleship's interpretation of Plato "the real value of the study of the sciences...is to teach us to think. Science is the result of thought exercised on sense." (Nettleship, 1963, p. 268.)

realities in it, of its purpose and the reason why in all things." (Grube, 1980, p. 255.) Plato's belief rests on his metaphysical interpretation that all knowledge is a rational part of the universe. Knowledge exists in a latent form within the human soul.[36] The essential element which can bring forth this latent knowledge is philosophic contemplation, *elenchus* and dialectic[37] or what has also been termed the Socratic Method of Inquiry. The "Socratic *elenchus* is thinking by proxy, by attempting to convert something into the opposite or turn it around. In the process of examination and refutation the interlocutor is brought to realize that we are each responsible for our own knowledge." (Crooks, 1994, p. 9.)

In The Republic Plato uses analogies to demonstrate that true knowledge in the highest form is attainable by those people who possess the greatest natural ability and are schooled in the ways of philosophic contemplation throughout the developmental stages of education.

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[36] According to Frost's interpretation of Plato "the human soul, then, is a part of pure reason. But it is debased by the body. However, since it existed before it came into the body, it may free itself from the body and continue to exist after the body has been destroyed. The soul, for Plato, is immortal...[and] Plato offers several proofs of the immortality of the human soul...Having a desire to possess a body, the soul, which had occupied a star, leaves its heavenly abode and enters into matter, or body. From then it has to struggle to free itself from the body...The ultimate goal of life, according to Plato, is release of the soul from the body so that it may return to its star and there spend eternity contemplating the beautiful and pure world of Ideas." (Frost, 1989, pp. 157-158.)

[37] According to Harold Tarrant, *elenchus* "is Socrates' means of examining the soundness of the views of others" by demonstrating the "problems with beliefs and inconsistencies." On the other hand he defines dialectic as "'conversational art'-not the art of polite conversation, but the art of employing person-to-person discussion in such a way as to come nearer to the truth of a given issue." (Tarrant, 1993, pp. xii-xiii.)

> Plato's revolutionary idea was that education...was to be a process of learning those forms of knowledge that would give the student a privileged rational view of reality...[that] would enable the student to transcend what Plato considered the contingencies, the confusions and delusions, that constituted the dominant norms and values of everyday life. By careful study of increasingly abstract knowledge the mind could be carried to an understanding of what was ultimately true, real, and of human importance. (Egan, 1992, p. 634.)

For example in the analogy of the Myth of the Metals Plato accounts for the differentiation in natural ability of humans. Plato has enormous faith in the capacity of human reason to lead all humans, regardless of natural ability. onto the virtuous path. He recognized that this was a long and arduous process. Only through the contemplation of unchanging, eternal, universal Forms or Ideas and the supreme Idea of the Good could one hope to attain the level of wisdom and an understanding of universal truths. For Plato the human soul affords humans the ability to know beyond the mere shadow of reality we see in nature around us.[38]

> His metaphysics is one of the ultimate reality of pure forms, culminating in the Form of the Good; his epistemology presents man as being endowed, according to a ratio of nature, with pre-existent knowledge that, if properly activated, enables him to come to an understanding of the world; his value system, or axiology, is based upon the absolute nature of the Good which man must seek to grasp by means of a heightened vision. (Bowen and Hobsen (eds.), 1987, p. 25.)

Plato acknowledged that few people would actually succeed in arriving at the

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38 "Man can know this real world only through his reason. Therefore, reason is the highest good for man. The end or goal of life is release of the soul from the body so that it can contemplate the true world of Ideas." (Frost, 1989, p. 84.)

pinnacle of cognitive development.[39] He also stipulated that only a few should become what he calls Philosopher-Kings or those chosen few who are able to rule or preside over the society at large. Plato further suggested that there were few Philosopher-Kings who would be able to remain uncorrupted by the lower faculties of the majority of the society despite their training.[40] This internal struggle to lead the contemplative life and cope with the realities of daily life is acknowledged by Plato and treated with great sensitivity.

Plato's greatest analogy for the development of higher level thinking skills is what he calls The Divided Line also known as the Four Stages of Cognition. (See Appendix A.) Plato uses the Allegory of the Cave and the imagery of the sun[41] to illustrate the model which humans can follow as they journey through the four stages of cognition.

> The prisoners' cave is the counterpart of our own visible order, and the light of the fire betokens the power of the sun. If you liken the ascent and exploration of things above to the soul's journey through the intelligible order, you will have understood my thinking...in the

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39 "Since the path climbs from the concrete to the abstract, from the familiar world to a strange world, from well-known opinions to little-known truths, many people prefer to forgo the journey." (Sterling and Scott, 1985, p. 207.)

40 "Human imperfection decrees that no one can completely escape the downward pull of illusions; it follows that no one can live a life of uninterrupted rationality." (Sterling and Scott, 1985, p. 208.)

41 "In the physical world then we have the sun from which derive light, sight and the eye that sees; in the intelligible we have the good from which derive truth, knowledge and the mind that knows. It is to the good that the sun itself owes its existence. Furthermore, the sun is not only the cause of sight, its light makes existence possible on the physical plane; so the good is not only the cause of knowledge, but causes the very existence of the knowable and, a *fortiori* of the physical which derives from the knowable." (Grube, 1980, p. 24.)

> intelligible world the last thing to be seen...is the idea of the Good. (Plato, The Republic, 517 b.)

In Book VI of The Republic, after providing an explanation of the significance of light or the sun to seeing as an analogy of knowledge to understanding of Goodness and truth, Plato gives a description of his model of thinking skills.[42] Through the character of Socrates Plato states:

> Let us represent them [the visible and the intelligible] as a divided line, partitioned into two unequal segments, one to denote the visual and the other the intelligible order. Then, using the same ratio as before, subdivide each of the segments. Let the relative length of these subdivisions serve as indicators of the relative clarity of perception all along the line. (Plato, The Republic, 509 d-509 e.)

For Plato the Ideas can manifest themselves in multiple images of reality and these images of reality can help us to understand or conceptualize an eternal truth. The nature of the Ideas are elusive at best and even when conceptualized, they are difficult to articulate. As Plato states: "And we can say that the multiplicity of things can be seen but not thought, while Ideas can be thought but not seen." (Plato, The Republic, 507 b.) The essence of the Ideas is that the true image is pure and discernable only to the intellect, not in any visible or tangible means.

> To understand intelligibility at the highest level...[one must go into] the realm that reason masters with the power of dialectic...for the attainment of unobstructed knowledge. When reason attains that

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[42] As Sterling and Scott suggest in an explanation of Plato's The Republic: "the line, the cave, and the dialectic are three different explanations of a single conception: a theory of knowledge that seeks to point the way from bondage of illusion to the freedoms of rational perception...All three explanations describe an ascent from darkness into light. The line is illumined by two centers of light. One is the sun, governing the visible world. The other is the good or goodness-governing the intelligible world...one cannot see visible objects without the sun; neither can one understand reality without the good." (Sterling and Scott, 1985, p. 205.)

> level and becomes aware of the whole intelligible order, it descends at will to the level of conclusions but without the aid of sense objects. It reasons only by using forms. It moves from forms through forms to forms. And it completes its journey in forms. (Plato, The Republic, 511 b-511 c.)

As Nettleship states: "the statement that in perfect intelligence there is no element of sense perception...is difficult to understand." (Nettleship, 1963, p. 254.)

In Plato's model the first level of cognition, called *eikasia* or "conjecture,"[43] is described as the ability to know something in terms of content. It involves the ability to recall something and define it in the same concrete terms in which it was presented to the learner. (Plato, The Republic, 534 a.) Much like the teaching method which should be age appropriate, the curriculum content should also suit the cognitive ability of the students in the first phases of the developmental learning process and it must be used to determine progression onto the next level.[44] In Plato's model, education in the first developmental stage would be an example of this level of cognition. Current practices of teaching mathematics such as addition and subtraction through the use of a visual model at the elementary level would be the most

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[43] Nettleship also points out that this "word has a double meaning; it has its regular meaning of conjecture, and an etymological meaning of which Plato avails himself, the perception of images, that state of mind whose objects are of the nature of mere images." (Nettleship, 1963, p. 241.)

[44] As Frederick Beck suggests: "all will benefit by mathematics, but only those with great inherent ability will be able to succeed in mathematics. That is, mathematics provided a means of selecting those intellects which will benefit from advanced study." (Beck, 1964, p. 210.)

practical example of this a level of cognition.[45] At this level the students are primarily the receptors of knowledge transferred from an external source. In Plato's model this level of knowledge was necessary in order to ensure that citizens could participate in a society guided by the principles of civil obedience and participation in the military.[46]

In Plato's second level of cognitive development known as *pistis* or "belief," cognition is a function of commonly held beliefs or experience. (Plato, The Republic, 534 a.) It is much like intuitive knowledge or the ability to apply something previously learned through sensory perceptions. This type of learning is still part of Plato's first stage of educational development which went up to the age of twenty. An example of this level of cognitive development in Plato is evident in the following quotation:

> From childhood on we have been brought up with certain convictions about what is just and honorable, and we have obeyed these convictions with the same reverence with which we have obeyed our parents...then we meet with various kinds of behavior contrary to these convictions... men of any decency [education or cognitive ability] will resist their blandishments and will continue to honor and obey what their fathers have taught them. (Plato, The Republic, 538 c-538 d.)

Both this level of cognition and that of *eikasia* "compose opinion and so focus on transient things." (Plato, The Republic, 534 a.)

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45 "Oh, that trivial business of being able to identify one, two, and three. In sum, I mean number and calculation. Is it not true that every art and all knowledge must make use of them?" (Plato, The Republic, 522 c.)

46 As for arithmetic and calculation"it follows that they must be among the studies we want to prescribe. Both the soldier and the philosopher must master them...the object of study... should serve the purposes of war and lead the soul away from the world of appearances toward essence and reality." (Plato, The Republic, 525 b-525 d.)

> They are rooted, not in fundamental principles, but in concrete examples...their concept of justice, then, would be bound up in the particular instances...[people at these levels] are not implanted by rational instruction but by persuasion and conditioning...[and therefore] they are amenable to being changed not by reasoning but by persuasion and conditioning. (Egan, 1981, p. 126.)

The third level of cognitive development in Plato's model is called *dianoia* which means understanding. (Plato, The Republic, 534 a.) This is the first level of rational thinking and the first stage at which there is an awareness that reality is a mere manifestation of abstract Ideas. As Plato states: "only by practicing the true science...can we convert the natural and inherent intelligence of the soul." (Plato, The Republic, 530 b.) For Plato this manifestation can only approximate the reality or truth of that Ideas within the limitations of physical reality. This is also the first stage at which the latent knowledge in the soul has the ability to materialize through the intellect. In terms of Plato's developmental stages, it corresponds to the second stage of educational development which spans the ages 20 to 30. At this level students are still aware of sensory perception but they are increasingly becoming aware of the abstract "eternal...unchanging reality." (Plato, The Republic, 527 d.) At this level the student is able to hypothesize since this process is still firmly rooted in concrete thoughts and images. The clearest example of this cognitive level for Plato is the deductive reasoning associated with mathematics, geometry, astronomy and the sciences.

> Among those who work with geometry and arithmetic...having adopted [various principles]...as assumptions, they see no purpose in giving any account of them to themselves or others...they make use of visible shapes and objects...however,...in all cases the originals are their concern and not the figures they draw. But the objects they draw or construct cast shadows or reflections in water and are real, yet they convert what is real into images. And all the while they seek a reality

which only the mind can discover. (Plato, The Republic, 510 c-510 e.) The greatest limitation at this cognitive level is that there still remains an unclear focus as to the distinction between mathematical truths and the limitations imposed by the physical representations of those truths. At this level the mathematical understanding is based on the hypothesis which is uncritically accepted by the student. Plato suggests that this method of investigation is limited in two senses. It is limited because this method of inquiry is dependent upon hypotheses "it is unable to go beyond these hypotheses, [and therefore it] is also unable to attain the level of first principles and new beginnings." It is also limited because this method reduces an Idea to the level of an image which is lower than even the physical manifestation of that Idea. (Plato, The Republic, 511 a.) As Sterling and Scott suggest: "dependent on un-examined hypotheses [it]...cannot yield pure knowledge because it cannot go beyond conclusions preordained in its own unverified assumptions." (Sterling and Scott, 1985, p. 207.)

The final stage of cognitive development in Plato's model is called ('science') and knowledge by *nous* ('reason'). At this level nothing is accepted at face value. Critical thinking skills are employed to test the validity of commonly held beliefs, assumptions or hypotheses. For Plato, the only means by which the highest level of thinking skills can be developed, is through the dialectic whereby the hypothesis in question must satisfy the rational facility of the intellect in the realm of the Forms and all that is eternal.

> The dialectic remains the only intellectual process whose method is that of dissecting hypotheses and ascending to first principles in order to obtain valid knowledge. (Plato, The Republic, 533 c.)

As Sterling and Scott explain in modern terms this is called "a unifying idea. Once this highest point on the line is reached, one has achieved the ability to transcend hypothetical reasoning and to seize some part of reality itself. Only at this highest level of the line can one find certainty since here alone is the realm of reality where truth may be discovered." (Sterling and Scott, 1985, p. 207.) At this level the soul and the rational faculties are no longer bound to concrete images of reality. As a result of this freedom the philosopher can search for the ultimate, universal truths of the Form. Although this level of cognition has some semblance of the ideas behind the development of universal physical laws, for Plato the real significance of this level of cognition is that truth, beauty, morality and justice can be fully understood and attained in all their splendor.[47] It is a forgone conclusion for Plato that the philosophers should naturally be the rulers of society and guide the masses which have not themselves attained this level of cognition. In many ways Plato's model has great faith in the ability of human reason to go beyond the limitations of physical reality.

It is essential that as educators we acknowledge the potential impact of using a model for the development of higher level thinking skills. Despite the

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[47] As Nettleship suggest: "Plato took up the word 'dialectic', as one might the word 'logic', and gave it a meaning which it has never since lost. It came to mean with him, first and most commonly, true logical method in contrast to false or assumed methods; and, secondly, not the methods of knowledge at all, but completed knowledge, or what we may imagine would be the result if the true methods had been carried out completely through all branches of knowledge." (Nettleship, 1963, pp. 279-280.) In the article "Plato's Theory of Educational Development: On the Appropriateness of Applied Psychology," Egan suggests: "educational development for Plato is not only an intellectual task, it is also a moral enterprise." (Egan, 1981, p. 128.)

shortcomings of Plato's model which will be articulated in subsequent chapters, there is one very important component of Plato's model which has relevance for contemporary education. Plato made clear his understanding of the utilitarian value of his model for the development of higher level thinking skills. One may say that his agenda or conceptual framework was clearly articulated. Plato's model recognized that there is a critical link between education and the concepts of wisdom and morality. In our contemporary society, traditional wisdom and morality of the past are constantly being challenged and eroded. Today educators face many great challenges in teaching students who come to schools without the strong support of stable family structures and without the support of a society which values traditional wisdom and morality. Teaching of knowledge or skills to compete in our fast-paced society is not enough. It is essential that a model which espouses desirable values such as justice and morality and a model which attempts to articulate a means by which individuals and a society can achieve these ends through the development of higher level thinking skills should be of great interest to all educators.

> Choose...instruction instead of silver, knowledge rather than choice gold, for wisdom is more precious than rubies, and nothing you desire can compare with her. Proverbs 8: 10, 11 (No. 10), (Wolf, Teachers Are..., 1993, p. 9.)

Chapter Four
Bloom's Taxonomy: A Paradigmatic Model for the Development of Higher Level Thinking Skills

> *A final criterion is that The Taxonomy must be accepted and used by the workers in the field if it is to be regarded as a useful and effective tool. Whether or not it meets this criterion can be determined only after a sufficient amount of time has elapsed. (Bloom, 1956, p. 24.)*

Much like the focus of the previous chapter which dealt with the developmental stages and cognitive levels in Plato's model, this chapter will discuss Bloom's model for cognitive development of higher level thinking skills. The significance of these two chapters is simply to ensure that we as educators think critically about our role in the development of higher level thinking skills in our students. Our goal should be to ensure that our curriculum and lessons are infused with numerous activities and strategies which will foster the development of such skills or behaviors as Bloom calls them. In order to meet this goal, I believe that educators need to develop, evaluate, adapt and revise models designed to promote the development of higher level thinking skills. An example of this type of adaptation and synthesis will follow in the subsequent chapters where I will present the generic meta-model I developed and the lessons on thinking which I used with my students in the Advisor Program at Beatty Fleming Senior Public School.

There continues to be considerable debate on the usefulness and impact of the Taxonomy of Educational Objectives, Handbook I: Cognitive Domain since it was first published in 1956. Evaluations of the impact of this monograph range from unequivocal praise to fierce criticism. Although The

Taxonomy has had worldwide recognition and has been termed as "probably the all-time 'best-seller' in the field of education," it is difficult to determine exactly how it has been implemented in the classroom. (Postlethwaite, 1994, p. 179.)[48] After over 40 years there seems to be no conclusive resolution to this debate. The many accolades of The Taxonomy include praises such as: "a small volume developed to assist college and university examiners, [it] has been transformed into a basic reference for all educators worldwide." (Bloom, "Reflections," 1994, p. 1.) Lewy and Bathory also suggest that it is "one American idea that was welcomed and used intensively by educators and educational research in continental Europe, the Mediterranean, and the Middle East for test construction, curriculum development, lesson planning, and teacher training." (Lewy and Bathory, 1994, p. 146.) Bloom also suggested that every country he visited in 1970 in South America in preparation for the 1971 Granna Seminar in Sweden was familiar with The Taxonomy and since 1986 it has had widespread application in China as well. (Bloom, "Reflections," 1994, p. 1 and p. 6.)

The authors of The Taxonomy of Educational Objectives The Classification of Educational Goals Handbook One: Cognitive Domain were very specific in identifying the intended purpose and usage of their work in the mid 1950s. The Taxonomy was developed as a "heuristic framework" or model for the development of higher level thinking skills. (Krathwohl, 1994, p. 182.) As theoretical framework the model was "designed to be a classification of the

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[48] According to Kreitzen and Madaus: "The Taxonomy has sold over a million copies and has been translated into several languages." (Kreitzen and Madaus, 1994, p. 54.)

student[s'] behaviors which represent the intended outcomes of the educational process." (Bloom, 1956, p. 12.) According to Bloom:

> The idea of this classification system was formed at an informal meeting of college examiners attending the 1948 American Psychological Association Convention in Boston...[Although] it was pointed out that we were attempting to classify phenomena which could not be observed or manipulated... Nevertheless, it was the view of the group that educational objectives stated in behavioral form have their counterparts in the behaviors of individuals. Such behavior can be observed and described, and these descriptive statements can be classified. (Bloom, 1956, pp. 4-5.)

Numerous reasons have been cited for the development of The Taxonomy, such as:

> [a desire] to build a Taxonomy of educational objectives...intended to provide for classification of the goals of our educational system...[to] facilitate the exchange of information about their curricular developments and evaluation devices...[to] find here a range of possible educational goals or outcomes in the cognitive area...[to] help one gain a perspective on the emphasis given to certain behaviors by a particular set of educational plans...to specify objectives so that it becomes easier to plan learning experiences and prepare evaluation devices." (Bloom, 1956, pp. 1-2.)

Although there were a number of potential uses for The Taxonomy, according to Bloom and his colleagues, "the major purpose in constructing The Taxonomy of educational objectives is to facilitate communication," and it is regarded "as well worth the effort if The Taxonomy is found of value as a means of communicating within the field of education." (Bloom, 1956, pp. 9-10.) Despite the self-declared primary purpose of facilitating communication The Taxonomy has become "a relatively concise model for the analysis of educational outcomes in the cognitive area of remembering, thinking, and problem-solving," and it is in this respect that it is discussed in this project. (Bloom, 1956, p. 2.)

Any evaluation of The Taxonomy must consider that this model was a product of the particular historical context in which it was developed. A number of scholars have cited the influence of Ralph Tyler and John Carroll in the creation of an intellectual atmosphere which was receptive to The Taxonomy.[49] Tyler was a mentor to Bloom and he had great influence in shaping the idea that students' behaviors, instructional planning and evaluation methods were all linked to objectives. Tyler was also instrumental in suggesting that students' behaviors fell into a range of observable phenomena as students worked on more complex mental activities. (Airasian, 1994, pp. 82-84.) Carroll's work, "Model of School Learning" created a formulaic interpretation for understanding "the degree of learning that occurs in a school setting as a function of the time spent by a student on a learning task divided by the time needed by the student for mastery of that task...[whereby] a student's time needed to learn a particular task is determined by such variables as the student's aptitude and ability to understand instruction as well as the quality of the instruction to which the student is exposed." (Hymel, July 1993, p. 3.) These variables have also been termed "cognitive entry behaviors and affective entry characteristics." (Haertel, 1983, p. 79.) The popularity of The Taxonomy in the 1950s is also be attributed to a number of factors including: "its appealing simplicity, apparent usefulness,... convenient teachability; ...[and] the role of the strategies used in

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49 Peter Airasian suggests: "It was by no accident that The Taxonomy was dedicated to Ralph Tyler. His research, writing, and collegial interactions afforded the basic intellectual structure from which its authors proceeded. His work provided justification for its development and helped to fashion the education context which makes it relevant." (Airasian, 1994, p. 82.)

its dissemination." (Lewy and Bathory, 1994, p. 146.) Lauren Sosniak suggests that the popularity of The Taxonomy can also be attributed to the style and language of The Taxonomy which she suggests are indicative of the time in which it was written. She suggests:

> The Taxonomy was written in a style well known to and historically well-received by people seeking curricular advice. The main ideas were small in number, painted in broad strokes, presented in a chatty style, with repeated appeals to common sense, and with multiple examples demonstrating a fundamental connection with and respect for the persons who might find the advice helpful. The Taxonomy is easy reading, although perhaps it is easier reading for persons looking for practical help than it is for persons looking for theoretical discussion and development." (Sosniak, 1994, p. 117.)

As a taxonomic model, The Taxonomy had some important underlying philosophical assumptions.[50] The Taxonomy used a cumulative hierarchial framework to illustrate the relationship between objectives and behaviors. According to Bloom the "attempt to arrange educational behaviors from simple to complex was based on the idea that a particular simple behavior may become integrated with other equally simple behaviors to form a more complex behavior." (Bloom, 1956, p. 18.) Another significant underlying philosophical assumption in Bloom's model was the intricate nature of the three domains of The Taxonomy. Much like Plato's triad of the intellect, the spirit, and the appetites, and the use of the tripartite individual, Bloom's model identifies the

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[50] "Taxonomies...have certain structural rules which exceed in complexity the rules of a classification system. While a classification scheme may have many arbitrary elements, a taxonomy scheme may not. A taxonomy must be so constructed that the order of the terms must correspond to some 'real' order among the phenomena represented by the terms. A classification scheme may be validated by reference to the criteria of communicability, usefulness, and suggestiveness; while a taxonomy must be validated by demonstrating its consistency with the theoretical views in research findings of the field it attempts to order." (Bloom, 1956, p. 17.)

triad of the cognitive, the affective, and the psychomotor domains. In The Taxonomy the objectives of the cognitive domain "vary from simple recall of material learned to highly original and creative ways of combining and synthesizing new ideas and materials." (Bloom, 1956, p. 6.) The objective of the affective domain is to "emphasize a feeling, tone, an emotion, or a degree of acceptance or rejection." (Postlethwaite, 1994, p. 179.) This is similar to the idea which Plato had identified as the importance of grounding in the arts, literature and music. The objective of the psychomotor domain was to "emphasize some muscular or motor skill, some manipulation of material and objects, or some act which requires a neuromuscular co-ordination." (Bloom, 1956, p. 7.) This is similar to what Plato identified as essential elements of physical training so important in the first mandatory developmental stage. For the purposes of this project, my analysis of Bloom's model will deal specifically with the objectives of the cognitive domain and how these objectives relate to the development of higher level thinking skills.

The Taxonomy itself is divided into two parts. Part one contains the Introduction and Exploration provides the historical context for the development of The Taxonomy and the rationale for the use of a taxonomic model. Part two of is an outline of the various levels of cognitive skills. The model essentially divides thinking or cognitive skills into six hierarchial levels: Knowledge; Comprehension; Application; Analysis; Synthesis and Evaluation. (Refer to Appendix B.) In Bloom's model for the development of higher level thinking skills "the whole cognitive domain...is arranged in a hierarchy, that is, each classification within it demands the skills and abilities

which are lower in the classification order." (Bloom, 1956, p. 120.) As an individual moves up the hierarchy of thinking skills, that person begins integrating the lower level learning behaviors into the more complex level. This is sometimes called "horizontal transfer [where]...the hierarchial nature of The Taxonomy implies that learning has transfer effects. The learning that leads to the attainment of lower-level objectives transfers to or facilitates the learning that leads to related higher-level objectives." (Rohwer and Sloane, 1994, p. 48.) This is what Amelia Kreitzen and G. Madaus call a "cumulative hierarchy; hierarchy because the classes of objectives were arranged in order of increasing complexity, and cumulative because each class of behaviors was presumed to include all the behaviors of the less complex classes." (Kreitzen and Madaus, 1994, p. 66.)[51]

In this model Knowledge is intimately associated with memory and recall; Comprehension is the lowest level of understanding; Application is the ability to use abstractions in particular and concrete situations; Analysis is the ability to manipulate information and to reduce it to it's constituent elements; unlike Synthesis which involves the putting together of elements and parts so as to form a whole; and Evaluation is having the cognitive skill to make judgments about the value of material and methods for given purposes. (Bloom, 1956, pp. 204-207.) As educators our goal should be to assist students develop skills in all six of these areas by developing and implementing activities which will challenge the students to use higher level thinking skills. We also need to develop a variety of means for testing, evaluating and

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[51] See Bloom, 1956, p. 65.

reporting on this progress. Regardless of the specific grade and or subject area being taught, the curriculum experience needs to be infused with meaningful activities which will promote the development of higher level thinking skills. As Harris Sokoloff suggests: "We can teach thinking skills at the same time as we are teaching poetry by focussing students' attention on the skills they use in completing the broadly defined assignments." (Sokoloff, 1984, p. 44.)

In Bloom's model the six hierarchial levels are explained in reference to the constituent parts which make up each level. Knowledge is defined as involving "the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting." (Bloom, 1956, p. 186.) According to the authors of The Taxonomy the brain works likes a filing cabinet in which material is stored according to some logical pattern. Any test of Knowledge would then necessitate recalling the pattern which was used in order to recall what was stored. "The knowledge objective emphasizes most the psychological processes of remembering." (Bloom, 1956, p. 186.)[52] According to Michael Bennett, author of "An Evaluation of English OAC I Examination in Peel Secondary School: A Report," tests which ask students to: "define; state; list; [or] label...terms and principles in the form they were taught" are examples of this first level of thinking. (Bennett, 1987, p. 15.)

For Bloom Knowledge represents the lowest level of thinking skills. It is the kind of elementary or rudimentary thinking skill which is necessary to

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[52] Knowledge is also involved in the other levels of thinking as part of the process which assists in the development of the more complex levels of the hierarchy. (Bloom, 1994, pp. 18-19.)

function in society. Knowledge relies heavily upon the use of "symbols with concrete referents...[and represents] a very low level of abstraction..from which more complex and abstract forms of knowledge are built." (Bloom, 1956, p. 186.) The Knowledge level of Bloom's model is made up of three major parts: Knowledge of Specifics; Knowledge of Ways and Means of Dealing with Specifics; and Knowledge of the Universals and Abstractions in a Field. Each of these three parts is further subdivided. For example Knowledge of Specifics is defined as "the recall of specific and isola[ted] bits of information." (Bloom, 1956, p. 186.) It includes such things as Knowledge of Terminology or basic verbal and non-verbal communications, and Knowledge of Specific Facts such as rudimentary "knowledge of dates, events, persons, places, etc" in order to function in daily life. (Bloom, 1956, p. 187.) In the Platonic model, *eikasia* represented the thinking skill necessary for citizens to function in an orderly and moral state. At this point there appears to be some correlation between the two models.

Knowledge of Ways and Means of Dealing with Specifics represents "an intermediate level of abstraction...it does not so much demand the activity of the students in using the materials as it does a more passive awareness of their nature." (Bloom, 1956, p. 187.) In Bloom's model this means having Knowledge of Conventions; Knowledge of Trends and Sequences; Knowledge of Classifications and Categories; Knowledge of Criteria and Knowledge of Methodology including knowledge about "methods of inquiry, the chronological sequences and the standards of judgement within a field." (Bloom 1956, p. 68.) The third component of this Knowledge level of thinking

skill development is Knowledge of the Universals and Abstractions in A Field which represent "the highest level of abstraction and complexity" for the first level of cognitive skill. (Bloom, 1956, p. 189.) It includes Knowledge of Principles and Generalizations and Knowledge of Theories and Structures. Although this level represents knowledge of particular abstractions it does not approximate Plato's cognitive level of *dianoia* or rational thinking since Knowledge deals with recall rather than the formation of Ideas.

Bloom's second level of cognitive development is Comprehension or "a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications." (Bloom, 1956, p. 190.) According to Bloom educators have traditionally focussed on this area of intellectual ability. This level of thinking focusses on the ability to understand a "literal message contained in a communication." (Bloom, 1956, p. 89.) The three components of this second level of thinking skills are Translation, Interpretation and Extrapolation. According to this model students who are capable of taking a piece of communication, either in isolation or in context, and translate it into another language have demonstrated the behavior of Translation. (Bloom , 1956, p. 89.) Translation differs from Interpretation in that Interpretation "may require a reordering of the ideas into a new configuration in the mind of the individual...evidence[d]...in the inferences, generalizations, or summarizations

produced by the individual." (Bloom, 1956, p. 90.)[53] Extrapolation involves understanding trends or tendencies involved in a communication and having the ability to make "inferences with respect to implications, consequences, corollaries and effects which are in accordance with the conditions described in the communication." (Bloom, 1956, p. 90.) According to Bennett students who can effectively "justify, illustrate, explain, contrast [or] classify" something have demonstrated the skill of Comprehension. (Bennett, 1987, p. 15.)

The third level of thinking in Bloom's model is Application which represents "the use of abstractions in particular and concrete situations." (Bloom, 1956, p. 191.) In order to effectively demonstrate this cognitive behavior students would not only need to remember a given principle or idea, but they would also need to be able to take something learned in a generalized context and apply it to another specific situation. According to Bennett the ability to "predict, assess, choose, find and construct" are demonstrators of this cognitive behavior. (Bennett, 1987, p. 15.) Bloom's second the third level of cognitive development combined are reminiscent of Plato's second level of cognition, *pistis*, in that there is some application of something previously learned through concrete or sensory perception with limited understanding.

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[53] According to Bloom: "interpretation as here defined differs from analysis. In the latter the emphasis is on the form, the organization, the effectiveness, and the logic of the communication. It differs from application in that application is more definitely concerned with the meanings a communication has for other generalizations, situations, and phenomena, or the meanings that generalizations known by the student have for the communication. It differs from evaluation in that evaluation is characterized by the formulating of judgments explicitly based on criteria." (Bloom, 1956, p. 90.)

The first level at which there appears to be some real understanding and use of higher level thinking skills in Bloom's model is when students arrive at the fourth level of Analysis. At this level the students need to be able to identify and break down a communication into its constituent parts. The students need to be able to identify and establish relationships among those parts and they need to develop an understanding of the way in which an entire communication is held together. (Bloom, 1994, p. 23.) At this level the students are able to effectively dissect something previously learned into its constituent parts and understand the structure and relationship between the parts and the whole. This level of thinking development has three central components: Analysis of Elements; Analysis of Relationships; and Analysis of Organizational Principles. In general Analysis represents the precursor to Plato's cognitive level of *dianoia.* According to Bloom the cognitive behavior of Analysis is something which can be an integral part "of any field of study." (Bloom, 1994, p. 43.) Bennett suggests that asking students to "analyze, identify, compare, criticize [or] separate" something is a means by which educators can assist students in developing this level of thinking. (Bennett, 1987, p. 15.) Sokoloff also suggests that this level of thinking skill can be developed by asking students to "break down into parts, discriminat[e], look...for consistency and inconsistency" in various forms. (Sokoloff, 1984, p. 25.)

The next level in Bloom's Taxonomy is Synthesis, or the ability to take the constituent parts of an element and set about "arranging and combining them in such a way as to constitute a pattern or structure not clearly there

before." (Bloom, 1956, p. 192.) Synthesis may involve the Production of a Unique Communication such as an original written work; the Production of a Plan or Proposed Set of Operations, such as in the development of a proposal; or the Derivation of a Set of Abstract Relations, such as the "ability to make mathematical discoveries and generalizations." (Bloom, 1956, p. 193.) Asking students to "summarize, argue, derive, relate [or] generalize" teaches them how to "combine elements of knowledge into new structures." (Bennett, 1987, p. 15.) According to Sokoloff, assignments which involve "associating, translating, comparing, classifying, organizing, contrasting, sequencing, designing, putting together in unusual ways, combining, [or] patterning" also help develop this level of thinking. (Sokoloff, 1984, p. 25.) In some ways this level in Bloom's model represents the beginnings of rational and abstract thinking which are essential elements of Plato's third level of cognitive development, particularly with it's emphasis on geometry, arithmetic and science and deductive reasoning skills. In comparison to Plato's model what Bloom fails to acknowledge is that even in this rational thinking mode the students fail to be aware of the fact that the concrete understanding of abstract principles is a mere approximation of a phenomenon which cannot always be known in its purest form. For example the concept of zero in mathematics or the concept of a void in science can be understood in practical terms as an empty space, yet the concept of nothingness is so elusive that in it's practical form it can be appreciated, but in it's abstract form, it cannot be fully understood. One positive element of this level in Bloom's model is that it allows for an explanation for the development of creativity in the individual, something

which is not as valued in the Platonic model.[54]

The final level of cognitive development in Bloom's model is that of Evaluation. According to Bloom: "Evaluation is placed last in the cognitive domain because it is regarded as requiring to some extent all the other categories of behavior." (Bloom, 1994, p. 25.) Bloom identifies the highest level of cognitive development as the ability of the students to make a "judgement about the value of materials and methods for given purposes." (Bloom, 1956, p. 193.) This involves using a predetermined criterion developed either by the individual or externally imposed upon the individual. (Bloom 1994, pp. 24-25.) This cognitive level includes Judgments in Terms of Internal Evidence or in Terms of External Criteria. According to Bennett and Sokoloff activities which require students to "judge, evaluate, defend, select" or "critiqu[e], valu[e], [or] list priorities" all assist in the development of the highest level of thinking. (Bennett, 1987, p. 15 and Sokoloff, 1984, p. 25.) Although Evaluation should represent the pinnacle of higher level thinking skills I believe that Bloom's use of the term Evaluation is limited to "quantitative and qualitative judgments about the extent to which material and methods satisfy criteria." (Bloom, 1956, 9. 193.) The use of Evaluation in is way is a reflection of the pragmatic attitude which was prevalent at the time of the model's development and the idea that students' learning and understanding

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[54] According to Bloom: "this is the category in the cognitive domain which most clearly provides for creative behavior on the part of the learner. However, it should be emphasized that this is not completely free creative expression since generally the student is expected to work within the limits set by particular problems, materials, or some theoretical and methodological framework." (Bloom, 1994, p. 23.)

must be demonstrable in such a way as to be clearly identified, classified and evaluated. In recent years we have seen a resurgence of this attitude under the veil of what is now called "teacher accountability" and identifying outcomes or expectations which are demonstrable and which can be reported by use of objective criteria, guidelines and checklists. I believe that the major flaw within this position is that students who have reached the highest level of thinking can demonstrate the ability to evaluate according to a specific criteria, but that these students have not necessarily attained wisdom about the eternal truths which Plato suggests are at the heart of the wisdom of the Philosopher-King. In Bloom's model cognitive skills must be demonstrable and visible behaviors and knowledge should be taught because they enhance the "development of one's acquaintance with reality." (Bloom, 1956, p. 32.) There is no place in Bloom's model for contemplation of ultimate truths and realities which go beyond visual or sensory perception. What is also lacking in Bloom's model is the place of what Michael Polanyi refers to as the "tacit dimension" or that implicit and intuitive sense of knowledge which develops through contemplation of universal truths and realities. For example in Personal Knowledge: Towards a Post-Critical Philosophy and the Tacit Dimension Polanyi divides knowledge between a subsidiary awareness of a particular aspect of reality and a focal or holistic understanding of the relationship of the particular reality to the larger whole. Polanyi suggests that when the individual's subsidiary awareness of a particular reality observed in nature is united with intellectual contemplation and speculation, the individual may arrive at a more universal understanding. Although subsidiary knowledge

may appear more tangible, manifesting itself in observable phenomena, it is the focal knowledge or coherent unity which is closer to truth and reality. In my opinion this is one of the most serious shortcomings of Bloom's Taxonomy.

In some ways both Plato's model and Bloom's model discuss the stages of cognitive development. Another significant difference between the two models is that in Plato's model not all students can reach the highest level of thinking skills, while Bloom's model the underlying philosophical position is that all students have the ability to move through the hierarchial levels of The Taxonomy, albeit at a different pace.

> 'With each gain on the higher mental processes (HMP) there was a corresponding gain in learning the lower mental processes (LMP)... We're now finding that under less than ideal learning conditions the rate of learning varies by 1 to 6, meaning that some students take only one-sixth of the time it takes somebody else to learn. We have to understand how such variation develops and under what conditions we will get a 1 to 1 or 1 to 2 ratio.' (Bloom quoted in Koerner (ed.), 1986, pp. 59 and 65.)

In essence Bloom's model suggest that if one can identify and create the ideal learning conditions, one could foster the development of higher level thinking skills for all students. Bloom places great emphasis on the issue of environmental determinism and the effects of varied learning conditions and entry level conditions on students' learning. As Bloom stated in his interview with Ronald Brandt: "'I firmly believe that if we could reproduce the favorable learning and support conditions that led to the development [of experts]...we could produce great learning almost everywhere...The point is that under favorable learning conditions most people reach a high level of excellence.'" (Bloom quoted in Brandt, 1985, pp. 33-34.) This attempt to understand the impact of environmental issues on learning raised by Bloom

and his colleagues is still relevant today. For example the 1990 report "Learning, Teacher Assessment: A Theoretical Overview" states:

> Little if anything in the literature suggests a rationalist view of learning. Indeed, rather than an assumption that learning potential is innate and some students are naturally better than others, [as in the Platonic model and the Myth of the Metals], there is the view that any student can ultimately achieve success in any module...the way in which the learning environment is managed is more likely to be the determinant of the way learning takes place than is the modular structure itself. (Black, 1990, p. 31.)

Unlike Plato, for Bloom the curriculum itself is not the most important part of education. More significant than the curriculum itself is the practical application of that curriculum. It is this practical application of the curriculum which helps determine the level of students' success. For this reason Bloom's model is more inclusive and allows for the possibility of greater success by a larger number of students. This is diametrically opposed to the idea of the cohort progression in Plato's model and the moral, physical and intellectual tests which were used to limit students from progressing to the next level.

This underlying philosophical assumption in Bloom's model is the central epistemological position in what has become known as Mastery Learning:[55] "an instructional strategy based on the premise that virtually all students can and will learn what schools have to teach." (Anderson, 1994,

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[55] According to Lorin Anderson the relationship between The Taxonomy and Mastery Learning comes as no surprise. She suggests that "The Taxonomy has impacted on research on Mastery Learning in two primary ways. First, researchers on Mastery Learning have used The Taxonomy to develop highly valid unit and course assessments...Second...The Taxonomy has enabled researchers to examine the impact of Mastery Learning on the acquisition of higher-order as well as lower-order objectives." (Anderson, 1994, p. 129.)

p. 129.) According to Bloom: "Mastery Learning is the oldest idea in education...it was first used in the days of Socrates and has been rediscovered several times in each century thereafter." (Koerner (ed.), 1986, pp. 60-62.) Yet there is a significant difference in the concept of Mastery Learning applied to the Platonic model and applied in Bloom's model. According to Bloom if each student is provided with sufficient time and a suitable teaching environment almost all students can attain a high level of mastery in a particular field.[56] This is in direct contrast to the Platonic idea that only a few will ever reach the level of the Philosopher-King. In the Platonic model the education received by various members of the cohort was the same. Only those students who were successful in passing the test of progression moved on to the next level. Bloom's use of Mastery Learning lends itself to individualized and remedial instruction to ensure more widespread success. "Mastery Learning, then, suggests that success or failure in school learning is largely an artifact of the extent to which we adequately accommodate certain learner-based and instruction-oriented variables considered to be alterable rather than static." (Hymel, 1993, p. 3.) Bloom's notion that Mastery Learning is possible for the majority needs to be understood within the context of a democratic society in which the electorate is expected to actively participate in government. In this kind of a society the goal of education is not only to ensure that all citizens have the right to participate in the democratic process, but rather, that all citizens have the higher level thinking skills necessary to

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[56] According to Bloom: "a high percent of the students will reach the equivalent of mastery (85 percent +)." (Bloom quoted in Koerner (ed.), 1986, p. 61.)

make informed decisions through the voting process. This is of course in direct contrast to the oligarchic ideal of The Republic.[57]

According to Lorin Anderson the ultimate value of The Taxonomy lies in the fact that "during the past several decades, teacher educators have used The Taxonomy to help teachers in four general area: (1) specifying lesson objectives; (2) preparing tests; (3) asking questions at different taxonomic levels; and (4) increasing the cognitive levels of activities and tasks they assign to students." (Anderson, 1994, p. 135.)[58] Although I believe that Bloom's Taxonomy has been useful as a model for curricular development by those educators concerned with the development of higher level thinking skills, if it is unchallenged The Taxonomy runs the risk of becoming formulaic and meaningless. Much like Plato's model discussed earlier, Bloom's model has many important elements which are useful to educators wanting to assist

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[57] The authors of the teaching resource Cut to the Chase: Critical Thinking and Reading Skills articulate this point well. They state that "democracies demand much higher levels of participatory problem solving on the part of their citizens than authoritarian regimes. True democracies are rooted in the belief that a large proportion of the people who reside within their boundaries are capable of assisting directly in the solution of national and regional problems." (Barnes, Schroeder and Burgdorf, Cut to the Chase: Critical Thinking and Reading Skills, 1994, p. 1.)

[58] Anderson states: "In summary, researchers who used The Taxonomy in their studies of classroom instruction have learned that helping students master different types of levels of objectives requires quite different teaching methods and instructional strategies. Second, The Taxonomy has helped many researchers realize the need for highly valid forms of assessment in order to be able to detect differences in the effectiveness of various teaching methods or instructional strategies. Third, fewer than one third of the questions asked on the tasks assigned by teachers require students to engage in higher-order thinking. Fourth, when teachers use higher-order questions or assign higher-order tasks their students generally are able to engage in higher level of thinking." (Anderson, 1994, pp. 134-135.)

students in developing higher level thinking skills. It is up to each individual educator to rise to the challenge and take from these traditional models of learning what are the most salient features and apply them in such a way as to make learning and the development of higher level thinking skills real and meaningful for the students. The case study in the subsequent chapters will explain how I synthesized and adapted Plato's model and Bloom's model into a generic meta-model for the development of higher level thinking skills and the lessons I developed for my Grade 8 students as part of the Advisor Program. I will also use my interpretations of the students' responses to a "Student Development of Higher Level Thinking Skills Survey" to analyze and articulate the students' perceptions of thinking skill development and what I believe are the strengths and weakness of my generic meta-model and the teaching unit.

Chapter Five
The Genesis of a Meta-Model

> *Teachers are sharers not only of information, but ideas. They are givers not only of answers, but of ways to find answers. (Wolf, 1993, p. 6.)*

In essence this project is the chronicle of my journey through the process of articulating what Finley and Ober refer to as the "conceptual framework" from which I approached the creation of a generic meta-model for the development of higher level thinking skills for students and the application of this model with my Grade 8 Advisor class. In many ways my generic meta-model is a work in progress. It is something which evolved out of my conceptual framework, my interpretation of Plato's model and Bloom's model, and the experiences I had with my class. The previous chapters outlined the analysis of the two paradigmatic models I used in developing my own generic meta-model, and this chapter and the subsequent chapters will outline my challenge to develop, apply and evaluate my generic meta-model with my class. Through this journey I have gained a greater appreciation of how the theory of development of higher level thinking can be made real and meaningful for both educators and students.

I believe that as educators, we need to have faith in our ability to make determinations about what teaching and learning models and what essential elements of various models will best assist us in creating a climate in the classroom which will effectively move students along the lifelong journey of learning how to think and of how to develop higher level thinking skills. The

challenge before us is to frame new questions and challenge these educational paradigms to meet new standards. I believe that this can be accomplished through paradigm amalgamation rather than through paradigm replacement or paradigm shift. Adapting and fusing the most salient features of a paradigm or adapting them in ways which still makes some components of the paradigm useful is more beneficial than simply discarding a paradigm and replacing it with a completely new set of criteria. In doing this we can create an opportunity for these dominant paradigms to grow and change and remain alive in use as opposed to remaining static and relegated to the back shelves of the classrooms. When we actively seek to challenge dominant paradigms found in the teacher's culture and lore we ourselves grow as professionals and expand our understanding of how higher lever thinking skills develop and how we are able to assist our students to meet these goals.

The two most fundamental elements of both Plato's model and Bloom's model which I adapted were the conviction that thinking can be taught and the conviction that there is a need to teach students how to think better. In the Platonic model the teaching of thinking skills was perceived as the means by which the innate knowledge in the soul could be brought to the forefront. Plato's concept of the tripartite individual suggested that knowledge capability was predetermined in individuals and Plato saw education as bringing forth latent knowledge in the soul. The need to teach thinking was directly linked to the means by which a just and moral state could function. Although he suggested that almost all citizens of the state could reach a minimum level of intellect necessary to function in a just and moral state, Plato suggests that

only a chosen few had the intellectual and moral character to reach the highest level of cognition.

Bloom's model helped to create a counter model which rejected this Platonic idea. He suggests that in the Platonic model:

> much of the task of the schools and external examining system [wa]s to select the talented few who are to be given advanced educational opportunities and to reject the majority of students at various points in the educational process. (Bloom, 1971, p. 48.)

Bloom recognized that in his day this model for education was still prevalent but no longer relevant.

> In the late 1940s, the prevalent view was that education was to serve a selection function; that is, the purpose of education was to determine which students should be dropped at each stage of the educational process and which merited and were fitted by nature or nurture for the rigors of more advanced education. (Bloom, "Reflections," 1994, p. 7.)

Bloom recognized that the Platonic model was no longer sufficient and that there needed to be a fundamental shift in the purpose of education and schools. In essence Plato's model acted as a barrier to further education and in many ways Bloom established a counter model to deal with the realities of the Twentieth Century.

> The complexity of the skills required by the work force of any highly developed nation...suggests we can no longer assume that completion of...advanced education is for the few...We cannot return to an economy in which educational opportunities are scarce, but rather must provide enough opportunities that the largest possible proportion of students will acquire the skills and knowledge necessary to sustain the society's growth. (Bloom, 1971, p. 48.)

In Bloom's model, teaching thinking skills was initially developed as a means by which the majority, if not all, students could improve test scores and subsequently surpass any artificial limitations which might have otherwise

limited his or her possibilities for success and participation in society.[59] This idea was based on the principle that almost all students have the ability to develop higher level thinking skills. This basic philosophical assumption was also at the heart of Bloom's concept of Mastery Learning which suggested that although there can be a discrepancy in learning ability among students, this discrepancy can be reduced by altering the variable factors associated with learning, such as the time alloted for learning a particular skill. Bloom's model helped to create a culture which perceived "that success or failure in school learning is largely an artifact of the extent to which we adequately accommodate certain learner-based and instruction-oriented variables considered to be alterable rather than static." (Hymel and Dyck, 1993, p. 3.) When ideal conditions are established then the discrepancy among students is reduced. (Bloom, 1976, pp. 16 and 215.) According to Peter Airasian, Bloom and his colleagues caused a fundamental shift in how people perceived learning. He states:

> Educators and the public began to accept the notion that children's learning problems were not the result of native limitations, but instead of environmental factors that could be overcome with suitable instructional strategies. (Airasian, 1994, p. 86.)

Bloom's Taxonomy also helped to create a culture which rejected the Platonic idea that intelligence was fixed or intrinsic. Bloom and his colleagues refuted the Platonic notion that higher level thinking skills were something which were innately part of a person's very being or part of one's soul and

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[59] See The Taxonomy, p. 47 where Bloom suggests that all students have the ability to move through the hierarchy of thinking skills but at a different pace.

that knowledge was something constant and unchanging.[60] I believe that this fundamental shift helped change the belief that "mentally retarded people...have a limited intellectual capacity or ceiling." (Weber, 1990, p. 6 and p. 67)[61] It went against the Platonic idea that there be "a limited time for instruction...[which] should be enough for adequate mastery... and that if some people have not mastered the subject by then...they simply will not master it and should be directed toward things for which they have greater aptitude." (Egan, 1981, p. 132.) Instead, Bloom and his colleagues sought to show that almost all students could reach the highest levels of thinking and reasoning significantly reducing the gap in the type of society set up on the Platonic ideal. The notion that thinking skill development should be more inclusive is one of the underlying principles of my generic meta-model and my interpretation of this will be further articulated in this chapter.

The changes in attitude which arose from the widespread popularity of Bloom's Taxonomy are significant. This is particularly true in any post-modern society where is a greater need to have the majority of the citizens

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[60] "Thus, the view that measures of the higher mental processes are synonymous with measures of scholastic aptitude...has frequently been used to support the contention that, since intelligence is presumed to be constant, little can be done to develop some of the higher mental processes through educative experiences." (Bloom, 1956, p. 22.)

[61] This is also at the basis of the S.T.E.P. Model of learning which is used by Special Education teachers. S.T.E.P. is an acronym for Structure, Time, Encouragement, Practice, whereby time or degree of student learning is a function of the quality of instruction multiplied by time spent divided by time needed. This is similar to Bloom's idea of Mastery Learning. (See Weber, 1990, pp. 34-38.) If this is accepted the implication is that "retarded people develop through the same stages as those who are not retarded, but usually do so at a slower rate and often with smaller gains." (Weber, 1990, p. 65.)

develop higher level thinking skills and it is also true in any modern democracy where the majority of the citizens have the opportunity to participate in the ruling of the state. The challenge for modern educators is not to teach students what to think but rather how to think. I believe that training students to develop higher level thinking skills will assist students in coping with information processing, technological innovation, and rapid and unpredictable changes in the future. The cultivation of thinking skills is also necessary in order to assist students develop creative solutions to many of the world problems. As Sarah Parker states:

> future living and employment skills require school to facilitate improved instruction in higher-order intellectual abilities...[such as] problem-solving; decision making; critical thinking; application, analysis, synthesis and evaluation; mediating; organization and reference skills; logical reasoning; inquiry and discovery learning; divergent thinking; information processing; interpreting; [and] making inferences. (Parker, 1983, pp. 3-6.)

This idea is also suggested by Donald Barns, Thomas Schroeder and Arlene Burgdorf authors of the teaching resource As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School:

> modern personal, community, and world problems are so complex that they demand our very best thinking...Today we face a bewildering variety of political, social, and economic challenges. We must have an intellectually alert citizenry to address these perplexing, often overwhelming, dilemmas. (Barnes, Schroeder, Burgdorf, As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School, 1994, p. viii.)

What is significant in terms of Bloom's model is that Bloom also recognized this need in society in the 1950s. He states:

> Whatever the case in the past, it is very clear that in the middle of the 20th Century we find ourselves in a rapidly changing and unpredictable culture...Under these conditions, much emphasis must be placed in the schools on the development of generalized ways of

> attacking problems and on knowledge which can be applied to a wide range of new situations. (Bloom, 1956, p. 40.)

From my analysis of the Platonic model and taxonomic model I came to the conclusion that the development of thinking skills must be done in a well articulated manner. I believe that both Plato and Bloom would have agreed with the idea that thinking was an innately human process. Bloom suggested that "both teaching and learning are such natural phenomena that all members of the human species engage in them without being entirely conscious of the processes they are using." (Bloom, 1976, p. 1.) Unlike Plato, I do not believe that thinking capability is fully predetermined. There are a number of other external and internal factors such as environmental issues and motivational factors which impact on thinking development. Although any model for the development of thinking skills must take into consideration the cognitive development which comes naturally as a result of age and maturity, the model must also make allowances for environmental issues which shape the development of thinking.[62] Bloom's model has a greater sensitivity to environmental conditions and how these conditions impact on learning.[63] After analyzing his model I came to a greater appreciation of my need to be conscious and sensitive to the environmental background of my students, particularly in my Advisor Program. These environmental conditions could range from the socio-economic status of the students to

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[62] See also Bom Mo Chung, 1994, pp. 164-173.

[63] Bloom suggests that "there is also a geographical and cultural aspect to knowledge in the sense that what is known to one group is not necessarily known to another group, class, or culture. It must be clear from all this, that knowledge is...relative rather than...fixed." (Bloom, 1956, p. 32.)

familial and cultural traditions which could either promote or downplay the value of school and education.[64] The mindset with which the students come to school to some extent determines the success or failure of applying a model for teaching learning skills.[65]

Educator must be willing to accept the realities of the environmental or social conditions which shape students' lives and in some way accommodate the real needs of the class in determining how any model of learning can most effectively be applied.

> In pursuit of this goal, it is evident that the teacher must make a host of individual decisions concerning what kinds of stimulation to present to the learner, what communications to make, what questions to ask, what sorts of confirmation of the learner's production to provide... These decisions are based upon the teacher's understanding of what is happening to the students as learners; that is they are influenced

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[64] For example, the first year that I incorporated lessons on thinking in my Grade 8 Advisor class, I had a group of students who were generally well motivated and ready to take on the challenge of thinking about thinking. I presented the unit on thinking and the development of thinking skills for the first time in the 1997-1998 school year. The previous year, the students in my Grade 8 Advisor class were generally not inspired by academic challenges, and they were unwilling to commit themselves to educational inquiries into thinking. This first group of students on the whole had a number of social problems which ranged from suicide attempts to various criminal activity and other family crisis situations. Realizing how much effort and commitment was required on my part in conjunction with my students to undertake the challenge of developing a model and lessons on thinking and the development of higher level thinking skills, I opted to postpone this unit and deal with social issues such as peer pressure and moral and legal issues around stealing and other crimes in my Advisor class.

[65] Teresita Naval-Severino in her article "Cognitive and Creative Thinking: Comparative Study among Filipino Children," studies how two groups of children of the same intellectual abilities and socio-economic abilities respond to learning when one group is taught using Bloom's model and the other group is not taught his model. Her study presents some interesting findings, however, her study might have showed more interesting findings had she taken these two groups and cross-referenced her findings with a similar study of different intellectual and socio-economic abilities.

> by the teacher's conceptualization of the processes of learning and the expected outcomes to which these processes lead...Accordingly, a model of these processes provides an essential framework for describing the activities of teaching that are designed to support or otherwise influence them. (Gage (ed.), 1976, pp. 21-22.)

One of the fundamental decisions I made was to use the Platonic notions of philosophical contemplation and discussion in order to have my students probe into the question of "Thinking About Thinking." Although I felt that thinking can occur spontaneously I believe that it must be cultivated. As educators we cannot not assume that the subliminal infusion of thinking skills as part of curriculum will necessarily ensure that all students develop these thinking skills. As Harris Sokoloff suggests one cannot assume "that students would 'pick up' critical thinking and problem-solving as part of learning without some explicit inquiry into this subject as in the case of a special course on thinking." (Sokoloff, 1984, p. 25.)[66] For this reason I chose to do a very directed inquiry into the nature of thinking with the students in my class. In a series of activities the students were directed from easier to more difficult activities which combined concrete and more abstract discussions on the nature of the thinking process. I felt that all the students in my class, regardless of intellectual ability, could partake in the activities and discussions since each person had at the very least the personal experience of thinking to

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[66] As Matthew Lipman suggests: "we keep demanding that the individual academic disciplines do something to reduce their isolation from one another... unfortunately, these disciplines are virtually helpless to resolve this problem, so long as they continue to define themselves as subject areas to be learned, rather [than] as languages in which students must learn to think. Another reason the disciplines appear remote from one another is that they have shrunken away from their former contours by aping the technical disciplines in repressing the philosophical aspects which had once been vital to their integrity." (Lipman, 1985, p. 20.)

contemplate and share with others. The structure of the Advisor Program at Beatty Fleming School was the perfect forum in which to discuss this topic.[67]

Another element of both Plato's and Bloom's model which I adapted in conceptualizing a generic meta-model for thinking skill development was the concept of a linear model for the development of higher level thinking skills. I believe that Plato's linear model is essentially vertical. It is based primarily on the concept of age or cohort progression from one developmental stage to another. It is also based on the progression from a lower level of thinking skill development to a higher level of thinking skill development. Bloom's model, on the other hand, is essentially a combination of a lateral and a vertical model in which a hierarchy is used to arrange learning behaviors in terms of complexity whereby higher order thinking skills build upon the skills of lower order thinking. With both the Platonic and taxonomic linear models I found that there were serious deficiencies when it came to the practical application in my classroom. The difficulty which I faced with Plato's linear model was the reality that, unlike in Plato's time, all students in my class did not necessarily belong to the same intellectual cohort. My class, much like most destreamed classes, was an example of an age cohort in which

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[67] The purpose of the Advisor Program is to set aside a period of the day in which poignant social and educational issues can be examined, discussed and debated. Although the intended purpose is a significant one, the problem in reality with many Advisor classes is that the time often is used for announcements and other business. Conducting an effective Advisor class requires significant persistance on the part of the educator and the cooperation of the students.

intellectual abilities were generally very varied among the students.[68]

The class of 8B was composed of a wide range of mixed ability students. Integrated into my Advisor class were a number of students who had been deemed "Exceptional," identified with a cognitive exceptionality or learning disability and who spent part of the day in a special education classroom. I realized that in conceptualizing my generic meta-model it would be necessary for me to work within the reality of most mixed ability or destreamed classes. From my experience I have found that most of these classes are populated with students who have mixed abilities and are at various stages in cognitive and social development. I determined that my generic meta-model for the development of higher level thinking skills must fuse the seemingly incompatible ideas that all students are capable of developing higher level thinking skills and that only a few are capable of developing higher level thinking skills.[69]

In my experience I have found two ways to bring these apparently incompatible ideas together. The first way is through an Individual Education Plan (I.E.P.) and the second way is through carefully structured group work and discussion. In the case of an I.E.P., each child is expected to progress and

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[68] Much like Bloom suggests in his interview with Thomas Koerner: "the grades are like assembly lines where everyone hopes the learning problems will be corrected at a later grade, but in reality the learning problems get worse each year." (Koerner (ed.), 1986, p. 63.)

[69] As Dr. Dan Geagan suggests: "the difference here [may] be related to Plato's dependence on a cohort fixed in its membership and rate of progressions and Bloom's more fluid cohort which allows for variables in individual development and or quality of receiving condition." (Dan Geagan, History Department, McMaster University, Revision Notes.)

be successful in developing and understanding higher level thinking skills. The definition or expectations of higher level thinking skills can be very different for exceptional students or even gifted or mode students.[70] In the reality of my classroom situation I adopted the maxim that all students were capable of learning and developing some higher level thinking skills, with the understanding that there was a minimum expectation that I had of all students. Where individual students would reach beyond that minimum level was yet to be determined. In accepting and recognizing the difference in intellectual and social maturity among the students in my class I arranged the class into discussion groups which compensated for the discrepancies between abilities and motivation among the various students. Much like Plato I believe that discussion can be the most stimulating means of igniting a student's sense of inquiry. As Lorin Anderson suggests in her article "Research on Teaching and Teacher Education:"

> Teaching methods which emphasize efficient one-way communication (e.g., lectures) are more useful in helping students acquire lower-order objectives, while those which emphasize two-way communication either among students themselves (e.g., cooperative learning) or between students and teachers (e.g., discussion) are more useful in helping students achieve higher-order objectives...and this proposition has received substantial empirical support. (Anderson, 1994, p. 127.)

The difficulty I found with Bloom's linear hierarchy was that it did not sufficiently explain the overlap of thinking which occurs when students partake in multiple thinking tasks simultaneously. I found that Bloom's model

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[70] Bloom suggest: "that 'individual differences' between learners exist is indisputable...a fundamental task in education is to take into account individual differences in such a way as to promote rather than inhibit the fullest development of the individual." (Bloom, 1971, p. 49.)

did not allow for the fact that thinking is a multidimensional process. Nor did it have a comprehensive appreciation of the holistic nature involved in thinking. In the thinking process, often times more than one of Bloom's levels are experienced simultaneously. Although I believe that educators can frame questions and create activities which will target the development of a particular thinking skill, I do not believe that the process that one undergoes in thinking and in developing higher order thinking skills can be so rigidly compartmentalized. As Neville Postlethwaite suggests in his article:

> the naivete of the structure of The Taxonomy...[is that] educational objectives are multidimensional. Thus, to plot objectives in a two-dimensional form (content and behavior) is insufficient." (Postlethwaite, 1994, p. 176.)

My underlying assumption is the belief that what Plato referred to as human "wisdom" is much more than the sum total of the individual input of specific knowledge. Wisdom involves much more than Knowledge of specific curriculum. As professional educators we need to ensure that our own thinking skill development and our teaching of thinking skill development remains focussed on teaching this essential idea.

Since I believe that the thinking process is multi-dimensional, my model for the development of thinking skills had to be multi-layered, not just multi-leveled as in Bloom's model, and more inclusive than Plato's model. If a linear analogy had to be used then I would suggest that thinking skill development is both lateral and vertical with the added dimension of depth at the same time. Much like a three dimensional moveable grid, various thinking skills can intersect at various levels and at various depth points, depending on the task at hand and on how the students choose to or are directed to deal with

the task or issue. My model suggests that all students can experience the full range of thinking skills independently or in conjunction with one another. The significant difference is that each student experiences the various thinking skills at different levels of awareness or depth. One of the key elements of this grid analogy is that the development of a particular thinking skill can in itself be multi-layered, represented by the concept of depth perception. The multi-layering of various thinking skills means that each student can experience thinking as a function of personal knowledge, awareness and judgement based on personal experience, or even abstract reasoning which goes beyond the realm of what has been experienced in a concrete form.

In this sense I am suggesting that the idea of a hierarchy can be adapted from Bloom. Instead of there simply being a hierarchy of thinking skills which range in terms of difficultly, I am suggesting that within each thinking skill, there is a hierarchy of depth perception or understanding for that particular skill and for how one or more thinking skills intersect. For example I believe that both young and more cognitively mature students can experience what Bloom terms the higher level thinking skills such as Evaluation. The difference is in the depth perception that will vary with each student based on a multitude of factors such as: age; cognitive maturity; and previous experience. Essentially I believe that there are three depths at which a person can experience each of the thinking skills. The first is at the level of personal experience; the second is at the level of philosophical reasoning which is based upon personal experience; and the third is abstract

philosophizing which moves beyond the realm of personal experience into reason and logic.

The other key element of this grid analogy is that the grid must be open-ended and infinite. By this I mean to suggest that different thinking skills can be added to the model as students develop their cognitive abilities. The list of thinking skills on such a grid could never be comprehensive since it would not only depend on the task at hand and how the students approach or are directed to approach the task, but it would also depend on the conceptual framework of the educator who developed the activity. As Barnes, Schroeder and Burgdorf suggest in As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School:

> No program of critical-thinking and reasoning competencies can address more than a fraction of the cognitive skills needed for academic success and daily problem-solving. It is important to recognize that there is no consensus regarding which thinking skills are paramount. There are almost as many lists of skills as there are researchers in the field.(Barnes, Schroeder, Burgdorf, As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School, 1994, p. ix and p. 2.)

I do not believe that the process of thinking skill development must necessarily be sequential or hierarchial as in the case of Bloom since some development will occur simultaneously.[71] Among the thinking skills which could be included on the grid would be those espoused by Bloom, but these thinking skills would not necessarily have to follow a sequential pattern.

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[71] As Edward Furst suggests: "the notion of a cumulative hierarchy, ordered on a single dimension of simple-to-complex behavior, has provoked strong philosophical criticism... altogether, these various exceptions suggest that dissecting the cognitive domain, into linearly ordered categories has drawbacks. Inversions occur and there is frequent overlap between and within categories." (Furst, 1994, pp. 34-36.)

Other thinking skills which could be added to the grid would be such things as developing a students' ability to "infer, define, conceive, assume and surmise." (Lipman, 1985, p. 22.)

In this generic meta-model I believe that the teaching of thinking skills has more potential for impact than Bloom suggested was possible with his highest level of thinking, Evaluation. Although Evaluation does require higher level thinking skills as I stated earlier, Evaluation is usually criterion referenced, in which the subject of the Evaluation is compared to a standard according to specific predetermined criteria.[72] Evaluation as presented in Bloom's model does not even begin to approximate philosophical level that Plato suggested was the quality espoused in the Philosopher-King. Bloom's model and his definition of Evaluation do not necessarily allow the students to make the connection between the ability to evaluate and the ability to make a moral or just decisions. It never allows the students to reach the level of abstract reasoning that the Philosopher-King attains in Plato's model. Bloom's model lacks the appreciation that philosophical reasoning is the pinnacle of thinking and it does not link education or knowledge to the means by which good can be realized and actualized[73]. It is in this regard that Bloom's highest level thinking skill falls short of the Platonic ideal of higher level thinking

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[72] Summative evaluation in particular evaluates the final product. Formative evaluation, or evaluation for the purposes of feedback and sense of direction is still more likely to act as a commentary on how the student is progressing towards the final goal or product rather than to comment specifically on the process of learning.

[73] This is the suggestion made by Plato. His use of the term good is equivalent to the idea of the ultimate Good.

skill development. It is this critical shortfall which needs to be addressed in Bloom's model and which I believe is so essential for citizens of any complex society to address. For example the authors of As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School suggest:

> Self-interest dictates much of human behavior. We have a penchant for using our cognitive and affective processes to justify selfish motives and to undermine opposing interpretations of events. Critical thinking can help us learn to see merit in competing points of view and consider more fully the welfare of others. (Barnes, Schroeder, Burgdorf, As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School, 1994, p. viii.)

It is essential that as educators we recognize and value the teaching of students not only how to think, but also how to evaluate and improve their own thinking skills. I believe that the highest thinking skill is not Evaluation itself as suggested by Bloom, but rather "metacognition," or thinking about thinking. Students who are encouraged to think about their own thinking process can not only articulate better about thinking, but I believe that the directed inquiry into thinking will, in and of itself, promote the development of higher level thinking skills. Metacognition suggests that evaluation is a means of "monitoring one's own learning." It is a means of "evaluating the processing" involved in learning and allowing for the learner to bring forth the latent or subconscious thinking skill development into the forefront.[74] As Harry Black, John Hall and Sue Martin suggest in their article "Learning, Teaching Assessment: A Theoretical Overview:"

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[74] See Harry Black, John Hall and Sue Martin, "Learning, Teaching Assessment: A Theoretical Overview, Scottish Council for Research in Education Project Report No. 20" 1990, p. 8 for a depiction of the relationship between cognition, metacognition and the process of learning.

> Metacognition is more than 'intelligence' or mastery of the 'correct' procedure for each situation. It is an ability to apply skills and strategies appropriately in new situations, and to evaluate learning progress. The successful learner will not only have developed a range of strategies and skills that are transferable, but will also be able to manage these effectively. (Black, 1990, pp. 7-8.)

Metacognition, or assisting students to probe into the heart of their thinking process, is much like Plato's concept of contemplation, and for this reason I incorporated it in the lessons I did with my class. I believe that in order to do such activities in the classroom there is the need for a fundamental shift in the pedagogical philosophy of teachers from teaching students what to think to teaching students how to cultivate higher order thinking skills.[75] The significance of assisting student develop skills in metacognition is that the "students' sense of autonomy develops as they become aware of their ability to reason logically and to justify their thinking." (Ontario Ministry of Education, 1995, p. 12.) As Bloom states in Sarah Parker's article: "teaching the learner to think as well as think-about-thinking will need to be viewed as a priority goal in the public school curriculum." (Bloom quoted in Parker, 1983, p. 20.) Bloom recognized the importance of dealing with this issue and he was sensitive to the role the teacher plays in this process. "Little progress in developing these higher processes can be expected until teachers develop the necessary capabilities and are helped to find ways of teaching higher intellectual processes to the students in their classes." (Bloom quoted in

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[75] See Dewey quoted in Sarah Parker "Thinking About Thinking:" "'All the school can or need do for pupils, so far as their minds are concerned, is to develop their ability to think.'" (Parker, 1983, p. 1.) See also Lockhead as quoted in Sarah Parker: "'We should be teaching students how to think; instead we are primarily teaching them what to think.'" (Parker, 1983, p. 12.)

Parker, 1983, p. 20.) In my estimation his model does not necessarily allow for this goal to become actualized.

Through metacognition each person is capable of evaluating his or her thinking process. Metacognition means that as humans we have the ability to make judgments about how we think, and I believe that how we think affects how we act. Based on the fact that we as thinking beings are capable of evaluating our own thinking process, I believe that we also have a moral responsibility to make judgement on how we can make a positive contribution to the dignity and worth of humankind. "This is a reflection of [the] belief that people cannot be both ignorant and free." (Barnes, Schroeder, Burgdorf, Cut to the Chase: Critical Thinking and Reading Skills, 1994, p. 1.) Much like Plato[76] I believe that reason has great ability to effect action for greater good and that we have a responsibility to so act. Plato places such importance on these eternal questions that he limited them to the realm of the Philosopher-King. I believe that they are so important that philosophical thinking should be contemplated by all people. As educators I believe that we need to assist our students come to this realization and we need to create and facilitate the experiences which will allow them to contemplate such poignant issues. I readily acknowledge that there is little support in our schools for promoting philosophical contemplation and pure intellectual pursuits, but the onerous task set before us is truly noble. For example in the article "To B.A. or not to

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[76] In some ways I might fall into the category of those people who believe that humanism is a desirable goal if it is perceived as the process of philosophizing about the dignity and worth of humans through self-realization and reasoning.

B.A.? The Liberal Arts Degree in the Third Millennium," Jim Zucchero, an academic counsellor at King's College, The University of Western Ontario, states:

> The value and relevance of a liberal arts degree has been a subject of considerable debate recently...You may recall that Mr. Harris [Premier of Ontario] challenged universities to close down programs that are not relevant to the job market...The argument made against the liberal arts has always been that they are impractical...too abstract, to theoretical and not sufficiently connected to the 'real world.' (Zucchero, 1999, p. 5.)

This attitude is one which I believe has done much to destroy the once esteemed place the humanities and philosophy in our society. Educators need to be able to articulate that the value in pursuing an education which focuses on the development of higher level thinking skills and critical thinking.

> Now, more than ever, we need to cultivate the [higher level thinking] skills that will enable us to discern what is truly valuable and what is genuinely good, as well as what is efficient and profitable...[These skills will] enable us to develop the intellectual skills required to inform our political and social and personal choices. [They will] allow us to develop our aesthetic values...[and] allow us to cultivate the self-discipline and restraint needed to accomplish our goals [and our efforts] to make the world a better place. (Zucchero, 1999, p. 6.)

In essence, the difference in my conceptual framework and that of Plato's model and Bloom's model is that I see the model as the starting point where educators can begin to teach about thinking skill development as opposed to the end point you should arrive at after teaching thinking skills. The Platonic model of thinking skill development in The Republic suggests that the curriculum theory or content is a greater measure of students' success than the practical application of the curriculum since in the practical application of the curriculum many students are eliminated from the higher levels of thinking. Bloom's model for thinking skill development found The

Taxonomy suggests that students' behavior as a function of the practical application of the curriculum is a greater measure of students' success than the curriculum theory. The generic meta-model I am proposing strikes a balance between these to two positions. Instead of using research findings to develop a theoretical framework or model as in the case of Bloom, or creating a rigid system of points of defeat as in Plato's model, my position is to implement a generic model which takes a theoretical framework and applies it to the realities of the particular situation. I believe that anything less becomes cumbersome to use particularly by pragmatists when the circumstantial evidence of the particular situation does not closely approximate the initial conditions of the theory or research finding itself. In this way any model which does not allow for flexibility and adaptation actually undermines itself. This may serve to explain the apparent inconsistency whereby educators are well versed in the theory of The Taxonomy but not so well versed in its practical application within the classroom.[77] My generic meta-model for the development of thinking skills must be seen as a developmental process (like

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[77] One of the most serious shortcoming of The Taxonomy is that although it has become enshrined in teacher education programs and taught to teachers as a dominant model for the development of higher level thinking skills, it is difficult to determine its success as applied in a practical sense. There is little evaluation of its usefulness for its' intended purpose. As Postlethwaite states: "The Taxonomy has become a kind of dogma in many educational circles." (Postlethwaite, 1994, p. 174.) According to Lewy and Bathory: "The Taxonomy became part of the curriculum of teacher training programs, and most teachers trained in the last twenty years...have at least a rudimentary knowledge of it." (Lewy and Bathory, 1994, p. 146.) As Sosniak points out: "Acceptance as measured by frequent reference to the work is hardly sufficient for judging or even understanding how The Taxonomy might have been a useful and effective tool for curriculum theory and practice...even how often The Taxonomy is used in actual curriculum practice seems impossible to determine from the literature." (Sosniak, 1994, pp. 103-112.)

Plato's model)[78] which allows for the maximum success of the students (like Bloom's model).[79] It cannot be a closed or fixed system like that of Plato or Bloom[80] but rather a flexible, open-ended, ever growing system which can be adapted or customized by educators and which ensures that all thinking skills, including metacognition, will be experienced by all students at various depth perceptions.

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[78] For example my generic meta-model is a model which takes into consideration the developmental stages of learning and the teaching strategies which should be used at various stages of cognitive development.

[79] In my generic meta-model I suggest that all students are capable of experiencing the full range of thinking skills at various depth perceptions.

[80] One of the most serious difficulties with a closed or fixed system is that this type of model does not readily lend itself to manipulation or adaptation. A closed of fixed model tends to imply that the model must be applied without changes in order for the model to be successful. An open-ended or flexible model which allows for constant change and modification has a better chance of being adopted by educators who face a multitude of challenges in the classroom.

Chapter Six
The Meta-Model Applied and Evaluated: The Case of 8B

> *A wise teacher gives not of his or her own knowledge but rather leads you to the threshold of your own mind and encourages you to explore the possibilities therein. (Wolf, 1993, p. 26.)*

The purpose of this chapter is to provide my readers with an example of an effective working model of the lessons I implemented with my students dealing with the topic of thinking skill development. In no way do I mean to suggest that the lessons in this chapter are the only way to discuss the development of thinking skills with students. These lessons were an effective and stimulating way to present this topic for my Advisor class. The success of the lessons as a theoretical framework and as a generic meta-model derived from a theory are evident in the students' responses given in the "Student Development of Higher Level Thinking Skills Survey." Through this survey I had the students analyze the learning and thinking process on both a philosophical and personal level. As I stated in previous chapters, my goal in developing this generic meta-model was to improve my understanding of higher level thinking skill development and to inspire my colleagues to deal with such issues with their own students. I urge my colleagues to adapt and modify my lessons and generic meta-model in order to meet their own curricular needs and the unique needs of the students in their class.

The structure of the Advisor Program at Beatty Fleming School is that for the last 25 minutes of each day students return to their Homeroom class under the supervision of their Advisor teacher. The Advisor teacher can be

any teacher in the school including a Core Subject Teacher or a Rotary Teacher. Since I teach Grade 8 French at Beatty Fleming School I am considered a Rotary Teacher. As noted in the previous chapter, in my Advisor class I have a combination of students including special needs students who have one or more identified learning exceptionality and gifted students.[81] This complex mix of academic abilities coupled with personal strengths and interests and the reality of the physical limitations of the Advisor class[82] all played an important role in my lesson development.

When I began surveying the professional literature for the Advisor Program at my school I noted that there were ample activities which focussed on career awareness, personal relationships, values, decision making and coping with peer pressure.[83] Although part of the Advisor Program is also to focus on improving study skills and homework or test taking skills there was little which actually dealt with improving thinking skills through

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[81] According to Ken Weber's reference and resource book Special Education in Ontario Schools: "the rational for creating such a congregated class is that all of the pupils in it will likely benefit from a program which emphasizes social, communication, and life skills." (Weber, 1990, p. 17.)

[82] I had to ensure that during the class I had made some allowances for administrative matters which also had to be dealt with during the Advisor class such as daily announcements, collecting of money for school activities and reminders of homework.

[83] According to the Ministry of Education document Insights Guidance Resources Document: the "aims of guidance...[are] to provide students with opportunities to acquire the skills, knowledge, and attitudes necessary for them to achieve the following four aims of guidance: a) to know and appreciate themselves; b) to relate effectively to others; c) to develop appropriate educational plans; d) to explore career alternatives." (Ontario Ministry of Education, 1987, pp. 3-4.)

philosophical inquiry. The value of this type of philosophical contemplation was at the center of my belief in metacognition and it was something which I perceived of importance in any curriculum.

> 'Students must be encouraged, at appropriate moments in their learning experience, to reflect on the process of learning so that they may understand how they learn and assume responsibility for learning.' (The Common Curriculum Policies and Outcomes Grades 1-9, quoted in Myers, 1994, p. 8.)

I also believed that every adolescent learner could "benefit from this type of instruction since no child is devoid of critical-thinking competencies, and no child has [fully] developed these skills." (Barnes, Schroeder, Burgdorf, As Sure As Eggs Is Eggs: Thinking and Reading Skills for Middle School, 1994, p. vii.)

Through my research I did find some teacher resources which were aimed at teaching middle school students thinking skills. In my opinion the serious shortcoming with many of these teacher resources was that they focussed almost exclusively on activities which were supposed to bring forth the development of higher level thinking skills in a subliminal way. These activities did not necessarily promote discussion of the methodological or philosophical nature of thinking itself. For example Stephen Mahoney author of the teaching resources Reason and Write suggests:

> Why do you think what you think?...is the driving force behind this book, the aim of which is to teach students to think about what they think and to develop ideas that support their thoughts, choices, and opinions. (Mahoney, 1996, p. 5.)

This particular resource uses Bloom's model to develop "a writing template that enables students to form an opinion or take a position [on a particular issue] and then support their position in an organized and logical matter." (Mahoney, 1996, p. 5.) Although it does aim to move from concrete activities to

more abstract ideas, it does not ever allow the students to move into the realm of philosophy or the dialectic like Plato's model.

I would suggest that the development of my generic meta-model and the lessons outlined in this chapter were created actually to affect the level and quality of students' thinking skill development in a positive way by promoting philosophical contemplation of the nature of thinking. My goal was to develop a model for the development of higher level thinking skills which would translate into "activities which make the learner an active part of the learning process... which... permit... planning, follow through and evaluation." (Scovic, 1983, p. 36.)[84] Although many students at this age still learn "by systematic manipulation of ideas as well as objects," by the beginning of adolescence increasingly they are able to "reason about things never experienced-[they] can reflect about [their] own thoughts...[and they can begin to] think abstractly." (Norris and Boucher, 1980, "Language/ Intellectual Growth Approximate ages 11-13" section.) By allowing the students to participate in the development and evaluation of the unit the students had a vested interest in their learning. In doing so the students were much more engaged in the lessons and certainly more so than if I had simply presented them with a variety of models for the development of higher level thinking skills and asked them to accept and internalize these models. In this

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[84] According to Maslow quoted in Scovic these experiences are called "'peak learning experiences.'" They are the kind of learning experiences which students remember and could in fact be "'the stimulus to major attitude and value changes.'" (Scovic, 1983, p. 36.)

way the students themselves acted as researchers probing into the question of the process of thinking and thinking skill development. In order for the unit to be successful and truly meaningful I believed that there had to be a high interest level and commitment level on the part of my class. This precondition was necessary for a number of reasons. One reason centered around the fact that I decided to use a teaching strategy which is called "discovery learning [and which] is the process of acquiring new information or knowledge, largely as a result of the learner's own efforts." (Parker, 1983, p. 42.) Another reason for the need for a high level of student interest and commitment was that I chose to focus on class discussion as opposed to pencil-and-paper activities which could be more readily controlled by me. Finally the third reason for this need was that I agreed with Plato's position that learning is also a voluntary act and my belief that "thinking skill improvement should be acquired by voluntary performance rather than by compulsory drill." (Lipman, 1985, p. 22.) I felt that these preconditions were necessary if in fact the experience was to have real significance and impact on the students' level of understanding of thinking.

Much like Plato I also believed that the vital role of a teacher is to create and facilitate the experiences whereby the students will come to a greater understanding of how thinking occurs through their own experience of thinking and through more abstract reasoning. It is too easy when teaching to resort to activities in which right and wrong answers are clearly delineated and more readily articulated to students. It is the role of the educator to create

an atmosphere which will not only inspire students to learn about thinking but will also keep them engaged as they go through the process of thinking. It takes a certain amount of courage to create and implement activities in which multiple views can be correct or partially correct simultaneously. This requires a willingness on the part of the educator to take a risk in front of the class and expose a certain vulnerability as the entire learning community works through the issues of thinking about thinking. I attempted to do this with the lessons and class discussions on thinking. I believe that it is in these true teachable moments, when both teacher and students penetrate into a deep philosophical question, that we grow as a community of inquiry and develop our thinking skills.

In developing my model for teaching thinking skills I took from Plato and Bloom the understanding that the teaching technique to be used had to be age appropriate. For this reason I decided to use a form of teacher directed discovery learning through inquiry and discussion. I also tried to develop activities which would be stimulating and fun,[85] and for this reason I used activity based learning as opposed to textbook teaching. I combined this with Bloom's idea that age and intellectual development also have an impact on a

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[85] The significance of student enjoyment is found in The Republic and this principle is also found in the motivational forces of Bloom's Mastery Learning. As Larry Powell suggests in his article on active learning: "some noted educators have joined the 'learning how to learn' camp. Among these is Benjamin Bloom who believes that when the child 'learns how to learn' that he/she can be noticeably motivated by finding pleasure in learning." (Powell, 1989, p. 6.)

person's ability to think and articulate about thinking at various levels[86] when planning the groups for discussion. As the class contemplated and discussed the issues surrounding thinking about thinking I developed 12 lessons which I used with my students which spanned 28 periods of approximately 25 minute each. In many ways this was an experimental unit since I had never taught or created a unit on thinking and many of these students had never previously studied thinking and the development of higher level thinking skills.[87] In developing and implementing the unit I was taking a significant risk with my students. Despite the possibility of failure I felt that the potential gain for my students in studying thinking outweighed any personal vulnerability on my part.

The following table outlines the structure of the lessons which made up my unit on "Thinking About Thinking."

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[86] As Solman and Rosen suggest in their article "Bloom's Six Cognitive Levels Represent Two levels of Performance:" an "individual may fail to successfully complete higher level taxonomic tasks for a number of reasons, one being that they are not sufficiently cognitively mature to carry out the necessary complex operations." (Solman and Rosen, 1986, p. 246.)

[87] Over eighty percent of the respondents to Question 2 of the survey indicated that they had never previously studied thinking skill development in any other class. (See Appendix M.)

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
1	2	-Large group Brainstorming. (Age appropriate technique.) -Oral.	-Introduction to the unit. -Formative analysis-what do the students already know about thinking. -Promote spirit of inquiry. -Establish class expectation that all students have something positive to contribute to the unit. (Community of Inquiry.) -Establish a theoretical framework of the essential elements involved in thinking. -Develop Knowledge skill. (Record, list, relate, define.)
2	2	-Small group Discussion. (Age appropriate technique.) -Mixed ability grouping. -Pen & Paper.	-Students were to take the essential elements involved in thinking and to translate them into a definition of thinking. -Develop articulation of philosophical ideas. -Consolidate and refine their definition. -Develop Comprehension skill. (Restate, describe, explain, discuss.) -Develop Analysis and Synthesis skill. (Debate, compose, formulate.)

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
3	1	-Large group Presentations. -Oral.	-Any member of the group could be asked to present the small group definition of thinking to the class and answer questions of how the group had arrived at this definition. -Promote individual accountability within small groups. -Develop Application skill. (Illustrate, demonstrate, interpret.)
4	2	-Large Group Discussion and Debate. -Teacher Facilitator. -Oral.	-As a class, we examined the small group definitions of thinking in order to develop a meta-definition of thinking which consolidated the important elements of the group definitions. -Worked towards a definition of thinking which was accepted by all the groups to establish a common language and meaning. (Community of Inquiry.) -Ensure the definition includes the necessary elements and adequately defines thinking in the students' own words. -Develop Analysis, Synthesis and Evaluation skills. (Debate, criticize, select, combine, judge, assess)

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
5	3	-Small Group and Large Group Discussion. -Teacher Facilitator. -Oral.	-Deepen the philosophical inquiry into the questions of the different stages or levels of thinking based on the students' suggestion of this point. -Explore the multi-dimensional nature of thinking. -Discuss development of higher order thinking skills.
6	2	-Teacher Directed Lesson. -Teacher as Researcher.	-Present Plato's model and Bloom's model for the development of higher level thinking skill. -Present to students the topic of my project. -Develop a sense of validation-many students' ideas were similar to that of two philosophers of thinking and learning. -Develop the sense of authenticity-the questions which the students were exploring were real and had a practical application in their own learning and in theories of epistemology.

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
7	8	-Small Group Activity Based. -Large Group Discussion. -Pen & Paper. -Oral. -Case Study.	-In an attempt to bridge theory and practice, the students worked on one set of activities from Stephen Mahoney's Reason and Write, pp. 78-84. -This activity required students to use Bloom's Taxonomy to make an intelligent comparison between the merits of "seeing a video at home or going to the movies?" This topic was chosen because it was familiar to the students and of interest to them. -After completing each activity we discussed how the practical activity was related to the theoretical discussions of thinking. -Have the students develop an awareness of the thought process one undergoes as part of the development of higher level thinking skills and provide a means by which students could articulate their intellectual process.

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
8	2	-Socratic Method. -Oral. -Debate.	-After reviewing the main plot of two popular fairy tales (Goldilocks and the Three Bears and Little Red Riding Hood) to ensure all students had a fundamental knowledge, I asked students various questions. -After correctly answering the question, the students were required to identify and classify the question according to Bloom's Taxonomy. -Students were to use their understanding of the development of higher level thinking skills to assist them discern what kind of questions would promote higher order thinking development and why.

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
9	1	-Teacher Directed. -Oral. -Pen & Paper. -Voluntary.	-I introduced the idea of the "Student Development of Higher Level Thinking Skills Survey" and I explained to the students how I intended to use the results of the survey. -I outlined that the survey would deal with students' perceptions of the development of higher level thinking skills and that it would also ask the students to evaluate and comment on the structure of the unit for feedback - I explained that the survey was voluntary and anonymous, and that students who decided to participate in the survey were requested to take this activity seriously. -To assist me in making the survey meaningful and relevant for these particular students, I asked them to write down any questions they felt would be appropriate to include in the survey. -Allowed me to determine who had developed higher level thinking questions without explicitly being prompted to do so. -I asked for volunteers to assist me in developing and piloting the survey.

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
10	3	-Small Groups.	-With a small group of students I read through the student suggested questions and together we decided which questions to include and how to phrase them in a way in which would be easy for students to answer and easy to quantify. -After the other small group of students had piloted the draft the survey was printed. -This promoted the spirit of inquiry and added a sense of the importance and practical value of the unit and survey.
11	1	-Individual. -Voluntary Participation in in the Survey. -Teacher Directed.	-Those students who wished to participate completed the survey. (Out of 36 students 33 voluntarily participated.) -I read each question to the class. I paused long enough to give the students time to ask for clarification if necessary and answer the question. (This was done to ensure that all students understood what was being asked and to maximize the possibility that all questions would be answered.) -Summative evaluation. -Feedback on the unit.

Lesson Number	Number of 20 Minute Classes	Teaching Strategy	Lesson Objectives and Expectations
12	1	-Teacher Directed.	-The survey results were presented to the class both in terms of raw scores and percentages. -Students could comment on any results they found interesting. -At the end of the unit, I prepared a display of the activities, photographs, and survey results entitled "8B Thinks About Thinking" and I placed this in our school's central display cabinet. The display was up during our Meet the Teacher night and remained displayed for 3 weeks. It caused much interest in the topic of thinking both among staff members and other students.

One of the fundamental goals I had when developing these lessons was the idea that I wanted the students to uncover or discover the principles of thinking and thinking skill development. I felt that by engaging the students in thinking about thinking the students themselves became resident experts on thinking since they could draw upon personal experience and their own abstract reasoning. This activity would be authentic and would be more meaningful if the students identified the elements involved in thinking and if the students acted as researchers themselves.

> If children are to learn to think...they must begin with the raw subject matter...and refine it for themselves...Children presented with logic as a finished discipline find it repugnant, but they can find it delightful to

> discover it bit by bit and see how it all interlocks...Indeed, to learn something is to learn it afresh in the same spirit of discovery as that which prevailed when it was first discovered...it is when the spirit... of inquiry prevails in the classroom that children will eagerly work through the materials...and will appropriate them to themselves. (Lipman, 1985, pp. 15-16.)

For this reason I began the unit with having the students brainstorm and discuss the essential elements involved in thinking. Without my suggestions the students were able to come up with ideas that thinking is a fundamental or innately human process necessary for daily functioning and for higher level functioning in society. The students were able to identify that thinking skills involved using something previously learned or experienced reminiscent of Bloom's idea of Knowledge or Application. They were also able to identify that thinking involved taking what was previously learned and using that to produce or create something new as in the case of Bloom's idea of Synthesis. I was particularly impressed with the fact that the students touched on the concept of creativity and how thinking is a process which has different levels and stages. Through the brainstorming activity the students themselves had inadvertently moved into the direction I had hoped to pursue. (See Appendix C.) In fact later in the unit many students felt their contribution to our brainstorming activity was validated when I suggested that some of their ideas corresponded to established models of thinking.

After this initial large group brainstorming I divided the class into small groups to discuss the essential elements involved in thinking and to develop a definition of thinking. Within each group I attempted to pair off strong and weak students who had already had some previous positive class

interaction.[88] In my grouping structure I tried to ensure that all students would feel comfortable with at least one other group member in order to promote active discussion and participation. For this reason not all groups were the same size and not all groups were heterogeneous. (See Appendix D for photographs of the groups at work.) The idea behind the discussion group was to engage the students and create an atmosphere of active learning where students were encouraged to question and analyze and have "active involvement and ownership in the learning process." (Powell, 1989, p. 4.) As Matthew Lipman suggests:

> So a child is more readily encouraged to participate in education if the emphasis is on discussion...discussion in turn sharpens the child's reasoning and inquiry skills as nothing else can. Yet in many classrooms talking has a bad name, and students' efforts to engage in it covertly are treated as evidence of disobedience, rather than as evidence of healthy impulses needing only to be effectively organized so as to be harnessed in the service of education. (Lipman, 1985, p. 19.)

For these reasons small and large group discussion were the main teaching method chosen by me to deal with the topic of thinking.

A subtle understanding and sensitivity for the dynamics of adolescent social development on the part of the teacher is necessary in group formation if the group work is going to be successful. This was especially true in my case since the students did not have any external resources to rely upon other than the other members of their discussion group. The goal behind the group formation was not only to compensate for different levels of cognitive maturity within the class but also to create a climate in which each member of

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[88] The strength and weakness *I* am referring to at this point was both in the cognitive domain and in the motivation of the individual student.

the group could act as a stimulant on the other members as they explored the meaning and means of developing thinking skills. As Carol Rolheiser Bennett is quoted in Joanne Myers work: "If learners can be confident in their individuality, yet enriched by their collaborations with colleagues, then the result may be truly empowered individuals." (Myers, 1994, p. 8.)

I believe that discussion and collaboration with peers, if structured well in a classroom, can be an effective teaching tool particularly when dealing with issues of epistemology or morality or other probing areas and particularly when dealing with adolescent students. The main criterion for the discussion method to be effective in the classroom is that it needs to be structured so that students are on task and making progress. This was accomplished in a number of ways in my class. For example groups were structured in such a way that each group had at least one very motivated student; the class broke into smaller discussion groups only after the topic was discussed as a whole class to ensure every group had a starting point; discussion time was often limited to 15 to 20 minute sessions;[89] at least one student was to record by taking discussion notes and any student from the group could be called upon to present these notes to the class.

> The key aspect of this approach is that the teacher explicitly and consciously points out to students the behavior(s) in which to engage. In this way, the student is forced both to contemplate his or her thinking processes and label them. In this way teachers can help students learn new thinking skills...by constructing classroom activities that not only impart knowledge but also highlight specific thinking skills. (Sokoloff, 1984, p. 44.)

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[89] This 20 minute time block was primarily a result of time-tabling. At Beatty Fleming School the Advisor class is the last 25 minutes of the day.

After two periods for discussion and consolidation of the meaning of thinking the groups presented their definitions to the class. Among the elements of their definitions the students identified that thinking was a process which spanned time. It involved not only ideas and learning from the past but also applying previous knowledge in the present and producing or creating things for the future. Once again these students hit on the idea that thinking was a necessary and uniquely human function and many of them also alluded to the idea that improved thinking skill development impacted on a person's success and quality of life, "such as being successful in the working world." (See the definition by Neil, Toyan, Harman, Perry and Steven in Appendix E.) As well many of the groups also suggested that there were different levels of thinking such: as "recall;" "absor[ption];" "knowledge; dreaming; imagination; [and] memory." The groups were also able to identify the idea that different activities promoted different kinds of thinking such as: "brainstorming;" "problem-solv[ing];" "produc[ing] ideas and...put[ting] ideas together." (See Appendix E for a compete list of group definitions of thinking.)

In order for the students to continue to be able to effectively discuss this topic in a meaningful way I felt we needed to share a common meaning of thinking in a common language. For this reason the next activity focussed on debating the group definitions and synthesizing them into one mega-definition of thinking. This was necessary in order to maintain that sense of "community of inquiry" and to ensure that all students felt they had somehow contributed to a meaningful analysis and definition of thinking. As a class

our mega-definition of thinking was:

> If your brain is a machine, then thinking is its battery. Thinking is a complex process. It involves using your brain in order to recall or remember previously learned or experienced information; to absorb new knowledge and to organize or use that knowledge to produce or create ideas or things or to problem-solve. Thinking is fundamental, it is necessary in order to function, and in many ways it is beneficial and can lead to success. Thinking includes such things as: knowledge; dreaming; imagination; brainstorming; questioning; solving and memory.
> There are (number to be determined) levels of thinking.[90] (See Appendix F.)

For the next 2 classes the students discussed the multi-dimensional nature of thinking in small groups. As I moved from group to group and facilitated the discussion I asked the groups to explore what were the different kinds or levels of thinking. I also asked them to identify what activities or experiences promoted the development of these different kinds or levels of thinking. In many ways I tried to emulate the Socratic method or Plato's concept of the *elenchus*. I challenged the students to examine the soundness of their position and, if necessary, I pointed out any fallacies in their thinking. From this point we moved into our large group discussion. My aim at this point was to move my class towards the goals of Plato's dialectic where, through conversation, we might come nearer to a more meaningful understanding of thinking skill development. The students essentially divided thinking skills into three levels: "low;" "middle;" and "high." (See Appendix G.)

For the class low level thinking skills were identified as activities in

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[90] At this time the students in the class could not agree on a specific number of levels of thinking.

which the learner was not actively engaged. The learner is simply the receptor of external stimuli and is minimally required to respond to these stimuli. Middle thinking skills included active thinking necessary for daily functioning. In many ways what my students called "middle" thinking is reminiscent of the stages of Plato's development of thinking which promoted the thinking skill necessary for functioning in the society at large. For these students high level thinking involved activities which showed comprehension of previously learned material and of new learning and the use of imagination and creativity. The students also identified that thinking was both a non-conscious process and a mental process which could be cultivated and harnessed for success. One student identified that thinking could also move beyond the realm of the everyday of the visible and that thinking was also "spiritual/emotional." I believe that in a very rudimentary way this student had hit on the essence of metaphysics and epistemology. At this point I was very impressed that this normal mixed-ability class of young adolescents had understood some fundamental principles of the development of higher level thinking skills and I believe that they had truly begun to develop their own higher level thinking skills. This is what I had hoped would begin to happen and with the realization that this had begun at this point I felt the unit had great potential for success.

Many of the students were very impressed when I outlined Plato's model and Bloom's model for the development of higher level thinking skills and pointed out to them the many correlations between their "discoveries" and these established paradigms. I highlighted the essential features of Plato's

stages of development and his analogies and allegories discussed in Chapter Three and I provided the students with a handout on Bloom's model which I had obtained from a colleague at the school. (See Appendix H. My colleague could not identify the original source of the document.) Our philosophical discussions now took on new meaning and significance. They were real, meaningful and authentic for me and for my students as well. At this point I felt that the class had more than sufficiently explored the philosophical nature of thinking and I selected several activities to bring to life our philosophical discussions.

Once again I kept in mind what I had learned from my readings of Plato and Bloom. I selected activities which would be familiar, age appropriate, fun and interesting for my students. Our first set of activities was taken from Stephen Mahoney's book Reason and Write. Using Bloom's Taxonomy, the groups discussed the merits of "seeing a video at home or going to the movies?" Although I thought that these activities would enhance the discussions we had had I found that they prolonged the unit without adding significantly to the students' understanding of thinking skill development. As I stated earlier many of the resources developed for this age lack the philosophical element which I believe is so essential for higher level thinking skill development. I realized that towards the end of the Mahoney exercises the students' interest was decreasing. Some students felt this section of the unit was less challenging and not all groups completed the summary pages at the end of the Mahoney activities. (See Appendix I.) In general terms I found the discussion and results of the students' work on seeing a video at home or going to the

movies lacked the substance of our previous discussions. Many of the students found this pencil and paper activity meaningless and many of them pointed out that parts of the activity were repetitive. Instead of pursuing the activities which were no longer stimulating I moved back to our oral discussion method and did a fun activity analyzing the stories of Goldilocks and the Three Bears and Little Red Riding Hood according to Bloom's Taxonomy and playing with traditional plot. (See Appendix J. Once again I obtained these from a colleague at school and she could not identify the original source.) Once again I found these activities had limited value and use. After intense philosophical discussions on the nature of higher level thinking skill development, I believe many of the students were disappointed with the practical activities.

I believe that it is the individual teacher's responsibility to determine the meaning and worth of the curriculum or teaching strategy used.

> Once a reasonable promising program is developed, it has to be tried out in a classroom...with real school children taught by a real teacher. Then, before the development is completed, it has to be tried out in a regular classroom, where other obligations also exist. A teacher has many responsibilities, and children have diverse interests; whatever is new has to be fitted in somehow within an existing set of classroom procedures. (Hilgard (ed.), 1964, p. 413.)

In order to have an accurate reflection of the students' perception of thinking skills and the unit I decided to develop an evaluation strategy. I elected to use a survey. The purpose of the survey was not only to get a sense of what students had learned or comprehended about the development of higher level thinking skills but also to use their feedback as a formative evaluation to determine what I could do to improve the lesson content or teaching strategy. My intention was to use the students' perceptions of the development of higher

level thinking skill and the unit in order to make some conclusions about the students' learning and the success of the teaching unit. I also intended to use the students' perceptions as formative evaluation to help me improve on either lesson content or methodology. I believe that as an evaluation strategy this kind of a survey is useful in determining if a particular lesson or strategy is a worthwhile educational endeavour. I felt that if the students did not take the survey seriously then their responses would be meaningless. For this reason I chose to make this a voluntary activity.

I explained to the class that this survey was to be used by me to interpret their perception of the development of higher level thinking skills. I explained that the survey would also assist me in determining the success of the unit and their responses could help me identify weakness which I could then revise. Finally I explained to the students that the activity and the survey would be part of my research project. Once again there is a certain vulnerability when a teacher solicits this kind of feedback from the class but I truly believe that:

> the active learning environment involves the teacher and students together as learners and evaluators making use of...inquiry and effective questioning...planning and reflecting [and promoting] understanding...mutual risk-taking...co-operating, sharing and communication. (Metropolitan Separate School Board Curriculum Support Document, 1991, p. 11.)

Overall I found that the students who participated in the survey were very pleased to make comments on the content and methodology of the lesson. I also found that their comments and criticisms were generally well thought out and useful. I also found that many of the responses showed that some of the students had used higher order thinking skills of analysis and value

determination.

Among my secondary goals in using the survey was to have internal and inclusive evaluation. The focus was on increasing the number of participants in the evaluation process and to provide a clear and concise tool for the students to articulate their perceptions of the development of higher level thinking skills and the lesson content and methodology. Since another of my secondary goals in using the survey was to empower my students to become reflective learners I decided I would include them in the development of the survey. In order to ensure that students took ownership of the survey and found it truly personally meaningful I asked each student to identify questions he or she felt would be instrumental for me to ask on the survey. (For a complete list of students' questions for the survey refer to Appendix K.) To a great extent I believe this impacted on the number and quality of the responses I received during the actual survey. Some students were particularly interested in what I was doing in my project and they volunteered to participate in the writing and piloting of the survey. Keeping the students' questions in mind I worked with a small group of students to develop our "Student Development of Higher Level Thinking Skills Survey." Our mandate included: formulating both open-ended and closed-type questions which incorporated the spirit of the students' questions; developing questions which would allow students to express not only what they had learned but also their personal opinions; developing a piloting program to ensure that the survey was a viable means of achieving our intended outcomes; use a mix of methods for data collection and to develop a scoring or tabulating strategy which would

communicate the results of the survey in a clear and effective manner in both quantitative and qualitative reporting.

Collaboratively we developed a four page survey which would elicit information for the two specific outcomes. The survey was divided into two sections and it had a total of 34 questions. The first part had 29 closed-type (Yes or No) questions which dealt primarily with students' perception of the development of higher level thinking skills on a philosophical basis. The second part had 5 open-ended questions which offered the students an opportunity for personal reflection and commentary on thinking and the unit plan. The experience of working collaboratively with my students to write the survey was very rewarding. As an evaluator it gave me greater insight into the issues which my students felt were important to include in the survey. It also gave some of my students another very real and meaningful opportunity to exercise their judgment and to take ownership of the development of their higher level thinking skills. As Bennett states:

> When students help to plan and carry out evaluation, their motivation and sense of purpose...is strengthened...[and] with guidance and practice, students can actively join teachers in the process of observing and gathering information for evaluation and co-operative interaction. (Bennett, 1991, p. 136.)

The survey was piloted on another small group of volunteers and after necessary revisions were made, the entire class had the opportunity to complete the survey. Out of 36 students in my class 33 students chose to participate in the survey. (See Appendix L for a sample of the survey.) The students who did choose to participate were guided through the survey experience. Each question was read individually and the students had an

opportunity to respond or ask for clarification if necessary. The survey results were then tabulated by me and reported to the class along with my appreciation for their interest, assistance and co-operation.

Although the results of the survey need to be understood within the context of the experience of my particular class the fact that the students' perceptions were formally solicited suggests that my interpretations are not simply an impressionistic view of the students' experiences. My interpretations are based on the formal collection or assessment of data in order to reach some conclusions of students' perception of the development of higher level thinking skills and value of the unit of study. In many ways the survey acted much like clinical interviews allowing me to interview the participants of this unit and collect data which could be easily quantified and used to justify my endeavour. The conclusions I have made are based on the interpretations of the data which seemed most reasonable to me. I have decided to include all my quantitative and qualitative data for each question of the survey in Appendix M. I specifically chose to report my findings in the Appendix as percentages since this is the form which I believe the majority of my colleagues would find accessible and easy to use. I felt that including all this information in the main part of my report would upset my narrative approach. I also felt that the intended audience of my report would appreciate a comprehensive summary, analysis and interpretation of the data within the body of my narrative. Wherever possible I have attempted to provide an explanation of my interpretation of the students' responses and to articulate the conditions of this particular context which impacted on the unit

development and success.

After having sufficient time to analyze and interpret the survey results[91] I came to a number of general conclusions. Overall in the class there was a high level of involvement and enthusiasm for this topic. I believe this is evident through the high percentage of students who participated in the survey on a voluntary basis (91.6%) and the high percentage of questions which were answered. In the closed-type questions requiring a Yes or No response, of the 957 possible responses, only 23 were left blank and only 1 had something else written. This represents a loss of only 2.5% of the maximum possible responses. The last 5 questions of the survey which required more active participation on the part of the respondents had a slightly lower rate of response with 26 of 145 possible responses left blank. This represents a loss of 17.9% of the maximum possible responses. There was also some variation in the quality and explanatory value of some of the responses.

In terms of students' perceptions about thinking in general, the majority of the respondents (97.0%) to Question 5 indicated that they believed thinking was an innately human process. This position was supported by over ninety percent of the respondents to Question 4 (90.9%) who said they did not believe that it was possible for humans to live without thinking. In fact the majority of the respondents to Question 6 (90.9%) also indicated that they felt thinking was an activity which occurred naturally in humans. When I took into consideration the initial brainstorming activity, the group definitions

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[91] Refer to Appendix M for a complete analysis of the class survey responses for each question.

and the class definition of thinking, I expected the students' responses to reflect this perception of thinking. For example during the brainstorming activity the idea evolved that thinking was the battery which made the brain work. Perhaps the definition developed by Stacy, Erin, Shauna and Holly epitomizes this element of the students' perception. "Thinking...if your brain is a machine, then thinking is its battery. It could never be turned off, and it's always on. Without thinking, you couldn't move. (See Appendix E.) In our class mega-definition of thinking hints of the students' perceptions of thinking were evident: "Thinking is fundamental, it is necessary in order to function..." (See Appendix F.) My interpretation of the students' position is also based on an analysis of the open-ended questions. For example in response to Question 31 "Why do humans think?" Respondent #2 suggested: "It is a natural skill which humans need to function in everyday life." This sentiment is also suggested in many other responses. (See Question 31 in Appendix M)

There was one particular aspect of the students' perceptions of thinking which surprised me. The majority of the students felt thinking happened spontaneously and 63.6% of the respondents to Question 11 indicated that they were conscious of the thinking. What was interesting was that despite being conscious of thinking most students said that they did not spontaneously think about thinking. Once again 60.6% of the respondents to Question 1 indicated that they had not previously stopped to think about the thinking process. Perhaps this figure could be attributed to the fact that only 18.2% of the respondents to Question 2 had any recollection of studying thinking in school

despite the fact that thinking skill development and reflective thinking are essential components of any curriculum. This could mean that either thinking skill development had not been studied with the majority of the students or that it had been done in such a subtle way that the majority of the students could neither recognize it nor identify the impact it had on their life. Since I believe that most curriculum objectives include the development of higher level thinking skills I concluded that students do not necessarily learn thinking skill development through the "pick it up" method. Appendix B outlines a number of directing words which educators can use to target the development of a particular thinking skill in subtle ways. I believe that teachers need to structure activities which will articulate thinking skill development in such a way as to make it more obvious to the students. For my particular class this was accomplished by our philosophical discussions around thinking. As I noted earlier I believe that these philosophical discussions did more to stimulate interest in the topic of thinking and the development of higher level thinking skills than the commercial activities.

Another conclusion I reached based on my interpretation of the students' responses was that the students could identify the difference of thinking levels based on remembering or inferring from past knowledge or experience and philosophical contemplation. I was not surprised by the fact that 84.8% of the respondents to Question 21 suggested that past knowledge and experience are involved in thinking. I was pleasantly surprised that 75.8% of the respondents to Question 22 suggested that it is possible to think about something of which one does not have prior knowledge or personal

experience. It was important for me to have the students recognize that higher level thinking skills involved philosophical contemplation of things which are beyond the realm of personal experience. The significance of this result supports the position that I articulated in the description of my generic meta-model for the development of higher level thinking skills. Although these adolescents did not reach the level of philosophical awareness that Plato's Philosopher-King would be expected to achieve they were able to comprehend and participate in philosophical discussions at a fundamental level. This is an example of the idea of varying depth perceptions which I discussed in the previous chapter.

I concluded that the majority of the students recognized the importance of thinking about thinking which meant they could appreciate the value of metacognition. Over seventy percent (72.7%) of the respondents to Question 23 indicated that there were benefits to thinking about thinking. Over sixty percent (63.6%) of the respondents to Question 3 understood that humans need to think about thinking. The students who responded positively to the question "do we need to think about thinking?" cited a number of reasons justifying their position. The most common reason for thinking about thinking given by the students was that this process could help us better understand thinking and the functioning of the brain.[92] Several students suggested that there was some personal benefit gained by thinking about

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[92] Refer to Appendix M, Question 3, Respondents #3, #4, #13,#17, #18, #23, #24, #25, #28, #29, and #30.

thinking.[93] Two students alluded to the possibility that a greater understanding of the brain could help us become better problem-solvers.[94] Two students were able to identify that metacognition has the ability to affect the development of higher level thinking skills. Respondent #1 stated we need to think about thinking "because [if] we could understand it better [then it could] enhance out ability [to think.] A similar sentiment is suggested by Respondent #2 stated we need to think about thinking "because if we understand it we might be able to enhance our own thinking skills." The fact that only two students could identify and articulate this point could be attributed to the fact that I did not sufficiently articulate the value of metacognition to the class or to the students' inability to recognize this point. This may have something to do with the fact that I did not explicitly discuss the value of metacognition as part of the unit on thinking, or it may have something to do with the level of cognitive maturity or depth of awareness among the majority of the students.

Of the 30.3% of the remaining respondents who indicated that it was not important to thinking about thinking I was most disappointed by the rationale for this position provided by Respondent #8 and Respondent #24. Respondent #8 suggested: "I don't need to think about thinking because it won't help me in life." Respondent #24 who stated "it will not change your life if you don't." These two students had failed to grasp the essence of this curriculum unit.

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[93] Refer to Appendix M, Question 3, Respondents #6, #14, #16, #19, and #21.

[94] Refer to Appendix M, Question 3, Respondents #20 and #32.

Thinking about thinking has the potential to impact on your life and to impact it in a very significant way. Although I was extremely disappointed by these two particular responses I could appreciate how the students had come to this position. For example there are people who do not value spending time thinking about things which will not produce something tangible or something which translates into economic gain. As one student suggested in response to Question 3: "In today's world, we do not have time to stop and think about thinking." (Respondent #10) In many ways I can truly appreciate the intent of this comment. In my perception this student understood that thinking about thinking requires time and that the stresses associated with our modern life impinge on our time to contemplate the truly timeless issues, issues like those of morality, values, and justice which Plato urged the Philosopher-Kings to deal with. Ironically though my position throughout this paper has been that there is a great need to reintroduce philosophic contemplation to our students if they are going to be able to effectively face the challenges of the future. Many people go through life without thinking about thinking and because they do this, these people never even are aware of what they have been missing. As Barnes, Schroeder and Burgdorf suggest in the teaching resource Cut to the Chase: Critical Thinking and Reading Skills:

> Thirty percent of our adolescents and adults never reach [the highest] stage of reasoning. This means of course, that this segment of our population has problems manipulating ideas in their heads, thinking abstractly, and seeing subtle relationships..Many of the concepts and problem-solving strategies in academic programs lie well beyond their levels of comprehension. (Barnes, Schroeder and Burgdorf, 1994, pp. 1-2.)

A number of question on the survey were developed to solicit students'

perceptions concerning the issue of thinking skill development. An overwhelming 97% of the students who answered Question 7 indicated that thinking ability could change over time. Again 97% of the respondents to Question 13 suggested that thinking ability could increase while only 60.6% of the respondents to Question 14 suggested it could decrease. Over eighty percent of the respondents to Question 15 (81.8%) felt it is possible to train your brain to think better. I was surprised that the percentage decreased in the positive responses to Questions 24 and 25. Slightly over 78 percent (78.7%) of the respondents to Question 24 indicated that it was important for students to learn thinking skills in school and just over seventy percent (72.7%) of the respondents to Question 25 felt it was important for teachers to teach thinking skills to students. I found it particularly odd that only 57.5% of the respondents to Question 16 indicated that thinking and improving thinking could be taught given these other responses.

I concluded that the lower percentage response to Question 16 could possibly be attributed to the influence Plato's Myth of the Metals had on the students' perceptions of thinking skill development. Perhaps some students had accepted this as a rationale for why some people seem to be more inclined to be thinkers than other people. In some ways my own expectations for my class supported this idea. Although I felt that all students could develop higher level thinking skills through the class activities I did recognize that there were different levels of cognitive and social maturity among my students. In fact I took this into consideration when planning the discussion groups. Another possible explanation for this percentage decrease is the belief that

thinking skill development must be an internal process although it can be facilitated by an external source such as a teacher. To a certain extent this conclusion is based on my interpretation of the students' responses to Question 26. Ninety seven percent of the respondents to Question 26 believed that people think in different ways. If this is accepted as true, then one can also say that people learn in different ways. Perhaps some of these students felt it was not possible for thinking to be taught in a standardized ways. This interpretation should have a significant impact on teachers preparing any curriculum unit. As educators we need to ensure that our teaching methodology is as inclusive as possible. We also need to ensure that this methodology is varied and allows students the opportunity for growth measured on a personal scale rather than a standardized scale. This is one of the essential elements of an I.E.P. and Bloom's concept of Mastery Learning.

Questions 20, 28 and 29 were structured to solicit students' perceptions on the levels of thinking and thinking skill development. The majority (97.0%) of the students who answered Question 20 suggested that thinking activities vary in terms of difficulty. I was somewhat surprised to see that only 24.2% of the respondents to Question 27 felt that thinking was difficult. I thought this might have something to do with the fact that the students had recently completed the activities on seeing a video or going to a movie and Goldilocks and the Three Little Bears and Little Red Riding Hood. These activities had not really challenged the intellectual capability of the students. I suspect that had I asked students if higher level thinking is difficult after our philosophical discussions some of the responses would have been

different. My rationale for this position stems from my analysis of several responses to Question 33 "What have you learned about thinking from this unit?" Respondent #2 suggested: "I've learned that thinking is a complicated skill;" Respondent #6 suggested: "That sometimes it can be harder than others;" Respondent #12 stated "Thinking could be easy and hard;" Respondent #16 stated: "Sometimes it's easy to think. Sometimes it's hard;" and Respondent #22 stated: "I've learned that thinking isn't easy, it's a very hard process." Only one student, Respondent #9 stated: "That it is not as hard to think as I thought it was."

Initially I was very surprised to see that only 81.8% of all respondents to Question 28 felt that Bloom's Taxonomy included all the thinking skills and 9.9% of the respondents to Question 29 felt that The Taxonomy represented all the difficulty levels associated with thinking. After analyzing possible explanations for these responses I came up with three possible suggestions. The first suggestion is that the practical activities I had the students complete dealt only with Bloom's model. I can only surmise that had I had the class work on activities based explicitly on Plato's model fewer students might have felt this way about Bloom's model. The second suggestion is that I did not discuss with my students the philosophical position of my generic meta-model. Once again the students had limited exposure to models of thinking other than Bloom's model. The third suggestion deals much more with the issue of challenging an authority. Although one of the trademarks of adolescence is rebelliousness in an attempt to assert independence I do not believe that at this age many students are cognitively mature enough to challenge a model of

thinking skill development presented as a paradigm. I suspect that had this question been asked of students who were more cognitively mature the response would have been different. All things considered, perhaps I should not have been so surprised by the students' responses.

Question 30 focussed on ascertaining the student's ability to recognize the qualities associated with successful thinking development. In response to identifying someone known personally who is a good thinker most students spoke of a parent or family member, a friend or a teacher.[95] Among the reasons cited for identifying a particular person as a good thinker were: the ability of a person to identify, analyze and problem-solve;[96] the ability of a person to concentrate;[97] possessing more knowledge as a result of more life or personal experience;[98] possessing advanced oral communication skills;[99] having demonstrated academic success and knowledge;[100] having demonstrated characteristic of hard work;[101] possessing future looking

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[95] I was very flattered by Respondent #12 who identified me as someone who is a good thinker "because she gave us this survey." Refer to Appendix M.

[96] Refer to Appendix M, Question 30, Respondents #1, #6, and #9.

[97] Refer to Appendix M, Question 30, Respondents #2, #24, and #25.

[98] Refer to Appendix M, Question 30, Respondents #3, #22, and #23.

[99] Refer to Appendix M, Question 30, Respondents #4,#7, and #13.

[100] Refer to Appendix M, Question 30, Respondent #8, #14, and #15.

[101] Refer to Appendix M, Question 30, Respondents #11 and #20.

characteristics; [102] and being creative thinkers.[103] These responses were much like the responses I had expected from the students. The wide variety of indicators of a good thinker encompassed many of the elements discussed in our class discussions and definitions.

Question 31 was developed as an open-ended question to further solicit students' perceptions of why humans think. I expected the students' responses for this question to correspond to their responses to Questions 4, 5, and 6. By far the majority of the respondents indicated that thinking was a fundamental process which is necessary in order to survive and which is necessary to function in daily life.[104] For example Respondent #14 stated: humans think "because thinking is like moving body parts, you need it to live. If we didn't have it we would probably not live long." I was pleased to see that seven respondents identified thinking as the means by which humans develop ideas.[105] Of all the responses only one student suggested humans think in order "to be successful."[106] Several other students indicated that thinking was necessary

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[102] Refer to Appendix M, Question 30, Respondents #15, #16, and #28.

[103] Refer to Appendix M, Question 30, Respondents #17, #21, #29, and #32.

[104] Refer to Appendix M, Question 31, Respondents #2, #3, #5, #7, #8, #10, #11, #12, #14, #15, #19, #23, #24, #25, and #28.

[105] Refer to Appendix M, Question 31, Respondents #15, #16, #17, #18, #21, #29, and #30.

[106] Refer to Appendix M, Question 31, Respondent #22.

in order to facilitate the decision making process[107] or to problem-solve.[108] I concluded that the importance of problem-solving as a thinking skill stemmed from the students'[109] personal experience with problem-solving in the curriculum at this level. This is particularly true in math, science and design and technology classes or in courses which present students with complex problems they are expected to solve using what they have already learned. The emphasis on thinking as problem-solving was a common idea right from the beginning of our class activities. For example problem-solving was identified as an essential element involved in thinking in our brainstorming activity.[110] It was also included in two group definitions of thinking.[111] It was finally included in our class mega-definition of thinking.

Question 32 was developed in an attempt to provide students with an opportunity to further articulate their personal understanding of thinking. Their responses also provided me with a general overview of what elements of thinking were most important for the students. The majority of the students identified thinking as a cognitive process involving some aspect of the brain

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[107] Refer to Appendix M, Question 31, Respondents #1, #6, and #32.

[108] Refer to Appendix M, Question 31, Respondents #1, #9, #13, #20, and #26.

[109] Refer to Appendix F.

[110] Refer to Appendix C.

[111] Refer to Appendix E.

functions.[112] Although I fully expected many students to link thinking to the functioning of the brain, I felt that these responses only gave a rudimentary analysis of thinking. I had hoped that through our class discussions the students would come to appreciate that higher level thinking was more than simply the physiological functioning of the brain. I was pleased to see that a number of students identified other important elements of thinking. Six students suggested that thinking involved the process of understanding something which was previously learned.[113] For example Respondent #4 suggested: "Think means, to me, understanding what you know," and Respondent #30 suggested: "Thinking means that I can learn more and understand things better." I felt that these students had a somewhat deeper appreciation of the potential of higher level thinking skills. Three students identified thinking as a means of problem-solving.[114] Of the twenty nine students who responded to this question five students identified thinking as a way of decision making or creating ideas.[115] I believe that these students perceived thinking as a higher level process than simply the functioning of the brain. These students understood that thinking involved the capacity of the brain to analyze and evaluate something in order to make a decision. I also

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[112] Refer to Appendix M, Question 32, Respondents #1, #2, #10, #11, #17, #18, #20, #21, #23, #24, and #28.

[113] Refer to Appendix M, Question 32, Respondents #4, #7, #16, #19, #25, and #30.

[114] Refer to Appendix M, Question 32, Respondents #9, #12, and #13.

[115] Refer to Appendix M, Question 32, Respondents #6, #8, #14, #26 and #32.

believe that those students who said thinking involved the creation of ideas had a better understanding of the potentiality associated with the development of higher level thinking skills. Only one student linked a person's ability to think to his or her success level.[116]

The last two questions were developed to solicit students' feedback on the unit in general. Question 33 asked students to identify what they had learned from the unit and Question 34 asked them to identify what they still wanted to learn about thinking. Of the thirty response to Question 33 four students indicated that they had learned that thinking was a function necessary for survival or daily functioning.[117] I was pleased to see that most of the responses to Question 33 suggested that they had learned that thinking was a process which had various steps or levels. For example Respondent #30 stated: "I have learned that thinking is important and that there is a lot of different steps and ways of thinking.[118] Three other students indicated that they had learned that there were different kinds or ways of thinking.[119] I believe that these students had understood the fact that not all humans think in the same way and that individual allowances and variances are to be expected and dealt with accordingly. Students who can appreciate the difference in learning among people can also appreciate how different learning styles, strengths and

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[116] Refer to Appendix M, Question 32, Respondent #22.

[117] Refer to Appendix M, Question 33, Respondents #1, #7, #14, and #28.

[118] Refer to Appendix M, Question 33, Respondents #1, #5, #10, #13, #21, #23, #25, #30, and #32.

[119] Refer to Appendix M, Question 33, Respondents #4, #17, and #18.

weaknesses contribute to learning and becoming a good thinker. When teachers accommodate variances in learning style like Bloom suggests then we will move closer to equal opportunity for all students. Although many students were able to identify the characteristics which made other people good thinkers (Question 30), I was somewhat surprised that none of the students identified themselves as good thinkers. Perhaps this has something to do with the fact that it is more difficult to analyze oneself and identify these characteristics within one's own thinking process.

This unit was an introduction to topic of thinking and thinking skill development for most students. For this reason I felt it was important for the students to understand the value of metacognition and how to develop higher level thinking skill. There responses served as some validation of the positive utility of the unit. Six students indicated that thinking was a complex process that merited further study.[120] For example Respondent #2 stated: "I've learned that thinking is a complicated skill which deserves more thought than I've given it." I would hope that this is an indication that perhaps these students had been positively impacted by the unit on thinking about thinking and that they will continue to think about it in the future. These responses did much to validate my efforts in creating activities which would not only promote the development of higher level thinking skills in the students but would do so by assisting them to become self-reflective, life-long learners.

In responses to Question 34, "What do you still want to know about thinking?," three students indicated they were interested in learning more

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[120] Refer to Appendix M, Question 33, Respondents #2, #6, #11, #15, #22, and #26.

about how to improve thinking skills.[121] For example Respondent #1 stated: "How to become an even more brilliant thinker?" I was particularly impressed with this response since it showed that this student already perceived himself or herself to be a brilliant thinker. When I analyzed the response to the survey provided by Respondent #1 I noted that this student had clearly demonstrated and articulated the characteristics of higher level thinking skills. Five other students indicated they wished to know more about the mechanical functioning of the brain.[122] For example Respondent #23 asked the question: "What triggers your brain to do something like raise your hand in class?" Only one of these five students suggested that thinking involved using only part of the brain and that thinking and knowledge are related to Godliness. Respondent #15 stated: "To tell the class that humans don't use all of their brain and if we did we would know just as much as God!!" The nature of an anonymous survey meant that I could not positively identify this student by name. I thought this student was most likely the same student who had suggested "spiritual/ emotional thinking" when discussing kind of thinking.[123] There were also a number of students who indicated that there was nothing more they wanted to know about thinking. Several of the students suggested this was because they did not know what else there was to know about thinking. I was disappointed with this response. These students

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[121] Refer to Appendix M, Question 34, Respondents #1, #2, and #9.

[122] Refer to Appendix M, Question 34, Respondents #11, #15, #22, #23, and #28.

[123] Refer to Appendix G.

had not grasped the idea that thinking about thinking was not a finite process. I was also disappointed that these four students could not identify an aspect for further study on their own.[124] Some students stated emphatically that there was nothing more they wanted to know about thinking.[125] In my estimation the reason for this response was that the unit had taken longer to complete than I had anticipated. Part of the reason for the prolonging of the unit stemmed from the fact that the Advisor class was often interrupted for administrative duties and these interruptions. The other factor which had prolonged the unit was the practical activities based on Bloom's model. As I stated earlier I now realize that these activities did little to enhance the unit. I suspect that by the end of the unit I had surpassed the threshold for the adolescent learners' attention.

It is difficult to use the survey to make definitive statements about the success of the teaching unit and what the students understood about the development of higher level thinking. I realize that my conclusions are based on what seems to me the most reasonable interpretations of data solicited and collected within a particular context. Despite these limitations the survey was a concerted attempt at 'internal' or 'inclusive evaluation. The fact the students' responses were formally solicited and tabulated also suggests that the internal evaluation was not simply an impressionistic view of the students' experience but, rather, a formal means of collecting data (assessment) for subsequent interpretation (evaluation). I am fully aware of the limitations of

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[124] Refer to Appendix M, Question 34, Respondents #4, #7, #17, and #33.

[125] Refer to Appendix M, Question 34, Respondents #3, #8, #10, #13, #16, #18, and #29.

the survey but I still believe that it was a positive tool for gaining substantial insight into the students' experiences and reaction to this unit. The survey offered me an effective, non-intrusive and expedient means of coding and tabulating my interpretations of the students' perceptions and reflections on the teaching and learning encounter. Based on my experience with the survey and my analysis of the students' responses I feel confident in providing my colleagues with an overall summary of my conclusions on the students' perceptions of the development of higher level thinking skills and the success of the unit.

It seem reasonable to me that the students' responses to Questions 4, 6, and 8 indicate that the majority of the students accepted the Platonic idea that thinking is innately human and necessary for basic survival and functioning within a society. The students' responses to Question 20 suggested that they accepted Bloom's notion that thinking skills range in terms of difficulty. The response to Question 26 indicated that the majority of the students reaffirmed Bloom's idea that thinking is a highly individual experience. This refutes Plato's idea of cohort progression through the stages of development as part of the process of thinking skill development. Although the students' responses to Questions 3 and 27 indicated that the majority of the students recognized the importance of thinking, the students' responses to Questions 1 and 2 equally demonstrated that thinking about thinking was not a spontaneous act. Based on responses to Questions 23, 24 and 25, I concluded that the majority of the students came to appreciate the importance of thinking about thinking and the need to have opportunities for philosophical contemplation and self-reflection within the school setting.

As educators we must try to reconcile the concept of the lifelong goal of the contemplative life espoused by Plato with Bloom's ideal that all students may achieve success in developing higher level thinking skills. The key then for educators is to use a generic meta-model to facilitate the growth of a "community of inquiry."[126] In doing so the educator must also be an active member of this community. The role of the educator is to create the activities which are not only age appropriate but intellectually stimulating and exciting to the students. The educator must be willing to ask the poignant questions which will make students probe into the depths of "Thinking About Thinking." The educator needs to provide the opportunity for experiences which would range from "internal self-examination by the learner" to meaningful small and large group discussion. (Black, As Sure As Eggs is Eggs: Thinking and Reading Skills for Middle School, p. 12.) I was determined to develop a sense within my classroom that we, teacher and students alike, all belonged equally to a community of inquiry and that each person had many insights to offer into the question of thinking about thinking. The significance of a unit plan which promotes philosophical contemplation about thinking cannot be underestimated. As Jim Zucchero quotes a University of Western Ontario Philosophy Department brochure:

> 'Intensive study of philosophy will teach you how to think more clearly and more critically and will help you develop the skills you need to solve problems of varying degrees of complexity and abstraction.' (Zucchero, 1999, p. 5.)

I continue to urge my colleagues to create and facilitate the classroom

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[126] This term is taken from Matthew Lipman's article "Philosophical Practice and Educational Reform." (Lipman, 1985, p. 14.)

experiences which will give students an opportunity to cultivate the development of higher level thinking skills through the process of contemplation and introspection and pointing out fallacies in the students' critical thinking and rationalization process.

Based on the responses to Questions 7, 13 and 14, I concluded that the majority of the students embraced the idea that thinking was a developmental process. I also concluded that the majority of the students accepted Bloom's idea that there are many factors which can impact on this developmental process. Since the majority of the students suggested thinking development changed over time I concluded that it was unlikely that the students had accepted the Platonic idea that thinking level is fully pre-determined. From the students' responses to Question 12, 15 and 16 I concluded that most students had refuted Plato's idea that thinking was fixed at birth, intrinsic, or static. My interpretation of their response was that the students would most likely agree with Bloom's idea that many factors can contribute to the development of higher level thinking skills . From the students' responses to Questions 18, 19, and 20 and from our class discussion, I concluded that the students had accepted the idea that there are different steps of levels of thinking and that some thinking skills are more difficult than others.

Based on students' responses to Questions 9 and 10 I concluded that the students appreciated the fact that thinking is a cognitive process which involves using at least some part of the brain. The majority of the students felt that this cognitive process was somewhat automatic and based on personal

experience and personal knowledge.[127] I was particularly pleased to see that many of these students also recognized that it is possible to contemplate things of which one does not necessarily have any past knowledge or experience.[128] The positive recognition of the ability of humans to philosophize was necessary for the students to value the class discussions and activities. If the students perceived the value of these experiences then I truly had an opportunity to impact on the development of their higher level thinking skills.

In general both the number of responses and the quality of the students' responses to the survey were indicators that the unit was a success. I believe that the survey results demonstrate that not only did the students learn about the development of higher level thinking skills, but by discussing the philosophical and epistemological questions of thinking, the students' own development of higher level thinking skills was affected in a positive manner. Perhaps I might go so far as to suggest that my experience in analyzing paradigmatic models of developing higher level thinking skills, and creating a unit of curriculum and preparing and analyzing the students' responses to the survey questions, has in some way positively affected my own development of higher level thinking skills. If this is true, then all that I risked in attempting this unit and exposing my vulnerability to my students has been vindicated.

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[127] Refer to Appendix M, Questions 6 and 21.

[128] Refer to Appendix M, Question 22.

Chapter Seven
Conclusions and Recommendations

As teachers, we teach children. Since we teach children, then we understand how children think and how they learn...or do we just think we do? (Ed Labinowicz, 1990 p. vii.)

M. I Finley's concept of the "model" has guided my journey into the study of the development of higher level thinking skills. It has been the basis of my analysis of Plato's model and Bloom's model for the development of higher level thinking skills and it has also been the critical element in the conceptualization, development, and articulation of my own generic meta-model. In writing this paper and seeking to develop my own conceptual framework for a generic meta-model for the development of higher thinking skills which I could use with my Grade 8 Advisor class I aimed to present a lucid account of two paradigmatic models of the development of higher level thinking skills. My goal was to analyze and articulate the conceptual framework, model formulation and fundamental aims of Plato's model and Bloom's model in order to enhance my own personal understanding of the value and usefulness of these two models and of cognition in the contemporary class. In going through this activity I aimed also to inspire and influence my colleagues to join me in this journey. Throughout this project I have not only challenged my colleagues to value the development of higher level thinking skills itself and models which promote this development but I have also challenged my colleagues to think critically about our role as educators in this cognitive and developmental process. I firmly believe that we as educators

have a privileged position in society. We have the potential to have a great impact on students' learning and thinking skill development and we must rise to the challenge of contributing to the actualization of this potential in a positive way. Only when we rise to this challenge will we help our students truly become lifelong, contemplative and reflective learners. I have demonstrated for my colleagues one effective way of actualizing this mandate. By challenging traditional paradigms in the teaching culture and lore, and infusing the curriculum with activities and discussions which take our popular pedagogical theories and make them real and meaningful for our students, I believe that I have done something positive to effect the development of higher level thinking skills in my students.

From my in depth analysis of Plato's Republic, Bloom's Taxonomy, and my own conceptual framework, I have come to conclude that thinking is a natural, spontaneous activity. It is innately human to think. Thinking is also a skill which not only can, but must be cultivated. I find no consolation in the position that "the modern conception of thought within the dominant methodology of cognitive science is a functional one, based on the idea of the brain as a computer like an information processing system." (Evans (ed.), 1996, p. 874.) I believe that thinking is what elevates humans above data processing and that it is the most significant feature of humans which sets us apart from other members of the animal kingdom. In essence thinking is logical yet in some ways it defies logic. It does so at least to a certain extent until it is systematically studied, and analyzed, and an effort is made to articulate the essential elements involved in thinking and the development of

higher level thinking skills. This is certainly no easy task and to ask young adolescents to do this at first seemed an insurmountable challenge. And yet when I challenged my Grade 8 Advisor class to do just this, they not only rose to the occasion, they exceeded my expectations. Many of the students' responses awed me and inspired me to go on with my unit on "Thinking About Thinking."

Among the many insights I gained from studying Plato's Republic, perhaps the most significant were: the appreciation that the intellect has the means to actualize one's potential;[129] the realization that thinking must be cultivated and that educators have a special role in that cultivation as facilitators of the experiences which will lead to higher level thinking skill development; the realization that what one learns through voluntary acquisition has a much greater impact than what one learns through compulsion; that *noumena* or Ideas are timeless and universal; and that the "study of the role of intelligence in the world and in [humankind] is an appropriate launching pad for study into human wisdom and human excellence in general." (Tarrant, 1993, p. xvii.) I believe that there is a need to value contemplation, philosophical inquiry and learning, which should not always be or cannot always be expressed in economic or social or other visible gains. Reaching the highest levels of thinking requires some level of philosophical contemplation of issues which are truly timeless. In Plato's work there is a sense in which certain issues or ideas are real, timeless, and

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[129] Even the students in my class repeatedly hit on this theme suggesting thinking was a means to be successful both in academics and in the working world.

interconnected. Among such enduring issues to contemplate and meditate upon are the concepts of metacognition, truth, justice and morality or what Plato called *arete*. These are all essential components of the traditional wisdom of philosophy which Plato so highly revered. If I had continued with the unit on thinking with my class I would have had my students contemplate the link between critical thinking, wisdom, truth, justice and morality. I did not do so at this time because I felt that I had exhausted the time period in which I could maintain the students' focus on this unit. It takes great time and effort to teach our students to stop and ponder the types of questions that deal with issues of right and wrong, moral and social well being, and how we as individuals can act in the greater good of all humanity as opposed to simply for our own personal gain.[130] I have stated on numerous occasions that the value in teaching students to become contemplative cannot be underestimated. This is especially true because our contemporary society is in a critical state[131] and especially since these youths will face the challenges of the new millennium. I believe that there is a need to recognize that many of the social problems

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[130] I think back to the frustration a colleague of mine felt last year. After having completed a six week unit on character development dealing with being polite and kind to others in his Grade 7 Advisor Class, he was mortified when his class hurled nasty statements to two Grade 6 students who were sent to his class on an errand. I suggested to him that six weeks of reading about being nice could not in and of itself produce niceness in all his students. I said that character development, much like developing thinking skills, requires a lifelong commitment.

[131] The crises in society I am alluding to includes the multitude of social problems which infiltrate the classroom and the pressure on educators to cope with these real issues while trying to maintain a basic curriculum and the chaos in many parts of the world riddled with warfare and basic crimes against humanity.

which educators must confront on a daily basis stem from the fact that we as citizens of the state and of the world do not always take the time to think and act in rational or moral ways.[132] Plato stresses the importance of taking the time to be truly contemplative and to ponder the universal or timeless truths. There is a basic need to return to traditional wisdom in order to overcome the challenges of today and the future. He suggests that this is so important that it is left to the Philosopher-Kings. I suggest that this is so important that it is the responsibility of every person to develop higher level thinking skills.

Among the many insights I gained from analyzing Bloom's Taxonomy were: the appreciation that all students can learn and reach some level of rational or abstract thinking; that both internal and external factors impact on the extent of thinking skill development; that the educator has an essential role in creating an environment which will stimulate the development of higher level thinking skills in all students and that we as educators have a responsibility to create activities which will foster the development of these skills; that thinking is a developmental process and that intelligence is not fixed or static; and that the process of learning and thinking is at least as important as the final product of learning. In order to meet these objectives there needs to be a shift in the teaching culture and society at large from valuing the final product exclusively to appreciating the significance of the

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[132] As Dr. Dan Geagan states in his Revision Notes: "Is our age so different from many others? Have humans ever taken the time to think and act in rational or moral ways? How important or even relevant is traditional wisdom? You are asking for an increased level of awareness of the decision making process, a greater self-awareness of individuals as thinkers to enhance the quality of public response."

processes involved in learning. This is a difficult task in light of the recent emphasis on the concept of visible manifestations of students' learning as part of teacher accountability issues and the return to standardization. Educators sometimes place such an emphasis on what knowledge students can demonstrate that we neglect the question of whether students have really learned to think. Often times students are able to provide rote answers which can be easily demonstrated and quantified. Determining that students have internalized and have been profoundly affected by our teaching endeavors is a much more onerous task. It is a process which requires extensive time and effort by both educators and students and often times the final product of this kind of teaching-learning-is not visible for many years. It is also a process which requires that an educator sometime show vulnerability in front of his or her students and join them in the quest to develop higher level thinking skills.

In reflecting upon my own varied personal background as an educator and as a student of learning I have come to the realization that the common thread which has been woven through the fabric of my diverse experiences has been my central preoccupation with the question of how to develop higher level thinking skills. In comparatively analyzing two paradigmatic models for this development and contemplating my own conceptual framework I have attempted to develop and articulate a generic meta-model for the development of higher level thinking skills. I have also attempted to demonstrate this by creating a unit of study for young adolescent students which could demonstrate thinking skill development through philosophical

inquiry, discussion and through collaborative group activity based learning. The development of my generic meta-model was born out of my struggle to analyze, evaluate and synthesize the best or most important elements of Plato's model and Bloom's model for the development of higher level thinking skills. This stems from my basic belief that paradigm amalgamation and adaptation can offer educators more than the traditional model of paradigm shift. My model was also born out of my own personal experiences as an educator, self-reflection on the internal mental processes I have undergone through my studies and my desire to have a positive impact on the students in my Grade 8 Advisor class and my colleagues in teaching. My attempt to develop and apply a generic meta-model for the development of higher level thinking skills has relevance for educators who see that there is a need to create and facilitate a climate in our schools which will induce and support the development of thinking skills in order to meet the diverse and complex challenges of the new millennium.

In developing my generic meta-model for the development of higher level thinking skills I came to the conclusion that thinking is a multi-dimensional, multi-faceted and multi-layered process. It cannot be reduced to an anthropological model of cohort progression like Plato's model. It cannot be reduced to a hierarchial model of skill development like Bloom's model. The development of higher level thinking skills is not itself a stage of development either of curriculum or of maturity, but it is a process which is present at all stages of development. It is a process which is developed with the cognitive development of the individual and it can be stimulated by educators. I believe

that any model for the development of higher level thinking skills must be the starting point at which one commences the inquiry into thinking and not the end point which one should arrive at after the inquiry. For this reason the model must be open-ended, flexible and infinite, and if it is to survive and truly be timeless, the model must be challenged and adapted as needed. In my attempt to articulate my conception of thinking I adapted the linear model from Plato and Bloom and suggested that a model for thinking skill development could be conceptualized as a three dimensional moveable grid. On this grid various thinking skills could intersect at various points and all students could experience the range of thinking skills. The difference is that each student experiences these thinking skills at various levels or depths of awareness and understanding. I suggested that among the most important thinking skills was metacognition and for this reason I created and developed the unit around thinking about thinking.

In implementing the unit on thinking about thinking, I sought to deal with the realities of a destreamed classroom. I took into consideration the relative strengths and weakness of my students and created a unit of study on thinking which would not only be age appropriate and fun, but stimulating and challenging as well. I created an authentic community of inquiry by promoting participation in real, meaningful and profound discussion. I used discovery learning and I offered the students an opportunity to ponder the timeless questions of how humans think and develop higher level thinking skills. My hope was to have these young adolescents glimpse into the intricate relationship between thinking, IQ, talent, creativity, personality, integrity

and social value. I would hope that what we studied in a very articulated manner in the class would permeate and infiltrate the students' thinking development as rational and moral human beings.

After much reflection on the success of my unit I realized that there were a number of areas which I would target in the continuing development of the unit. I realize that my experiment with the unit thinking about thinking was somewhat artificial. Although I have repeatedly stated how important it is for educators to be explicit in teaching students about thinking skill development I believe that this endeavour needs to permeate all curriculum. The self-reflective analysis and inquiry into thinking skill development needs to be the thrust of the entire educational system. Having the students study thinking skill development in isolation for a few weeks has limited potential for real impact on learning and thinking development. There were also several significant weaknesses of the unit as developed within the particular context I described in this project. One of the most fundamental problems I encountered was the difficultly in ensuring that the students had an uninterrupted block of time in which they could concentrate on this study. I believe that these were the factors which exacerbated this difficulty. The first was that the Advisor class was often interrupted, the second had to do with the limitations of the adolescent students' attention span, and the third had to do with the practical activities I selected for the class. I feel this last activity not only unnecessarily prolonged the unit but it did not do anything to really enhance the learning experience and students' understanding of thinking skill development. I need to be more critical in the section of ready-made

teacher resources I use in the class. In future work with this unit I will tend to seek out or create activities that are more stimulating and continue to promote interest in the philosophical contemplation of thinking. As well in future work with this unit, I would have students contemplate the relationship between the development or higher level thinking skill and morality and social responsibility. Another significant weakness in the unit presentation was that I did not clearly demonstrate to my students how to critique a paradigmatic model. I regret that during the lesson on Plato's model and Bloom's model I did not explain to my students how I was using these models in the development of my generic meta-model. Perhaps it was unfair of me to expect my students to intellectually challenge Bloom's model on the survey since I had not demonstrated this to them.

In implementing the "Student Development of Higher Level Thinking Survey" I attempted to create a real and meaningful opportunity for the students to internalize and take ownership of that which we had discussed in the unit. By allowing students to participate in the creation, development, piloting and evaluation of the unit, I ensured that students remained committed and engaged in the development of higher level thinking skills. This exercise offered my students another opportunity to reflect on the process of higher order thinking skill development and the steps taken in the survey activity also enhanced our own thinking skill development. In reporting and interpreting the results of the survey for my students and colleagues I have come to a better appreciation of the many insights the students had gained about thinking. Their responses, comments, and

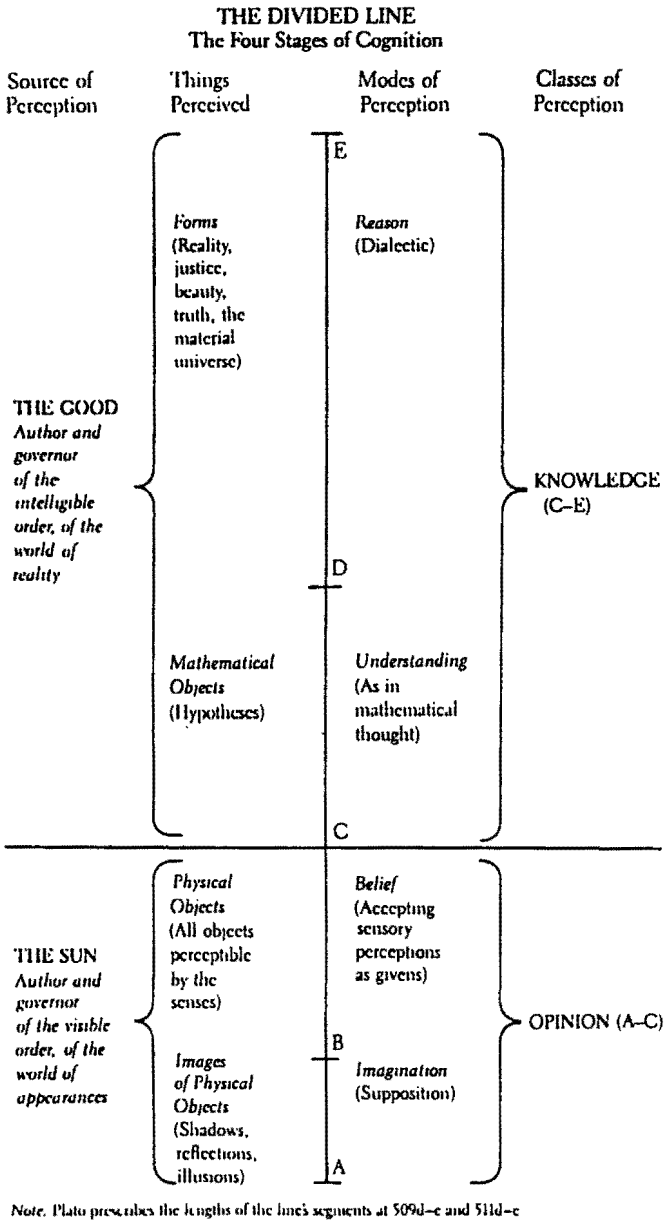
criticisms offered me valid proof of the success of the unit and a sense of the future direction of my journey. I realize some of the limitations of my survey include: students' willingness to participate in the survey; students' understanding of the questions being asked; the adolescent students' ability to articulate such complex ideas in a written form; and the fact that students were required to complete the activity as an individual exercise when many of the other unit activities had focussed on collaborative small and large group discussion. Despite having a clear understanding of these limitations, I believe that my project opens up many avenues for further inquiry into the nature of thinking and thinking skill development. I believe it opens up avenues for further study by me, by my students and by my colleagues. As I have observed in previous chapters, the possibilities of adapting an open-ended model are infinite. At this point it would be appropriate for me to examine more closely other paradigms of thinking and thinking skill development and see how I might incorporate them in the development of my unit. Perhaps I can use these insights to further refine and articulate the underlying principles of my generic meta-model and translate my ideas into activities which are real, meaningful and continue to promote the development of higher level thinking skills. For my students this unit was just the beginning of their personal journey into thinking about thinking. From the quantity and quality of the responses to the survey I believe that the majority of the students will continue on this journey. I challenge these students to take what they come to learn about thinking skill development and apply it in a moral and just way to the multitude of diverse and poignant issues

and problems which will face us in the new millennium. My wish is that in the future the teachers they will encounter will continue to create and facilitate their learning experience and self-reflection. It is for this reason that I challenge my colleagues to take the model and conceptual framework I have developed and to think critically about how they too can infuse their curriculum, regardless of subject, regardless of educational division, with real and meaningful activities which they adopt, adapt or create, which will inspire and motivate their students to think about thinking.

Through analysis, synthesis, paradigm amalgamation and adaptation of Plato's model and Bloom's model for the development of higher level thinking skills I have learned much about thinking. Through much philosophical contemplation and reflection I have begun to articulate the essential elements of my own model for the development of higher level thinking skills. Through the practical lessons, interpretation and evaluation of the students' responses to the survey I have come to the conclusion that my endeavors and efforts have positively impacted on the development of higher level thinking skills in my students. My hope it that the articulation of all that I have learned and accomplished through this project will motivate my colleagues to join me on my journey. Perhaps through this philosophical and educational enterprise I have done a small part in having my Teacher's Prayer answered.

Appendix A

Plato's Republic-The Divided Line. The Four Stages of Cognition.



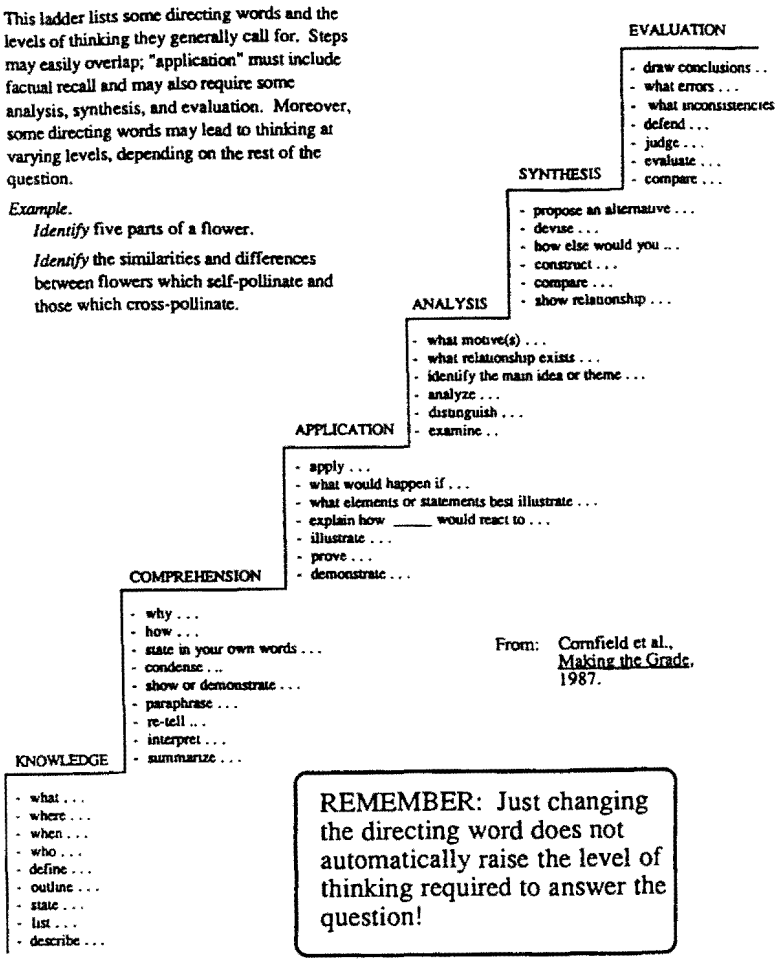
Note. Plato prescribes the lengths of the line's segments at 509d–e and 511d–e

Taken from Plato, The Republic, Sterling and Scott, 1985, p. 204.

Appendix B

Bloom's Taxonomy-Directing Words for Different Levels.

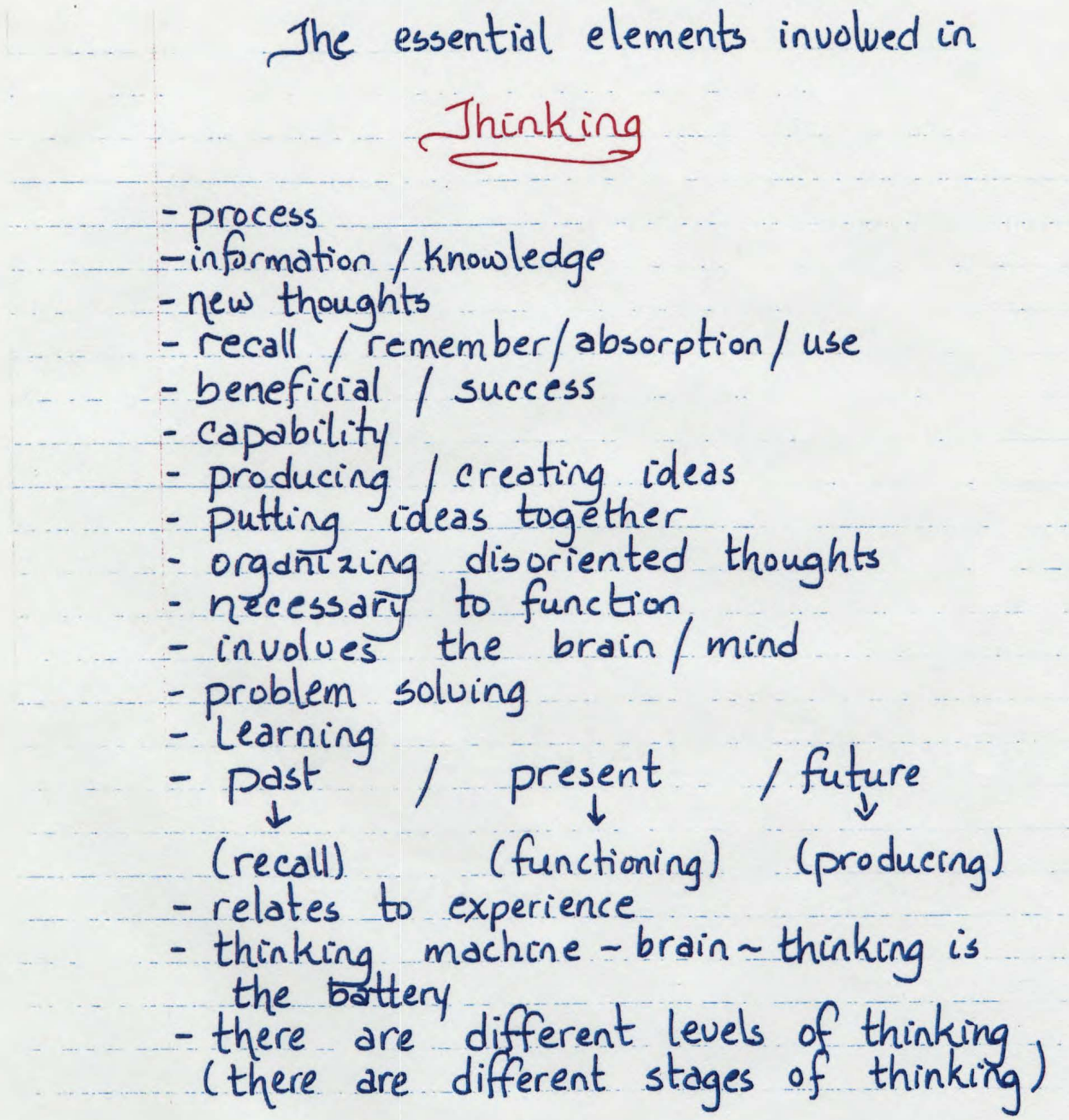
The chart below illustrates some appropriate directing words for different levels of thinking



Taken from Fine, Judith. Looking At Assessment. More Than Just Marks, Book 2, Essay Test Items. Revised Edition. Mississauga: Peel Board of Education, 1990, p. 10.

Appendix C

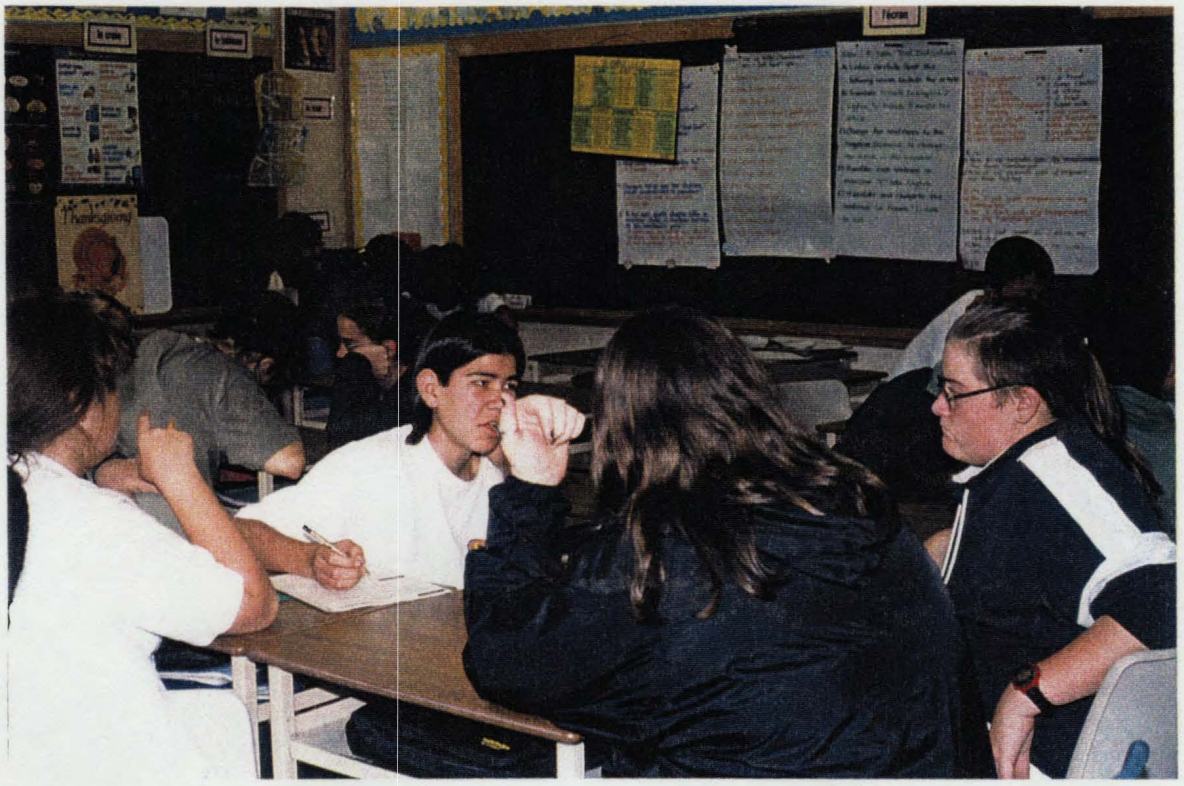
The Essential Element Involved in Thinking by 8B

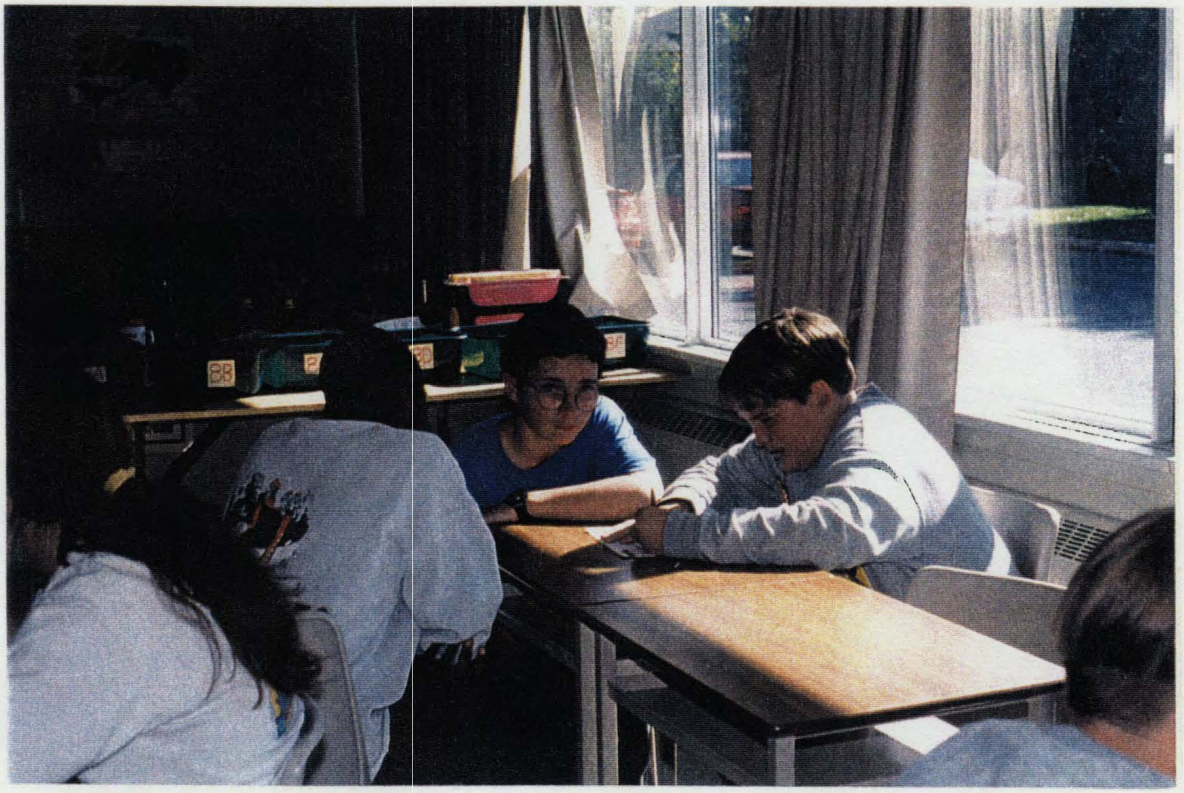


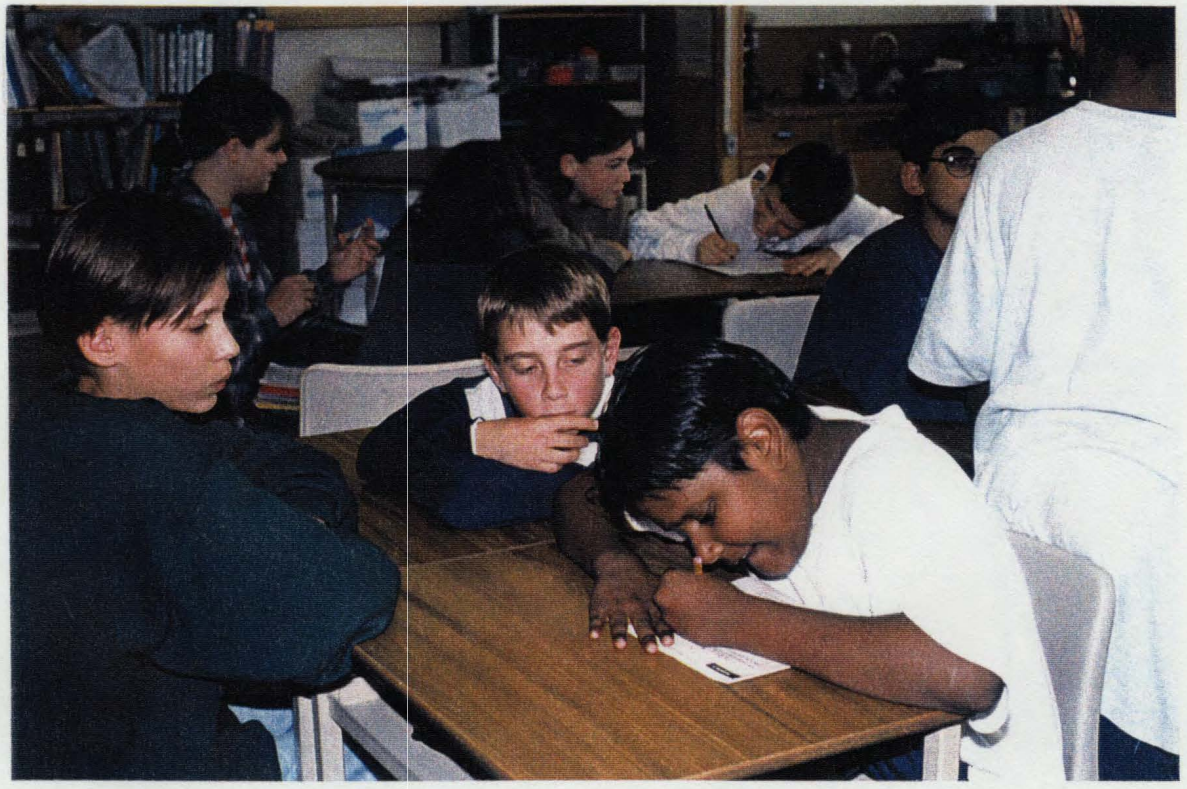
Brainstorming activity with points developed by the students of 8B.

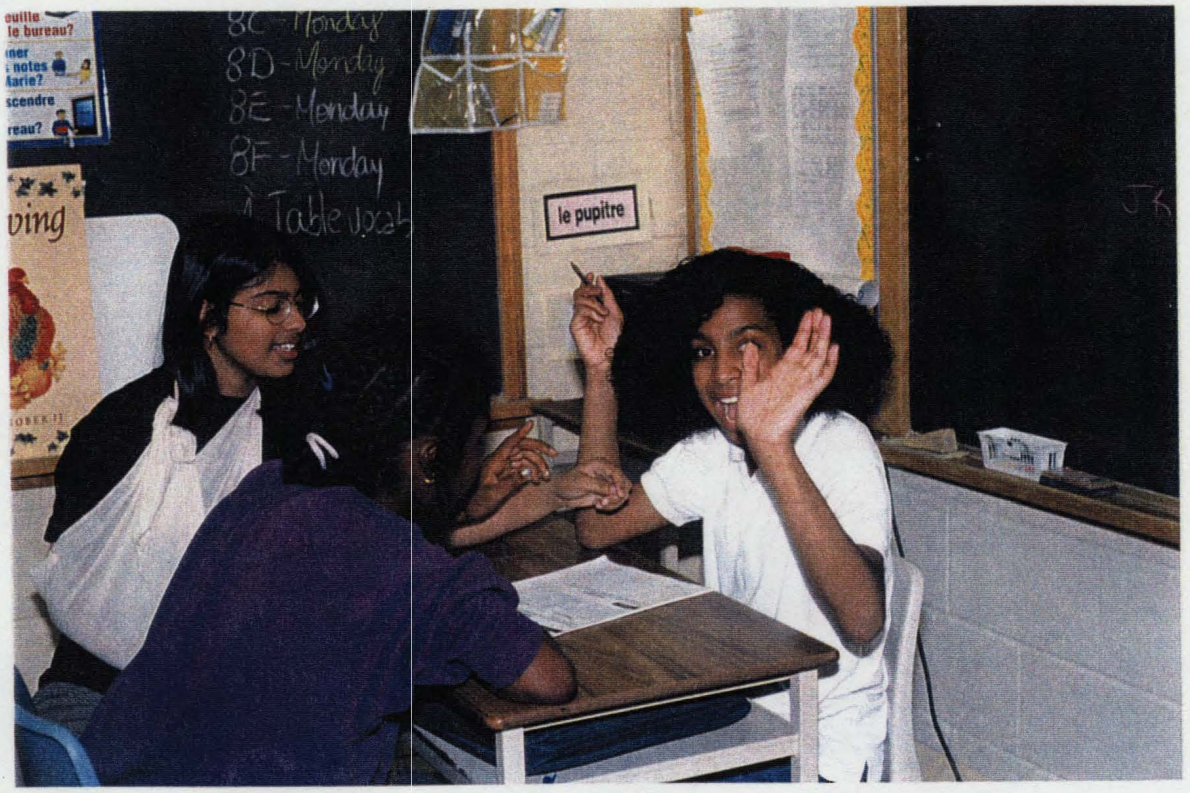
Appendix D

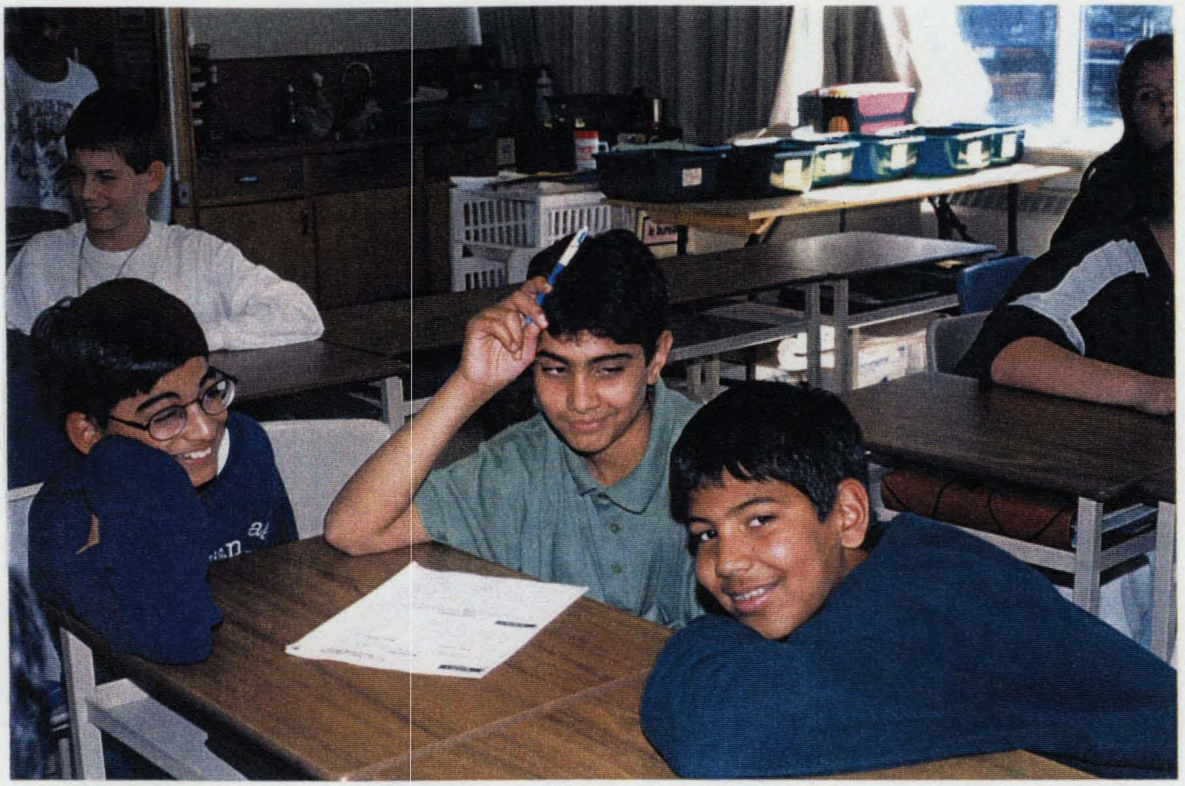
Students at Work-Photographs of Groups at Work.








8C - Monday
8D - Monday
8E - Monday
8F - Monday
le pupitre

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Appendix E

Thinking...?-Definitions by Student Groups.

Thinking . . . ?

. . . is the process of putting ideas into new thoughts and information.
(Simone, Meghan, Joey, Melissa M.)

. . . is to recall and process your thoughts. Thinking is also beneficial. By thinking you gain a lot of benefits such as being successful in the working world such as having any job. Thinking and success both depend on your capability to produce ideas and to put ideas together
(Neil, Toyan, Harman, Perry, Steven)

. . . is organizing disoriented thoughts to make sense.
(Sarah, Sheena, Shenelle)

. . . is a process of using various thoughts to brainstorm or problem solve. You think while you are reviewing or looking over many ideas from the past. You think as you ponder about different things and you think about what you'll learn in the future.
(Matt, Wes, Katy, Natasha)

Thinking...?

... is a source of learning that involves using your brain and knowledge. You also absorb information through your mind that helps you think of what to do next.
(Kanisa, Kris, Samantha, Hayley, Chris).

... is the process in which ideas come to the mind using knowledge and experience you have on whatever you are thinking about.
(Rishi, Tomas, Narvin, Sheldon)

... if your brain is a machine, then thinking is its' battery. It could never be turned off, and it's always on. Without thinking, you couldn't move. There are all different levels of thinking. Knowledge, dreaming, imagination, memory in the past, present & future.
(Stacy, Erin, Shauna, Holly)

... is using your brain to solve a problem.
(Trevor, Michael, Matt E. Ricky)

... is using your brain: to get information; to remember; to create ideas; to brainstorm; to talk; to complete a movement; and to write.
(Lerece, Melissa L., John)

Appendix F

8B Mega-Definition of Thinking.

8B Mega-Definition. Thinking.

If your brain is a machine, then thinking is its battery.

Thinking is a complex process. It involves using your brain in order to recall or remember previously learned or experienced information; to absorb new knowledge and to organize and use that knowledge to produce or create ideas or things or to problem solve. Thinking is fundamental, it is necessary in order to function, and in many ways it is beneficial and can lead to success.

Thinking includes such things as: Knowledge, dreaming, imagination, brainstorming, questionning, soluing and memory.

There are _____ levels of thinking.

Appendix G

The Different Levels/Kinds of Thinking by 8B

The different Levels / Kinds of Thinking

LOW
- passive activities - watching T.V.
  - listening to music
- rote learning - counting
  - memorizing
  - repeating
- testing like - matching
  - fill in the blank

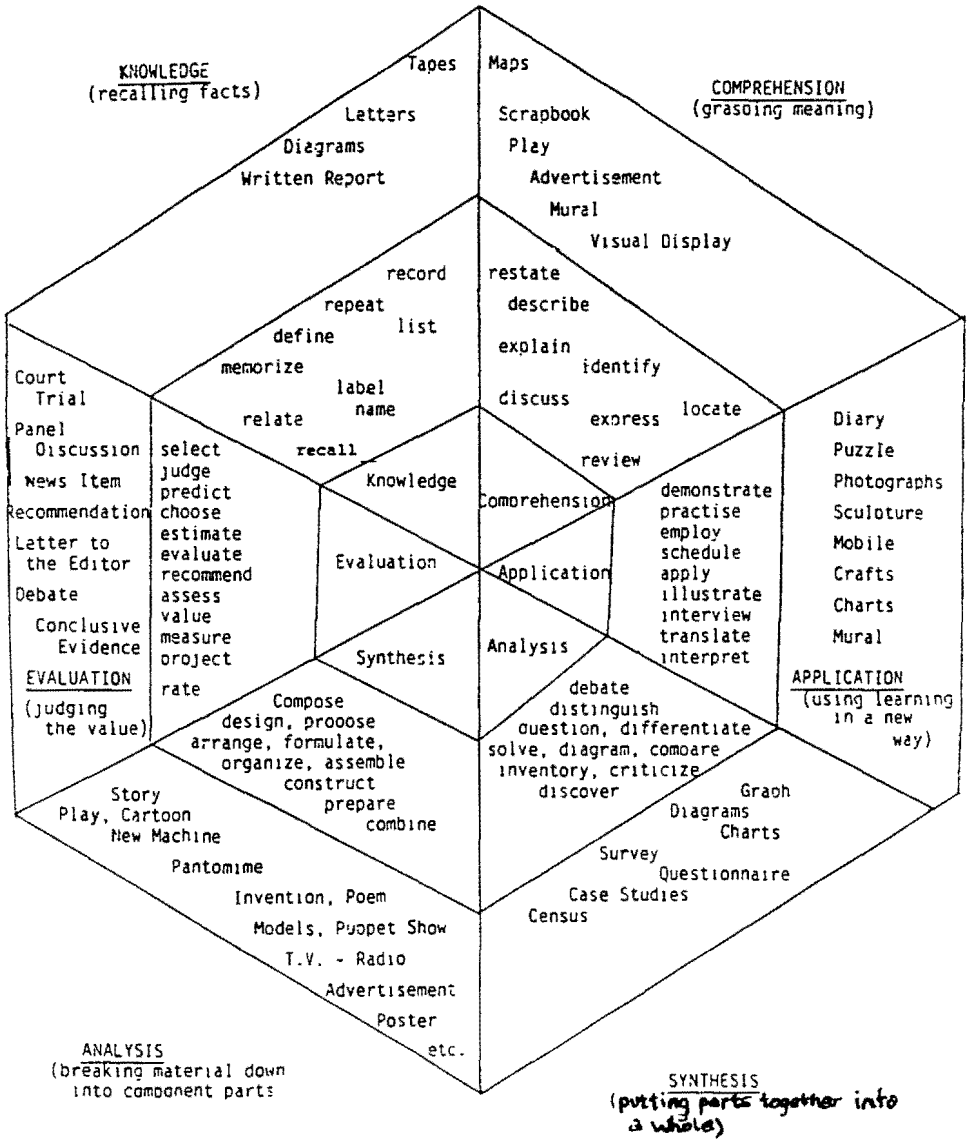
MIDDLE
- everyday decision making - what to buy?
  - what to eat?
- everyday activities - to read
  - to cook
  - necessary to function
- using common sense
- activities like brainstorming

HIGH
- activities that require imagination
- thinking of ideas constantly
- activities that include creating ideas such as writing a story or writing music
- showing understanding ~ like reading comprehen comprehension
- learning a new language
- debating

Kinds of thinking: everyday or automatic thinking
mental / academic thinking (for school / for a job)
spiritual / emotional thinking.

Appendix H

Bloom's Taxonomy-Student Overview Handout.



Original source not known. Handout obtained through a colleague.

Appendix I

Sample Student Activity Based on Bloom's Taxonomy.

Holly W, Shauna B, Erin M, Stacy B.

Activity 1

Seeing a Video at Home or Going to the Movies?

Knowledge ✓

Write as many facts (a true statement that we can prove) as you can about watching a video at home and going to the movie theater.

Video at Home	Movie Theater
- Cheaper	- Bigger Screen
- Older movie	- Costs more
- Wider selection	- New movies (unless anniversary special)
- Keep for a while	- Don't have to cook food
- You can pause and rewind it	- Certain time shift
- Comfortable atmosphere	- Don't have to have TV/VCR
- 1 price for any amount of people	- Furniture provided
- Cleaner	- Can't control
	- Messy (sticky floor)

Activity 2

Comprehension ✓

Discuss the two activities. Tell about a time you went to the movies and a time you watched a video at home. What was the most fun about each?

- At home	- At theater
We were watching a scary movie and suddenly the lights started flickering on and off, and people started screaming. It turned out the bulb was dead	- Some guys were throwing candies so we threw gummie bears behind our shoulder and they started to complain and started throwing more so we threw a hand full of M&Ms back, and it sounded like rain.

Activities 1 & 2 78 © 1996 Good Apple

Sample of student completed activity. Original activity taken from Mahoney, Stephen. Reason and Write. Good Apple Publisher, New Jersey, 1996, pp. 78-84.

Activity 3

Application ✓

Your group will act out having a good time at the movies or having a good time watching a video at home. Try to think of all the fun things that might happen before, during, and after the show.

Activity 4

Analysis ✓

Compare the two activities. How are they alike and how are they different?

Alike	Different
- Watching a Movie	- No throwing
- With Friends	- No fights
	- No strangers
	- No screaming
	-

Activity 5

Synthesis ✓

You will get a piece of drawing paper for this activity. Draw a movie poster advertising your favorite movie, or design a video sleeve for it. Include information about the stars and why it is a good movie.

Activity 6

Evaluation

Write the pluses and minuses about watching a video and going to the movies.

Pluses About a Video	Minuses About a Video
- Fun to watch (most of them) - a variety of kinds of movies eg. action, horror, mysteries - all the good ones are in colour	- Some are real boring - Some could be really really long - Some are soooo old they don't even have colour. - If you get an old movie most of the people in it are probly dead.

Pluses About the Movie Theater	Minuses About the Movie Theater
- you don't have to clean-up - the snacks are already made - a way bigger screen	- You have to pay to get in. - pay for popcorn, snacks. - chairs aren't always that comfortable.

Name

Home Video or Movie Theater?

I think the theater is more fun than Home Video

Three reasons I think this are

- One reason I think this is The screen is bigger at a theater.

I know this because you can tell by looking at it.

- The second reason I think this is more selection in the Foods and (or) snacks

This is true because nobody has all the fancy things they have and if you bought all the stuff they had you wouldn't be able to afford a movie.

- The last reason I think this is you don't have to know how to work the V.C.R or even turn on the television

I know this because they do it for you

I think we should do both from time to time

instead of just one

because sometimes we may want to see a new movie or we may want to watch an older movie. And its more variety.

Name

Seeing a Video at Home or Going to the Movie Theater?

Paragraph 1: Introduction and three reasons that support my position

I think the theater would be more fun than at home (video)

The first reason I think this is the screen is bigger at the theater.

The second reason is there is no clean up and they make the snacks there.

The third reason is You get out of the house / New releases.

Paragraph 2: Reason 1 supported

Reason 1 restated: My TV. at home is much smaller

Support idea 1: We don't have enough money to by a bigger one

Support idea 2: Your neck doesn't hurt looking at a smaller screen

Support idea 3: We don't have enough room

Paragraph 3: Reason 2 supported

Reason 2 restated: I have to clean up and make snacks

Support idea 1: Popcorns everywhere.

Support idea 2: throw out pop cans

Support idea 3: You have to by all the snacks and then make them.

Paragraph 4: Reason 3 supported

Reason 3 restated: You get out of the house

Support idea 1: It gets a little boring staying at home.

Support idea 2: Parents bug us.

Support idea 3: Meeting new people

Paragraph 5: Summary

Restate position with most important point. _____

Make a statement or two regarding the importance of your position. We think going to see a movie is better than getting a movie because better sound, bigger screen, don't have to clean up and you can get out of the house.

Appendix J

Bloom, Goldilocks and the Three Little Bears and Little Red Riding Hood.

SAMPLE QUESTIONS FROM STORIES WE'VE ALL HEARD
(From the Book: If the Wolf Were an Octopus)

Goldilocks and the Three Bears

LEVEL I - KNOWLEDGE:
- List the characters in the story.
- What were the bears eating?
- Where was Goldilocks when the bears found her?

LEVEL II - COMPREHENSION:
- Retell the events in the story in your own words.
- Why was Goldilocks afraid of the bears?
- Why was Goldilocks sleeping in Baby Bear's bed?

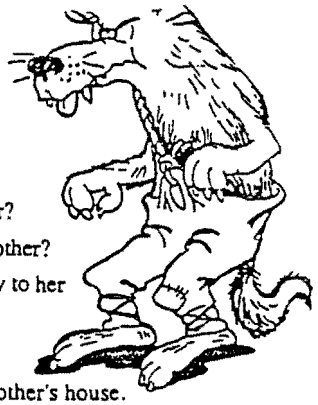
LEVEL III - APPLICATION:
- Tell what might have happened if you had been Goldilocks.
- Relate the story from the point of view of Baby Bear.
- Use the information from the story to hep you build a model of the bears' house.

LEVEL IV - ANALYSIS:
- Compare Goldilocks' experience with that of Little Red Riding Hood.
- Identify parts of the story that could happen to you.
- Make a list of all the events in the story that indicate it is a fairy tale.

LEVEL V - SYNTHESIS:
- Combine art and drama to create a new ending for the story.
- Suppose that Goldilocks had found the home of the Three Raccoons. What might have happened?
- What if Goldilocks had brought a friend to the home of the Tree Bears. Imagine what would have happened.

LEVEL VI - EVALUATION:
- Judge whether or not Goldilocks made a good decision by running away from the bear. Explain.
- Evaluate Goldilocks' behavior as a guest in the bears' home. .
- Pretend that Goldilocks was on trial for "Breaking and Entering". Decide whether you would find her guilty. Justify your decision.

Original source not known. Handouts obtained through a colleague.



Little Red Riding Hood

LEVEL I - KNOWLEDGE:

- Who saved Little Red Riding Hood and her grandmother?
- Why did Little Red Riding Hood go to visit her grandmother?
- Name the animal Little Red Riding Hood met on the way to her grandmother's house.

LEVEL II - COMPREHENSION:

- Explain the wolf's plans as he headed towards Grandmother's house.
- Why did Little Red Riding Hood's mother worry about the trip through the woods?
- How did Little Red Riding Hood know that the wolf was not really her grandmother?

LEVEL III - APPLICATION:

- Try to imagine what you would do if you were to meet a wolf on the way to your grandmother's house.
- What would you bring to your grandmother if she were sick?
- Interview the wolf and ask him five questions that will help you get to know him better.

LEVEL IV - ANALYSIS:

- Compare the wolf in this story to the wolf in "The Three Little Pigs". How are they alike? How are they different?
- Analyze the wolf's thoughts as he waited for Little Red Riding Hood.
- In what ways could the wolf have resembled the grandmother? How was he different?

LEVEL V - SYNTHESIS:

- Suppose that Little Red Riding Hood met a rabbit instead of a wolf. Make up a new story telling what might happen.
- Think of ways that Little Red Riding Hood could have been saved.
- Predict what might happen the next time Little Red Riding Hood goes to her grandmother's house.

LEVEL VI - EVALUATION:

- What character would you like to be. Why?
- Evaluate the wolf's plan for making a meal out of Grandmother and Little Red Riding Hood. What mistakes did he make?
- Select the character that you think is the most clever. Give reasons.

Appendix K

List of Students' Questions for the Survey.

1. "What goes on in your mind when you'r[e] thinking?"
2. "What do you use when you'r[e] thinking?"
3. "Why do we have to learn about thinking?"
4. "Why do you think?"
5. "Do you need to know a lot to think about something?"
6. "What do you think thinking is?"
7. "What do you think thinking is about and give reasons why?"
8. "Do you think that you have to be born with special abilities to be good at pro[c]essing ideas?"
9. "Why should there be so many different steps or ways for thinking regula[r]ly?"
10. "Why does everyone think differ[en]tly but have the same steps [for] thinking?"
11. "Do you think when we use our brain to think we are only using a portion of our brain and never use the other in our life that may telepathically move objects, or give us a superior level of thinking?"
12. "Thinking, Thinking, Thinking. Why should we think? Is there another way of thinking instead of using your brain? (Sometimes thinking is hard so maybe we should come up with a different way of thinking.)"
13. "What are the levels of thinking?"
14. "Do we need to think about thinking? Why do we do Advisor? Do we need it anyway?"
15. "Thinking Guy! Why do we have to learn about thinking since we a[l]ready know how to think? Thinking, thinking we do it every minute of the day."
16. "Why do we need to think through so many steps to think? and why do we think?"
17. "Do you think automatically or manual [is thinking a skill to be cultivated]?
18. "What goes on in your mind when you think?"
19. "What do you think makes you think?"
20. "What is the process of thinking?"
21. "Do you believe that the process of thinking and your ability of doing so dev[e]lopes as you get older? Why or why not?"
22. "Do you think this ability is easy to analyze?"
23. "Are we always thinking? Do we ever stop?"
24. "What does the word THINK mean?"
25. "Do you [think] thinking is hard enough to make you flip out?"
26. "What are the 6 levels of thinking?"
27. "According to Bloom's Taxonomy what are the 6 steps of thinking?"
28. "Why should we learn about thinking when we already know about it?"

29. "Is thinking hard or easy? Why?"
30. "What does thinking mean?"
31. "What is process of elimination?"
32. "What do you think about when the little bear found out someone ate his porr[idge] and broke his chair ad when he found Goldilocks in his bed?"
33. "Who is the main character [in the] Three Bears?"
34. "In your opinion should someone [who] trespasses or breaks in...be prosecuted?" [Goldilocks]
35. Statement-"Thinking is when you put things together from you past to solve a problem for the future."
36. Statement-"Thinking is when you creat[e] an idea [using] the information you have."
37. Statement-"I don't know."

Appendix L

STUDENT DEVELOPMENT OF HIGHER LEVEL THINKING SKILLS SURVEY

YOUR PARTICIPATION IN THIS SURVEY IS VOLUNTARY. IF YOU CHOOSE TO PARTICIPATE IN THIS SURVEY, PLEASE FILL IN YOUR RESPONSES AS ACCURATELY AND COMPLETELY AS POSSIBLE. THE RESULTS OF THIS SURVEY WILL BE USED IN MISS SORANNO'S THESIS PROJECT. YOUR COOPERATION AND INPUT ARE GREATLY APPRECIATED.

Instructions: Read each question or statement carefully. Indicate your responses with a _X_ and explain when necessary. Leave questions or statements blank if you do not understand them.

1. Have you ever stopped to think about what is involved in thinking?
____YES ____NO

2. Have you ever studied thinking or developing thinking skills in any other class?
____YES -Class _____ ____NO

3 a. Do we need to think about thinking? 3 b.Why
____YES ____NO
3 b_____

4. Do you believe it is possible for humans to live without thinking?
____YES ____NO

5. Are you born with the ability to think?
____YES ____NO

6. Does thinking happen automatically or by accident?
____YES ____NO

7. Does your thinking ability change over time?
_____YES ____NO

8. Are humans always thinking?
____YES ____NO

9. Does thinking involve using your brain?
____YES ____NO

10. Do we only use a portion of our brain when we are involved in thinking?
____YES ____NO

11. Are you consciously aware that you are thinking when you are thinking about something?
____YES ____NO

12. Is thinking a skill?
____YES ____NO

13. Can your ability to think increase?
____YES ____NO

14. Can your ability to think decrease?
____YES ____NO

15. Is it possible to train your brain to think better?
____YES ____NO

16. Can thinking and improving your thinking be taught?
____YES ____NO

17. Is it possible to know everything?
____YES ____NO

18. Is thinking a process that involves many steps?
____YES ____NO

19. Are there different levels of thinking?
____YES ____NO

20. Are some thinking activities easier or harder than others?
____YES ____NO

21. Does thinking involve past knowledge or experience?
____YES ____NO

22. Is it possible to think about something which you do not have any past knowledge or experience of?

____YES ____NO

23. Are there benefits to thinking about thinking?

____YES ____NO

24. Is it important for students to learn thinking skills in school?

____YES ____NO

25. Is it important for teachers to teach thinking skills to students?

____YES ____NO

26. Does everyone think in the same way?

____YES ____NO

27. Is thinking difficult?

____YES ____NO

Bloom's Taxonomy:

1. Knowledge-recalling learned facts or knowledge
2. Comprehension-understanding what you know
3. Application-doing something to demonstrate your understanding
4. Analysis-breaking things down into its component parts
5. Synthesis-putting things together
6. Evaluation-making judgments about something's value or worth

28 a. Do you agree that Bloom's Taxonomy of Thinking includes all the different thinking skills?

____YES ____NO

28 b. IF NO, WHAT THINKING SKILLS ARE NOT INCLUDED IN BLOOM'S TAXONOMY?

_____

29 a. Do you agree with the difficulty levels of Bloom's Taxonomy?

____YES ____NO

29 b. IF NO, IDENTIFY WHAT LEVEL YOU DO NOT AGREE WITH

_____

30. Identify someone you know personally who is a good thinker and give one reason why you believe he or she is a good thinker?

PERSON_____

REASON_____

_____

31. Why do humans think?

_____

_____

32. What does thinking mean to you?

_____

_____

33. What have you learned about thinking from this unit?

_____

_____

34. What do you still want to know about thinking?

_____

_____

TO THE STUDENTS OF 8B, I WOULD LIKE TO THANK EACH OF YOU FOR PARTICIPATING IN THIS SURVEY.

YOU HAVE TAUGHT ME MANY THINGS ABOUT THINKING!

Appendix M

Quantitative and Qualitative Data of the Survey

Rate of Students' Responses to the Individual Questions

Question Number	Total Responses (Maximum 33)	Rate of Response
1	33	100&
2	33	100%
3	31	93.9%
3b	29	87.8%
4	33	100%
5	33	100%
6	33	100%
7	33	100%
8	33	100%
9	33	100%
10	32	96.9%
11	31	93.6%
12	33	100%
13	33	100%
14	33	100%
15	31	93.6%
16	31	93.6%
17	33	100%
18	32	96.9%
19	32	96.9%
20	33	100%
21	33	100%
22	32	96.9%
23	32	96.9%
24	32	96.9%
25	32	96.9%
26	33	100%
27	28	84.8%
28	32	96.9%
28b	5 of 5 No Respondents	100%
29	30	90.9%
29b	3 of 3 No Respondents	100%
30	27	81.8%
31	30	90.9%
32	29	87.8%
33	30	90.9%
34	26	78.7%

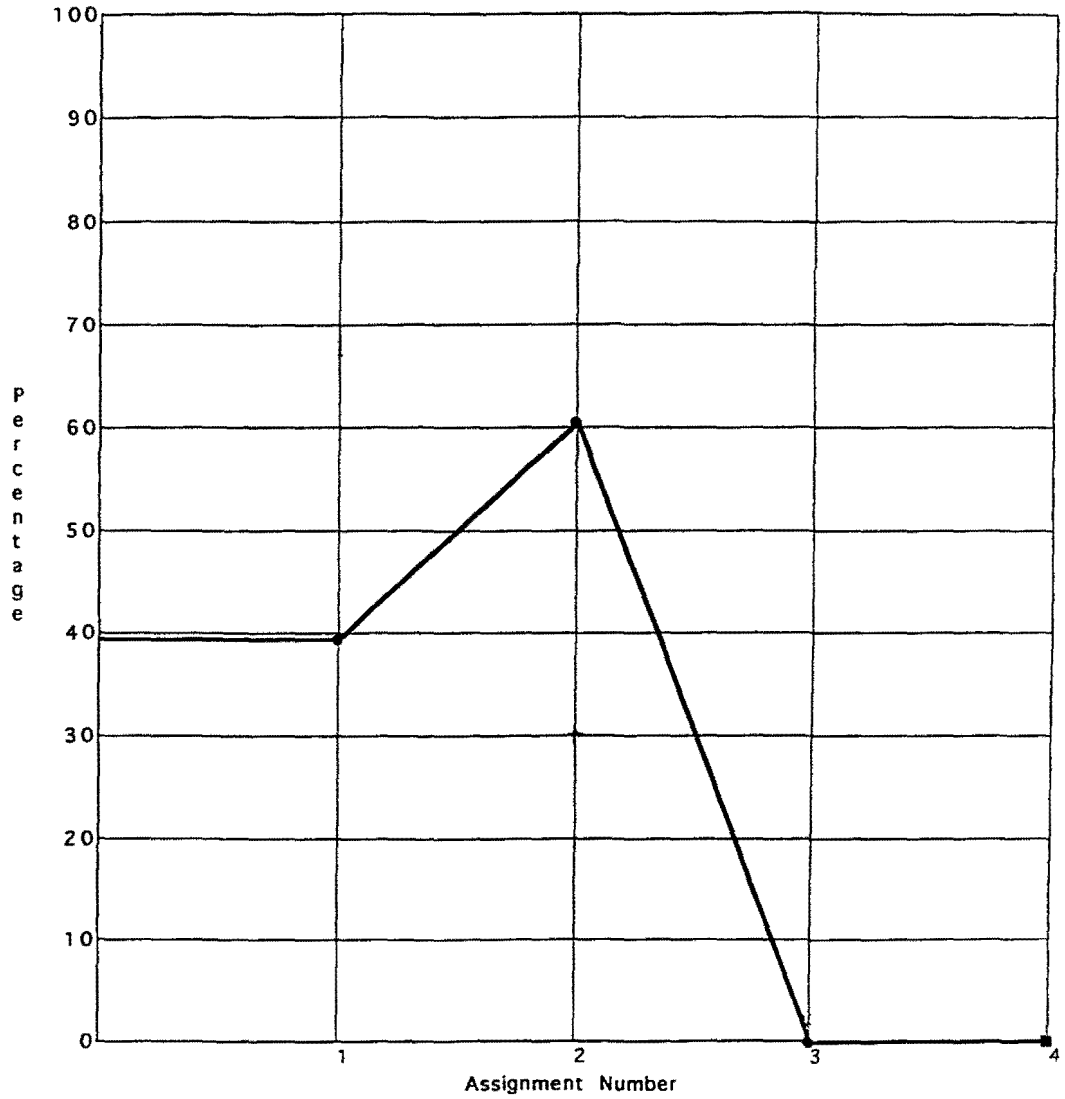
STUDENT DEVELOPMENT OF HIGHER LEVEL THINKING SKILLS SURVEY

#	Assignment		Category	#	Assignment		Category
1	Yes		Yes	3	Blank		Blank
2	No		No	4	Other		Other

#	Name	Scores 1	2	3	4	Yes	No	Blank	Other
1	Question 1	13	20	0	0	39.4%	60.6%	0.0%	0.0%
2	Question 2	6	27	0	0	18.2%	81.8%	0.0%	0.0%
3	Question 3	21	10	2	0	63.6%	30.3%	6.1%	0.0%
4	Question 4	3	30	0	0	9.1%	90.9%	0.0%	0.0%
5	Question 5	32	1	0	0	97.0%	3.0%	0.0%	0.0%
6	Question 6	30	3	0	0	90.9%	9.1%	0.0%	0.0%
7	Question 7	32	1	0	0	97.0%	3.0%	0.0%	0.0%
8	Question 8	31	2	0	0	93.9%	6.1%	0.0%	0.0%
9	Question 9	33	0	0	0	100.0%	0.0%	0.0%	0.0%
10	Question 10	18	14	1	0	54.5%	42.4%	3.0%	0.0%
11	Question 11	21	10	1	1	63.6%	30.3%	3.0%	3.0%
12	Question 12	20	13	0	0	60.6%	39.4%	0.0%	0.0%
13	Question 13	32	1	0	0	97.0%	3.0%	0.0%	0.0%
14	Question 14	20	13	0	0	60.6%	39.4%	0.0%	0.0%
15	Question 15	27	4	2	0	81.8%	12.1%	6.1%	0.0%
16	Question 16	19	12	2	0	57.6%	36.4%	6.1%	0.0%
17	Question 17	6	27	0	0	18.2%	81.8%	0.0%	0.0%
18	Question 18	30	2	1	0	90.9%	6.1%	3.0%	0.0%
19	Question 19	31	1	1	0	93.9%	3.0%	3.0%	0.0%
20	Question 20	32	1	0	0	97.0%	3.0%	0.0%	0.0%
21	Question 21	28	5	0	0	84.8%	15.2%	0.0%	0.0%
22	Question 22	25	7	1	0	75.8%	21.2%	3.0%	0.0%
23	Question 23	24	8	1	0	72.7%	24.2%	3.0%	0.0%
24	Question 24	26	6	1	0	78.8%	18.2%	3.0%	0.0%
25	Question 25	24	8	1	0	72.7%	24.2%	3.0%	0.0%
26	Question 26	1	32	0	0	3.0%	97.0%	0.0%	0.0%
27	Question 27	8	20	5	0	24.2%	60.6%	15.2%	0.0%
28	Question 28	27	5	1	0	81.8%	15.2%	3.0%	0.0%
29	Question 29	27	3	3	0	81.8%	9.1%	9.1%	0.0%
Pts	Possible	33	33	33	33				

Progress Graph for Question 1

1. Have you ever stopped to think about what is involved in thinking?
___YES ___NO



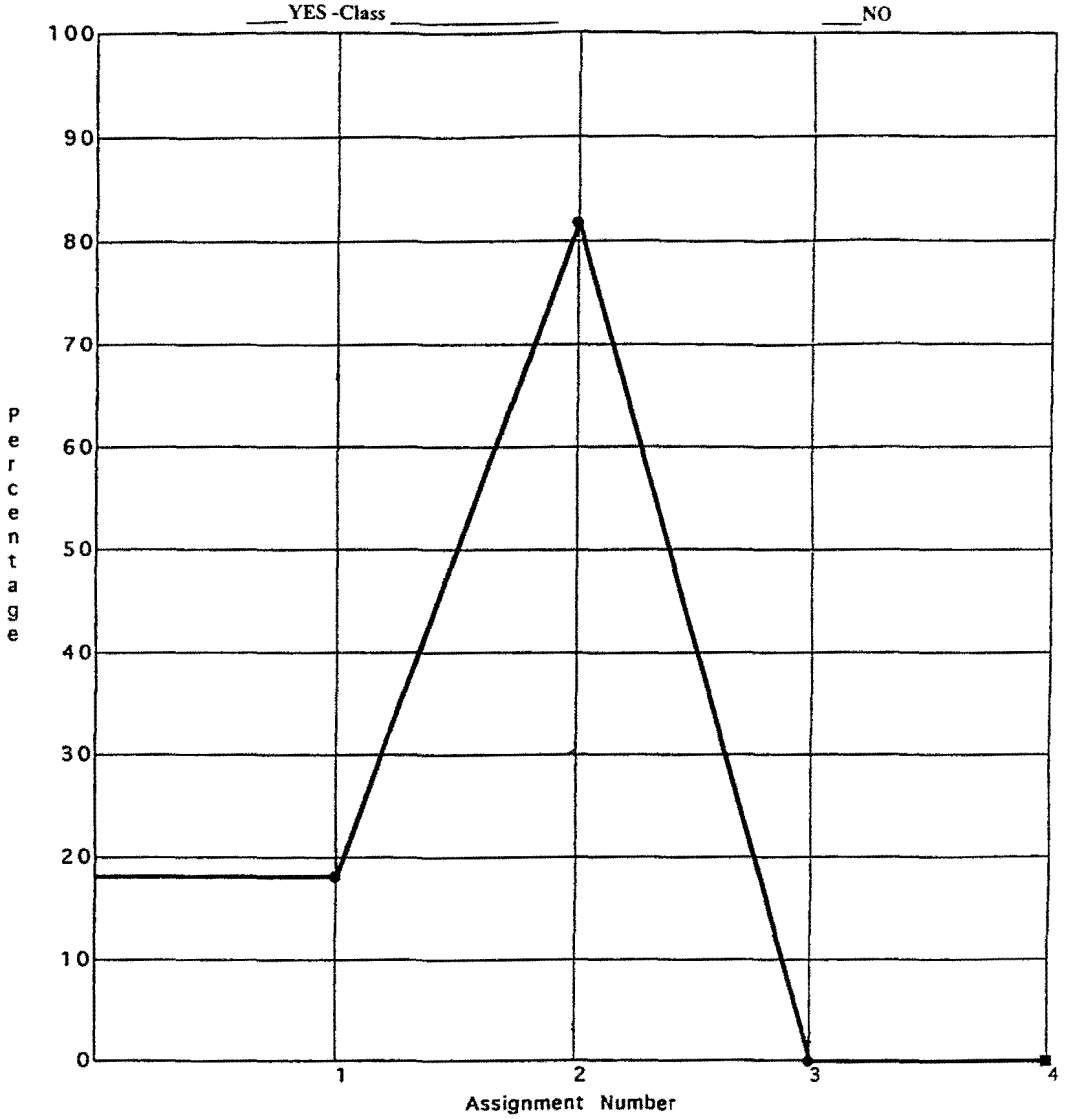
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	13	33
2	No		No	20	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	39.4%
No	60.6%
Blank	0.0%
Other	0.0%

Progress Graph for Question 2

2. Have you ever studied thinking or developing thinking skills in any other class?

___YES -Class _____ ___NO



#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	6	33
2	No		No	27	33
3	Blank		Blank	0	33
4	Other		Other	0	33

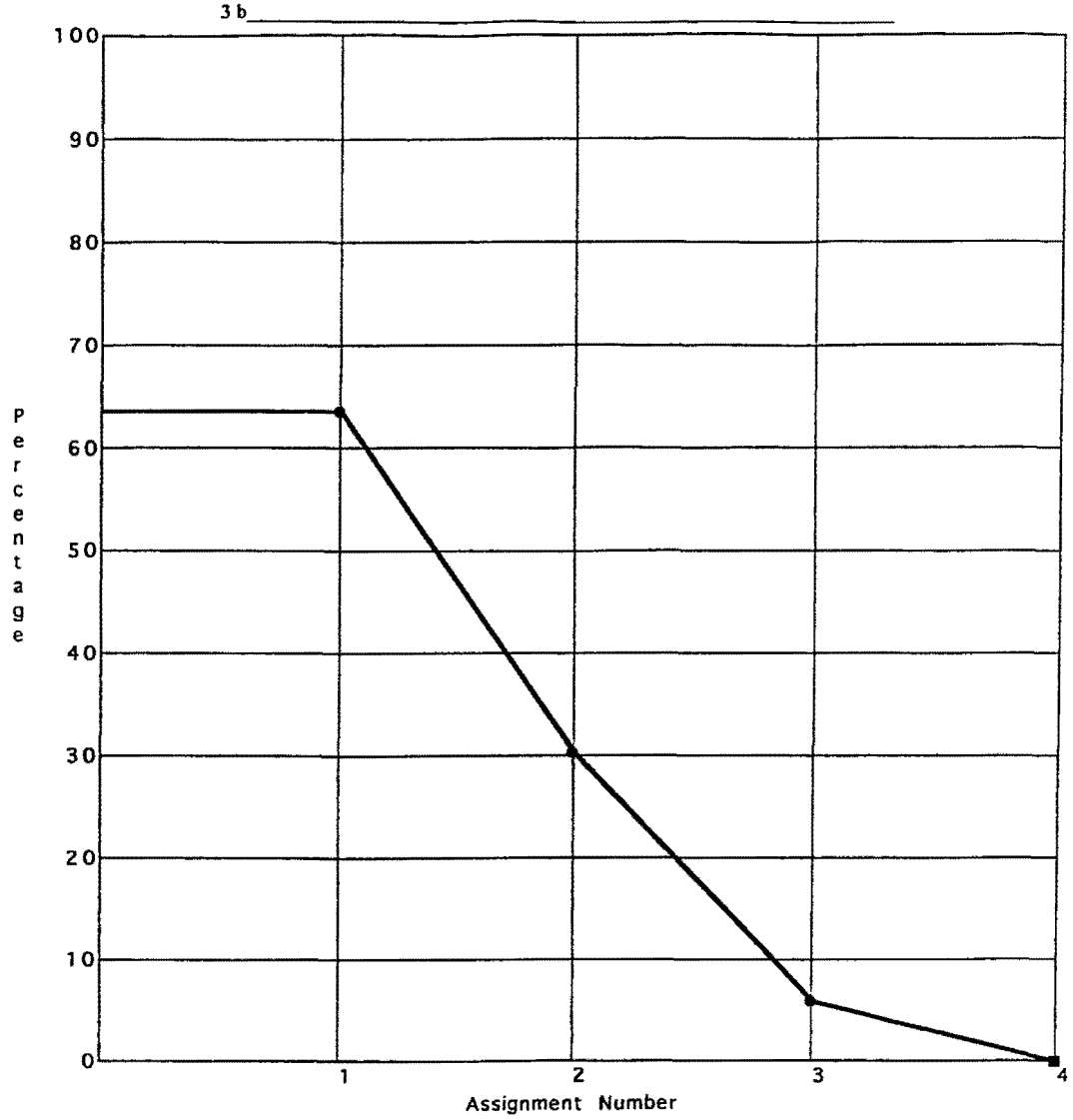
Yes	18.2%
No	81.8%
Blank	0.0%
Other	0.0%

Progress Graph for Question 3

3 a. Do we need to think about thinking? 3 b.Why

___YES ___NO

3 b_____



#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	21	33
2	No		No	10	33
3	Blank		Blank	2	33
4	Other		Other	0	33

Yes	63.6%
No	30.3%
Blank	6.1%
Other	0.0%

Personal Responses

3b. Why? Yes Responses

Respondent Number	Response
#1-	"Because we could understand it better and enhance our ability."
#2-	"Because if we understand it we might be able to enhance our own thinking skills."
#3-	"To learn more about it."
#4-	"So that we know more about our minds."
#6-	"Because it will help us."
#13-	"Helps us understand more things."
#14-	"It is very important in life and it would be good to know about it."
#16-	"It is important to know how to think."
#17-	"To help us re[a]lize what it really means."
#18-	"For us to get information in [our] brain that we already learned."
#19-	"Because it will help you."
#20-	"Because think about solving problems."
#21-	"To learn more in school for education."
#23-	"So we can learn more about the brain."
#25-	"So we can understand thinking."
#26-	"Because we need to know how it works."
#28-	"So we know more about it."
#29-	"It makes your more knowledgeable about it."
#30-	"I think we do because you'll understand things better."
#31-	"Because you need to know what the stages are."
#32-	"I be bet[t]er at solving things."

Personal Responses

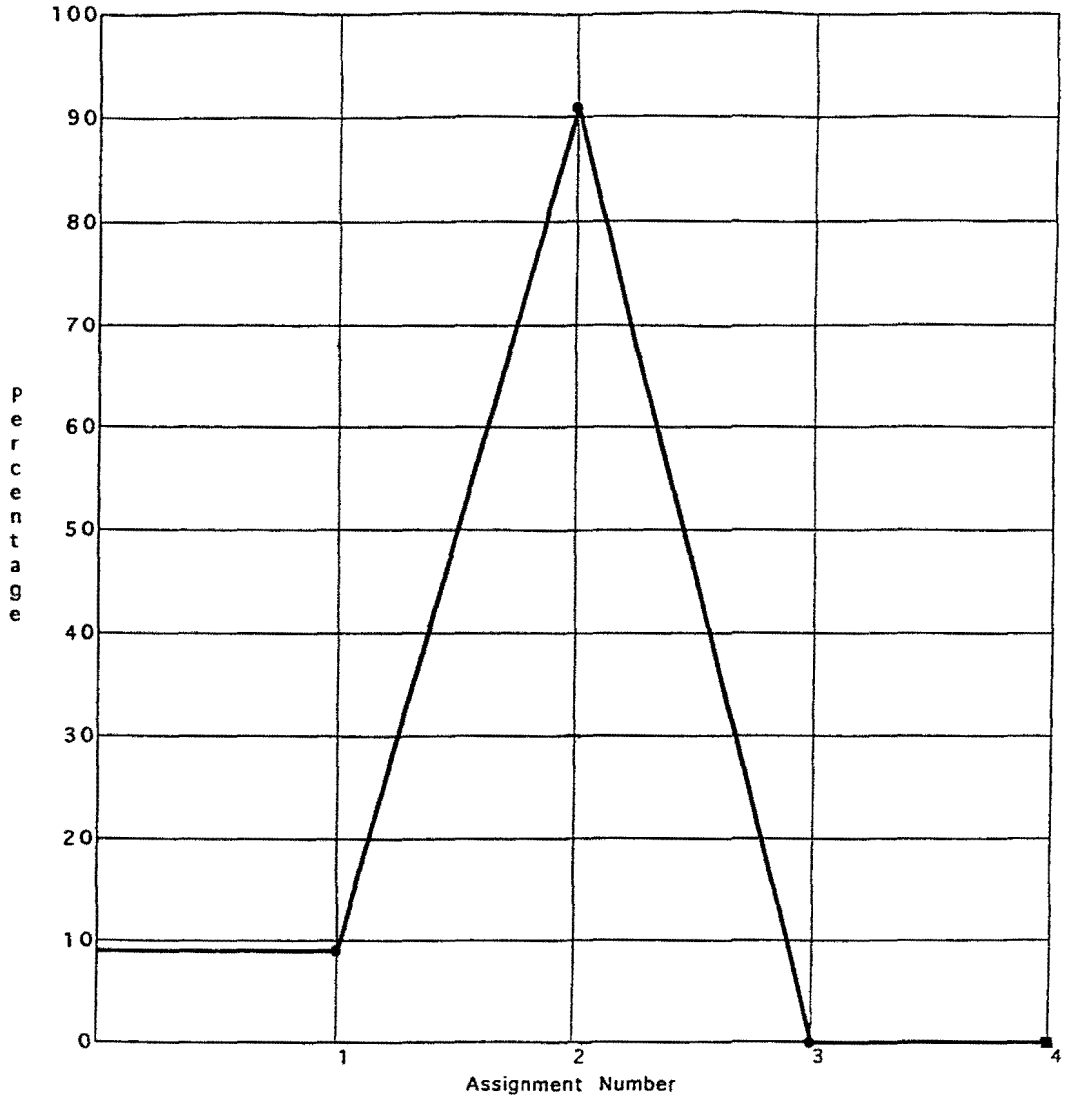
3 b. Why? No Responses

Respondent Number	Response
#5-	"Because when you think about thinking it gets yo[u] confused."
#7-	"I don't think it's really ne[ces]sary."
#8-	"I don't need to think about thinking because it won't help me in life."
#10-	"In today's world, we do not have time to stop and think about thinking."
#12-	"No point."
#15-	"'Cause we do it automatically/why would [we] need to think about it?"
#24-	"It will not change your life if you don't."
#34-	"Because we don't need to learn about thinking sometimes."

Progress Graph for Question 4

4. Do you believe it is possible for humans to live without thinking?

___YES ___NO



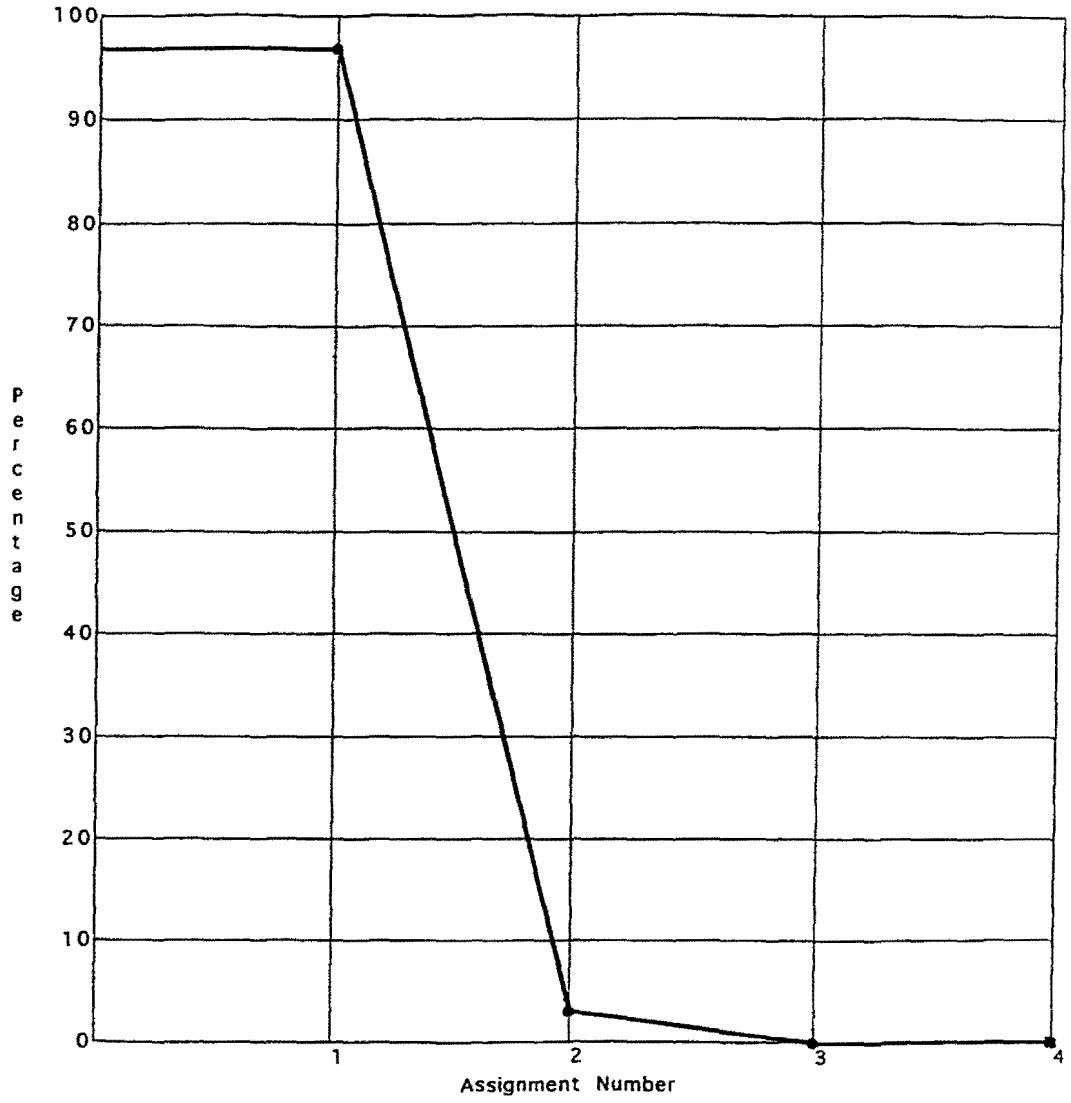
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	3	33
2	No		No	30	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	9.1%
No	90.9%
Blank	0.0%
Other	0.0%

Progress Graph for Question 5

5. Are you born with the ability to think?

____YES ____NO



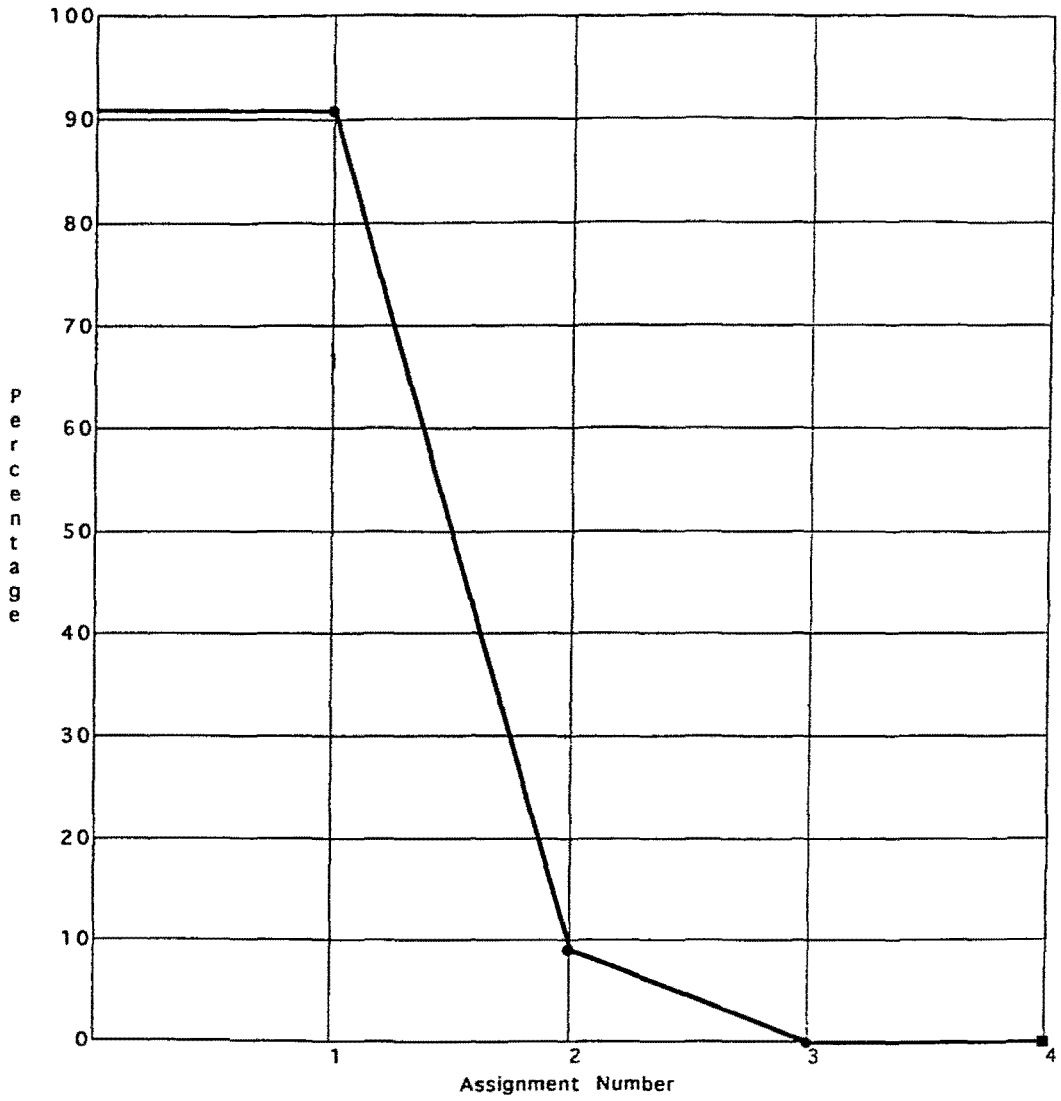
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	32	33
2	No		No	1	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	97.0%
No	3.0%
Blank	0.0%
Other	0.0%

Progress Graph for Question 6

6. Does thinking happen automatically or by accident?

___YES ___NO



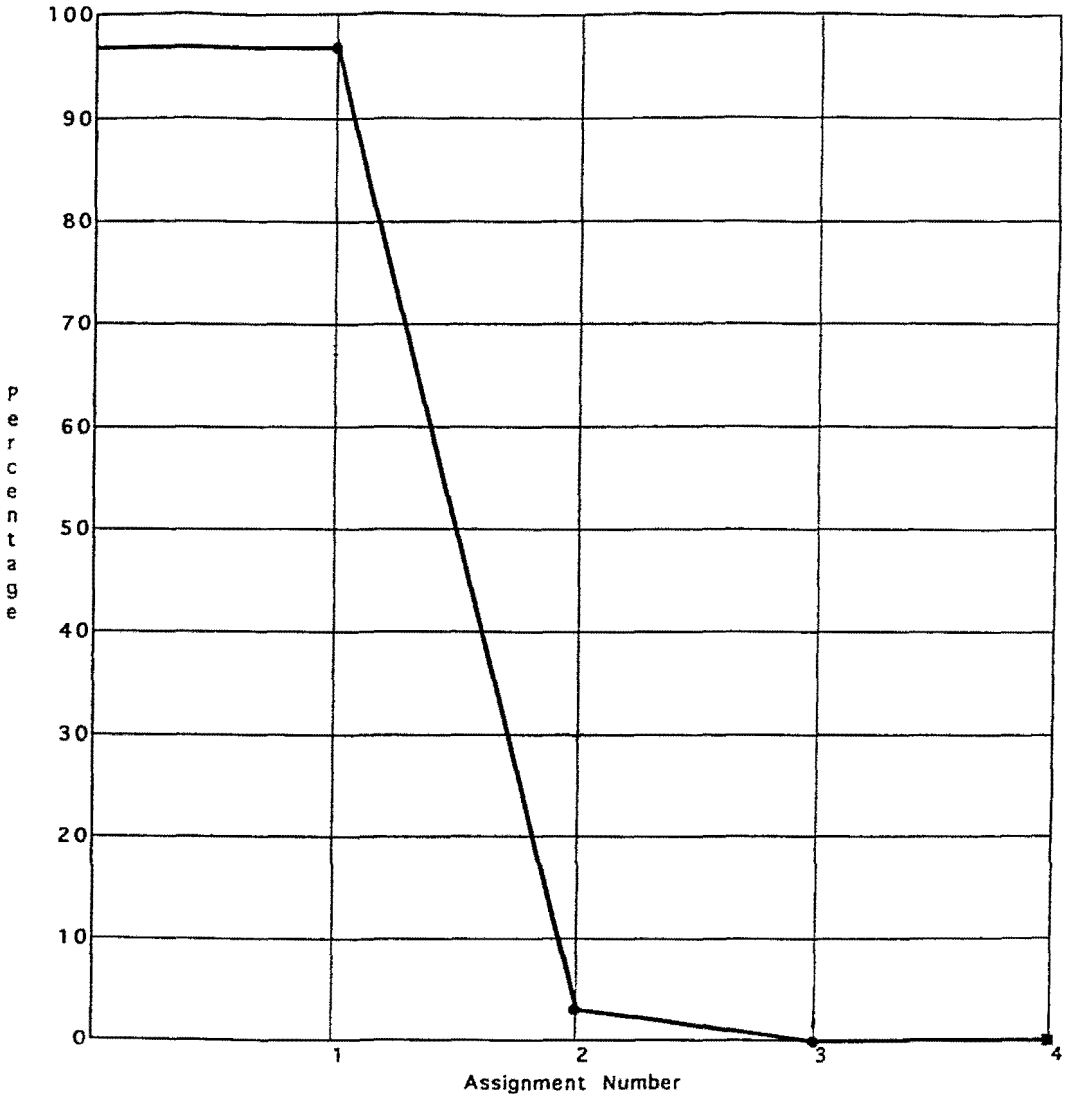
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	30	33
2	No		No	3	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	90.9%
No	9.1%
Blank	0.0%
Other	0.0%

Progress Graph for Question 7

7. Does your thinking ability change over time?

____YES ____NO



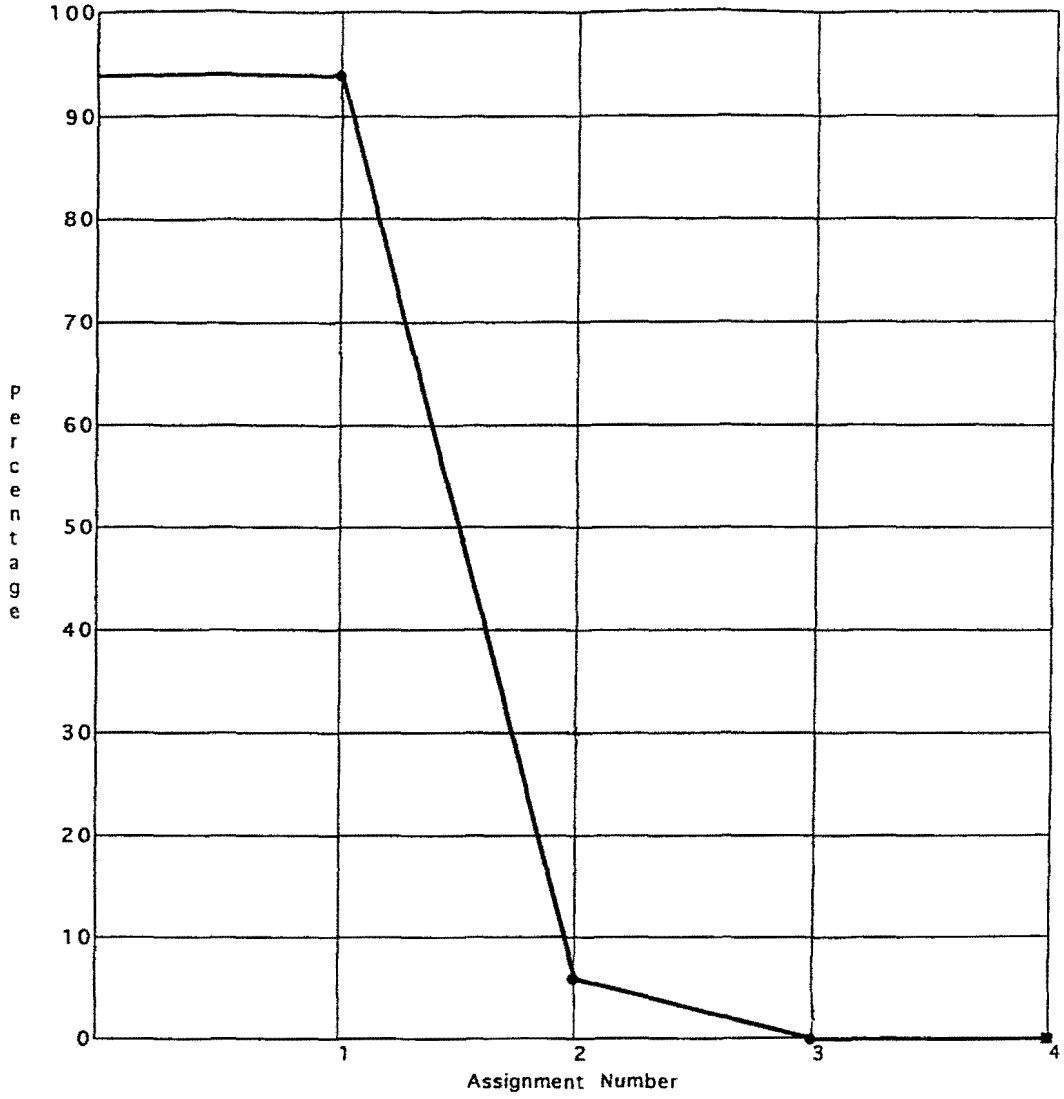
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	32	33
2	No		No	1	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	97.0%
No	3.0%
Blank	0.0%
Other	0.0%

Progress Graph for Question 8

8. Are humans always thinking?

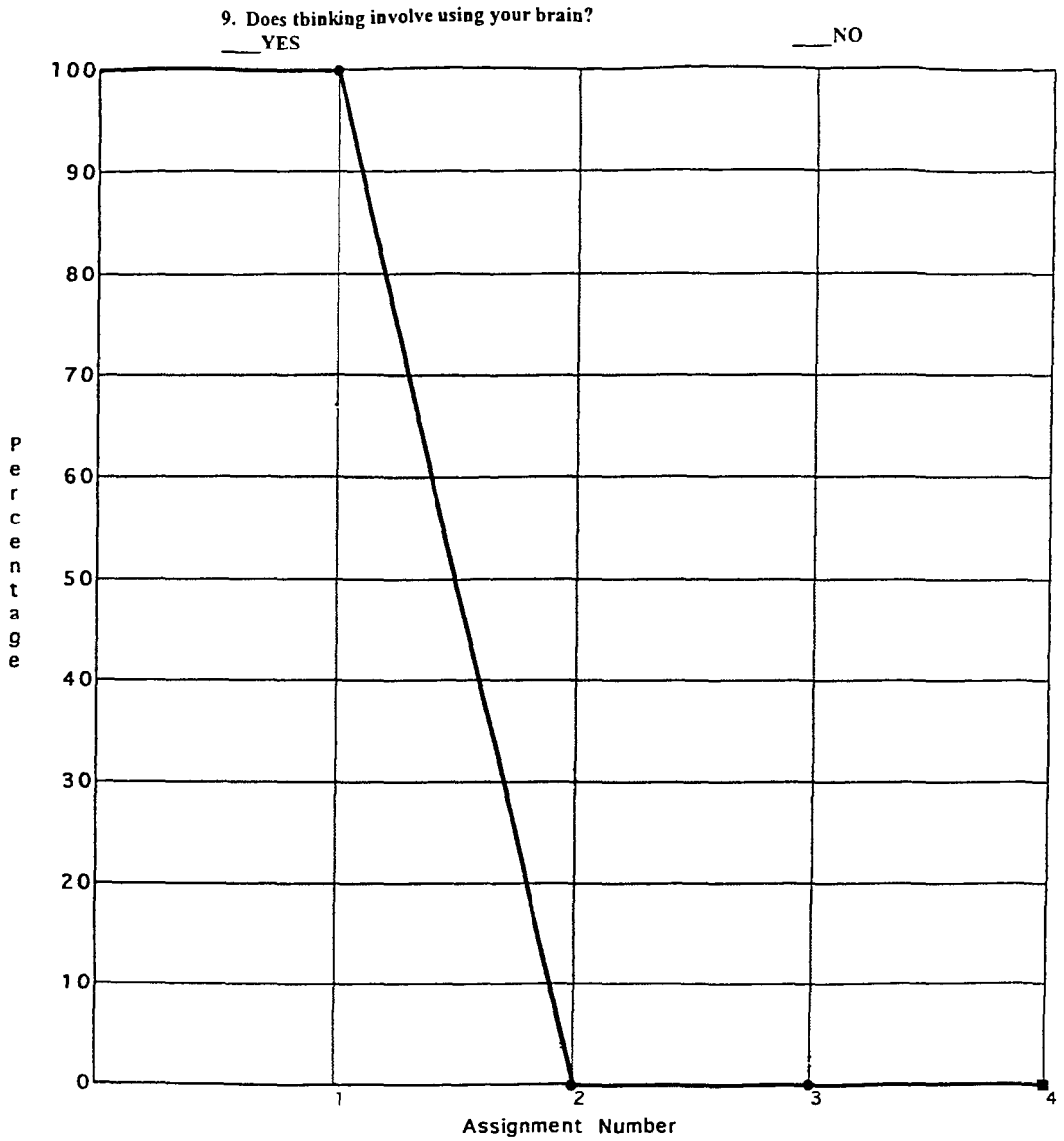
___YES ___NO



#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	31	33
2	No		No	2	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	93.9%
No	6.1%
Blank	0.0%
Other	0.0%

Progress Graph for Question 9



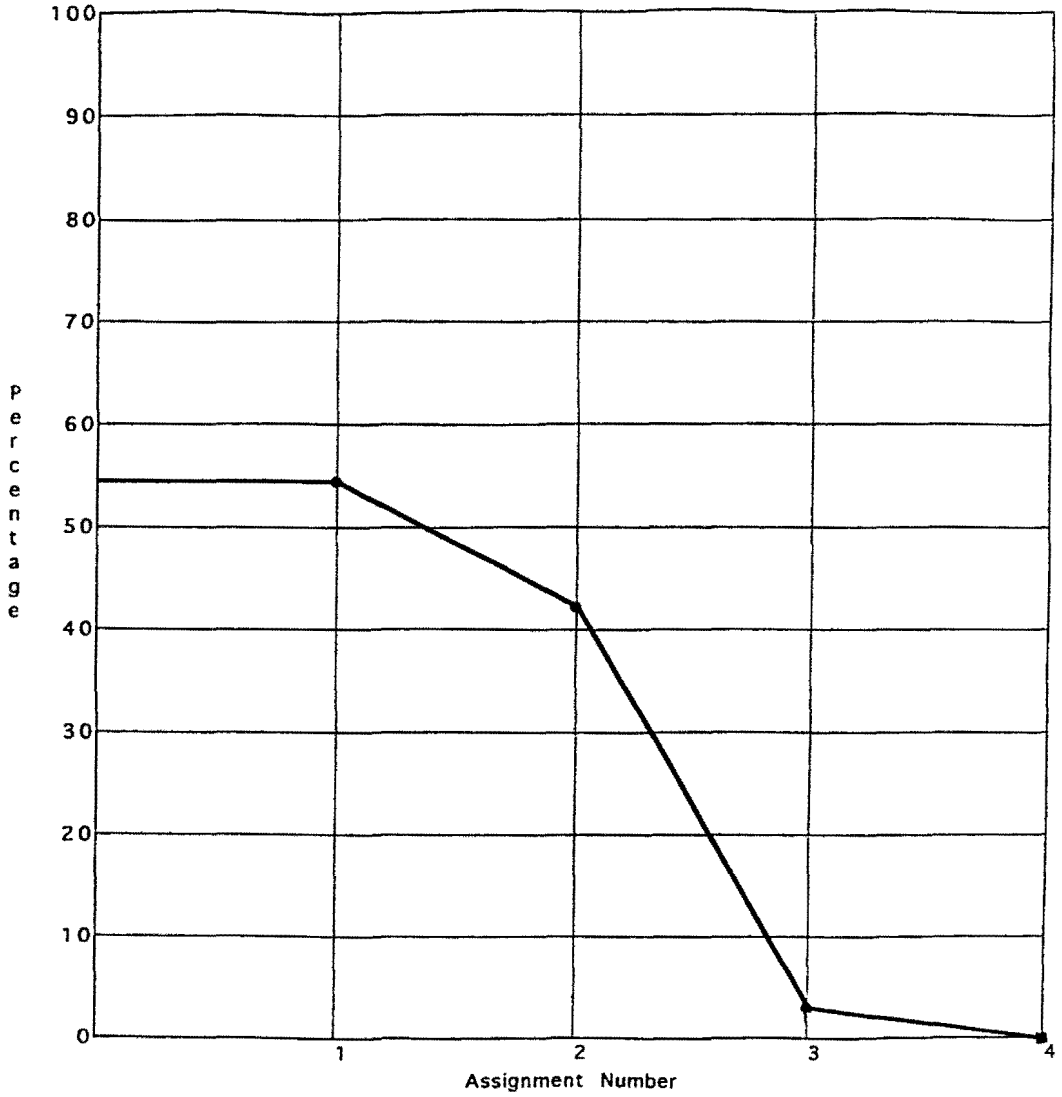
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	33	33
2	No		No	0	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	100.0%
No	0.0%
Blank	0.0%
Other	0.0%

Progress Graph for Question 10

10. Do we only use a portion of our brain when we are involved in thinking?

___YES ___NO



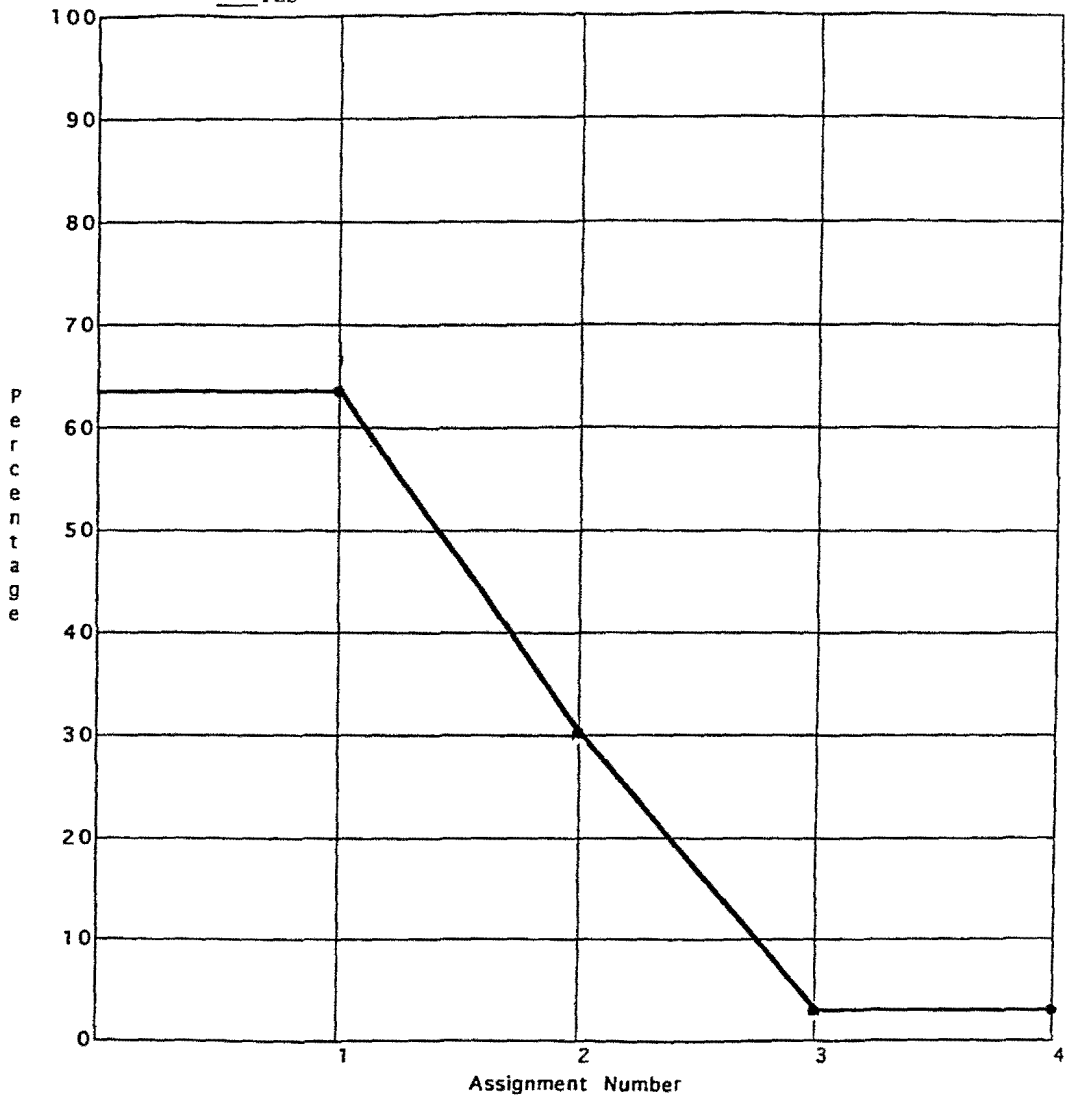
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	18	33
2	No		No	14	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	54.5%
No	42.4%
Blank	3.0%
Other	0.0%

Progress Graph for Question 11

11. Are you consciously aware that you are thinking when you are thinking about something?

___YES ___NO



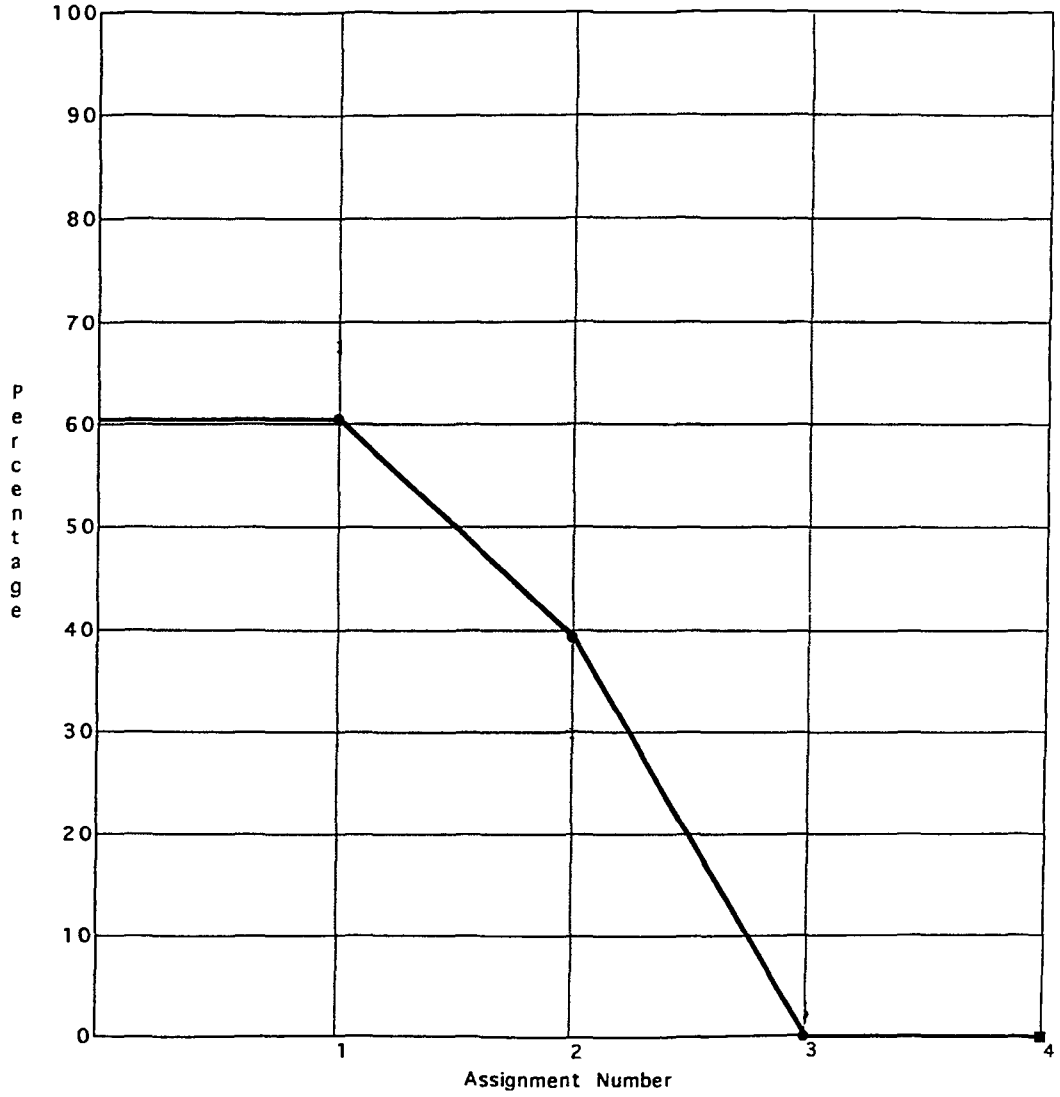
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	21	33
2	No		No	10	33
3	Blank		Blank	1	33
4	Other		Other	1	33

Yes	63.6%
No	30.3%
Blank	3.0%
Other	3.0%

Progress Graph for Question 12

12. Is thinking a skill?

____YES ____NO



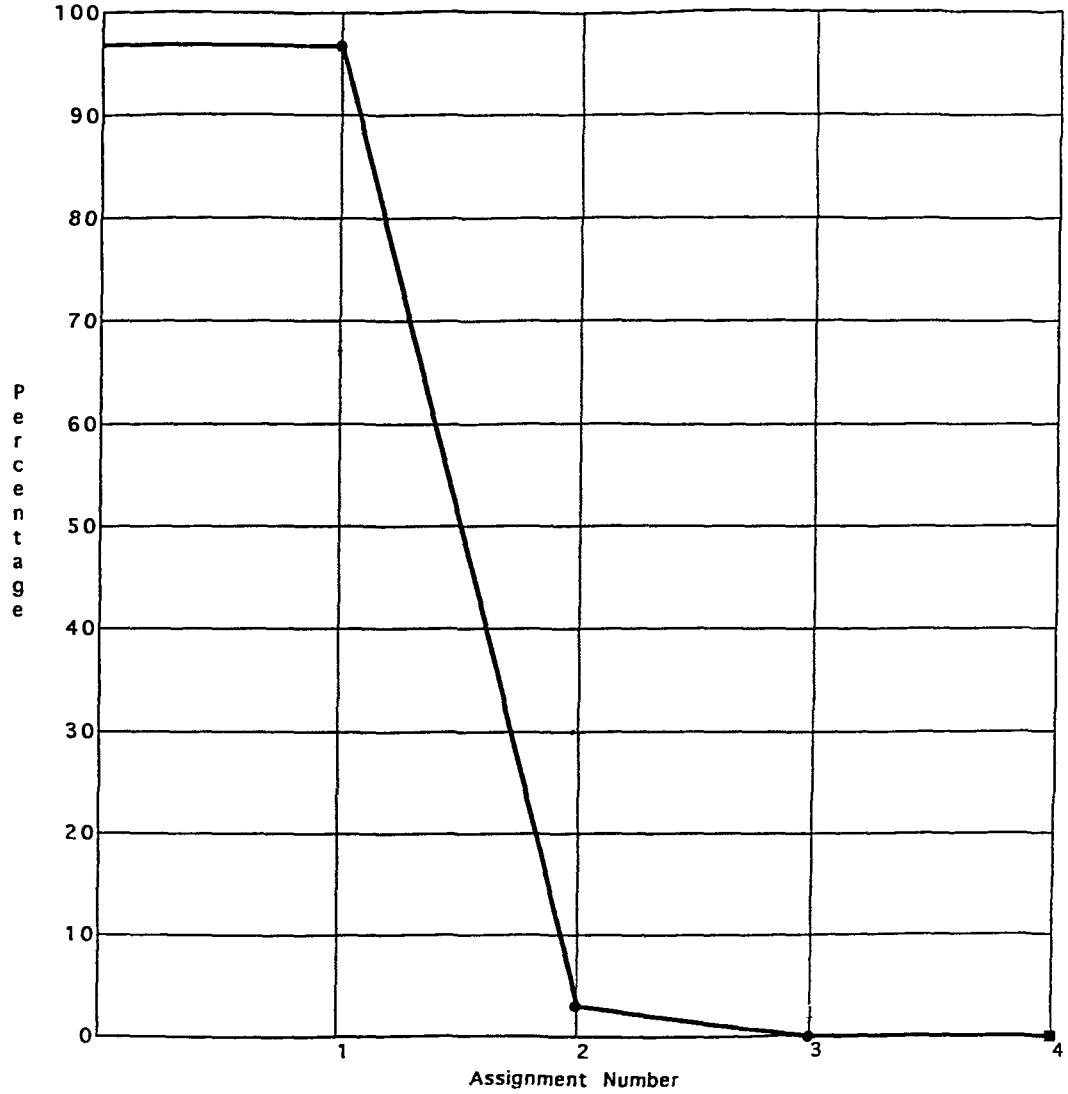
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	20	33
2	No		No	13	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	60.6%
No	39.4%
Blank	0.0%
Other	0.0%

Progress Graph for Question 13

13. Can your ability to think increase?

___YES ___NO



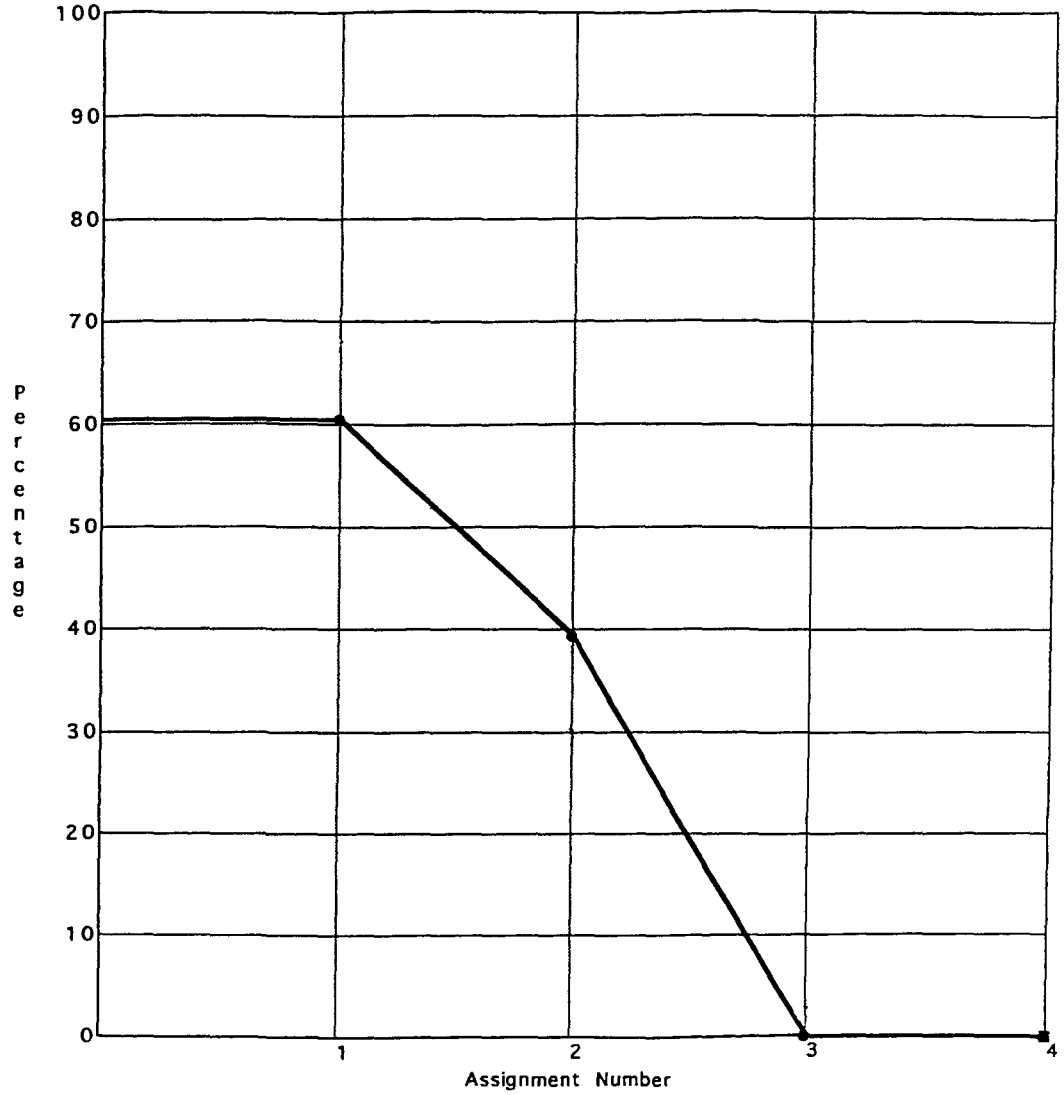
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	32	33
2	No		No	1	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	97.0%
No	3.0%
Blank	0.0%
Other	0.0%

Progress Graph for Question 14

14. Can your ability to think decrease?

____YES ____NO

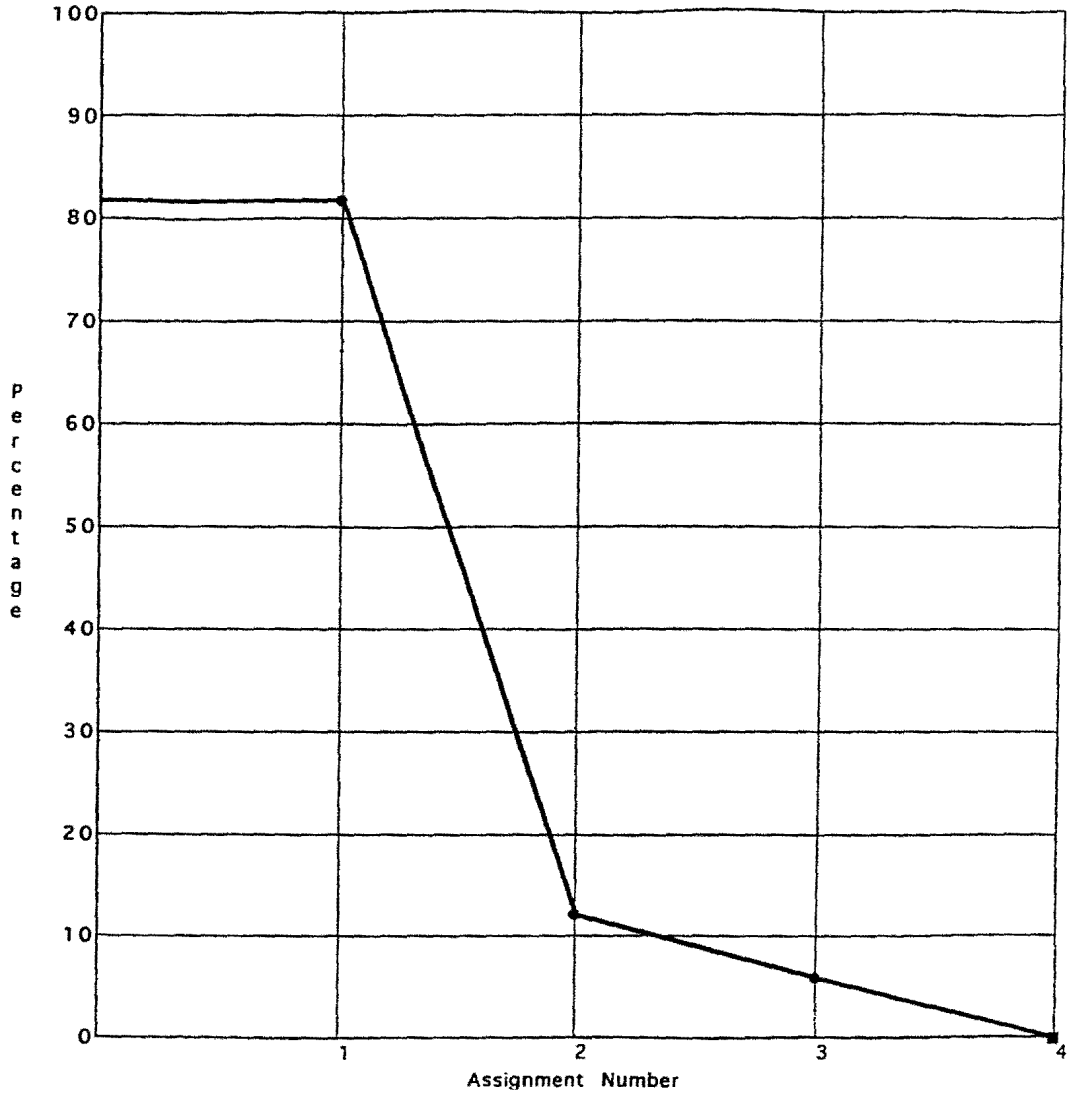


#	Assignment	Misc.	Category	Score	Points Possible		
1	Yes		Yes	20	33	Yes	60.6%
2	No		No	13	33	No	39.4%
3	Blank		Blank	0	33	Blank	0.0%
4	Other		Other	0	33	Other	0.0%

Progress Graph for Question 15

15. Is it possible to train your brain to think better?

____YES ____NO



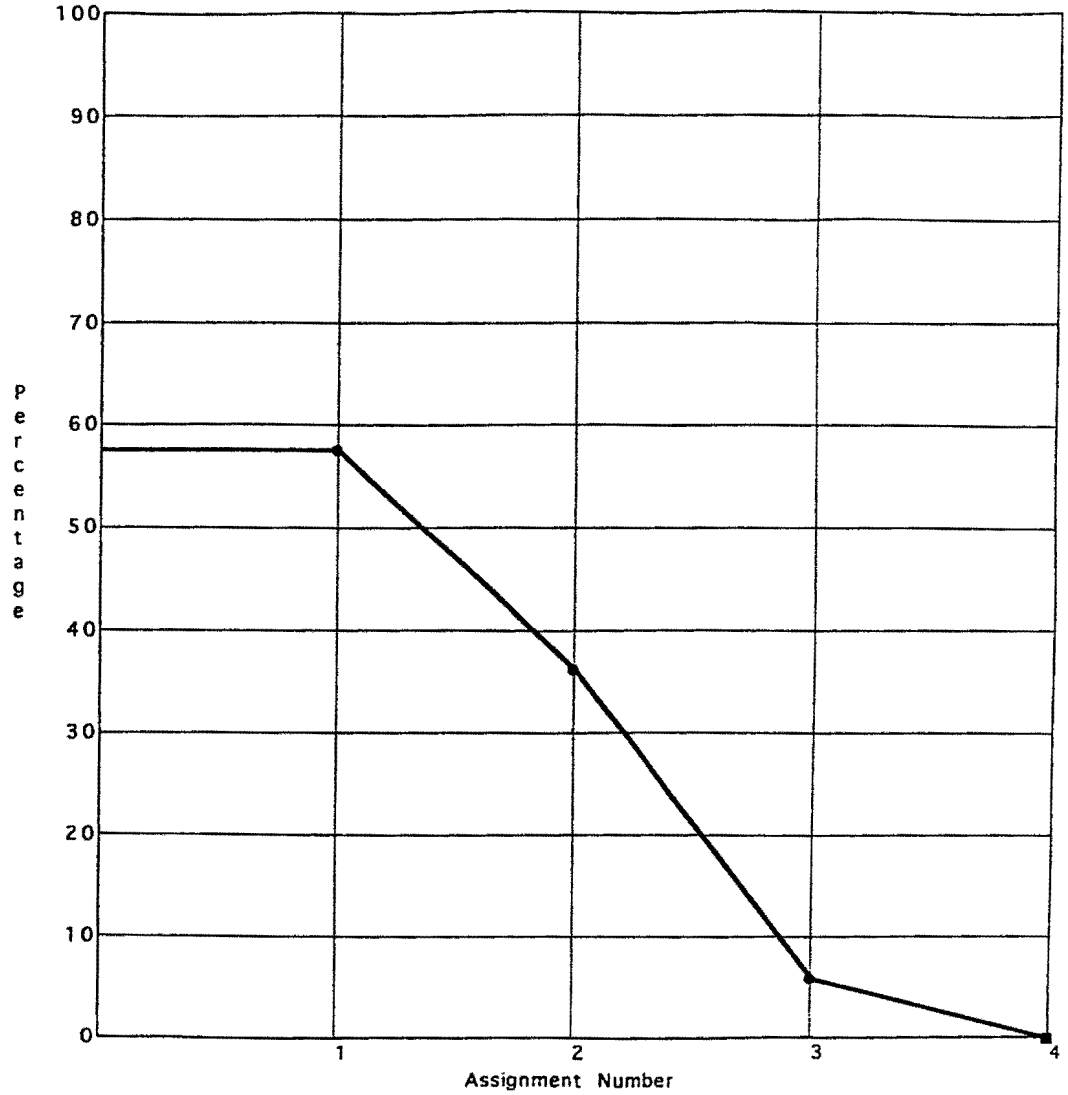
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	27	33
2	No		No	4	33
3	Blank		Blank	2	33
4	Other		Other	0	33

Yes	81.8%
No	12.1%
Blank	6.1%
Other	0.0%

Progress Graph for Question 16

16. Can thinking and improving your thinking be taught?

____YES ____NO



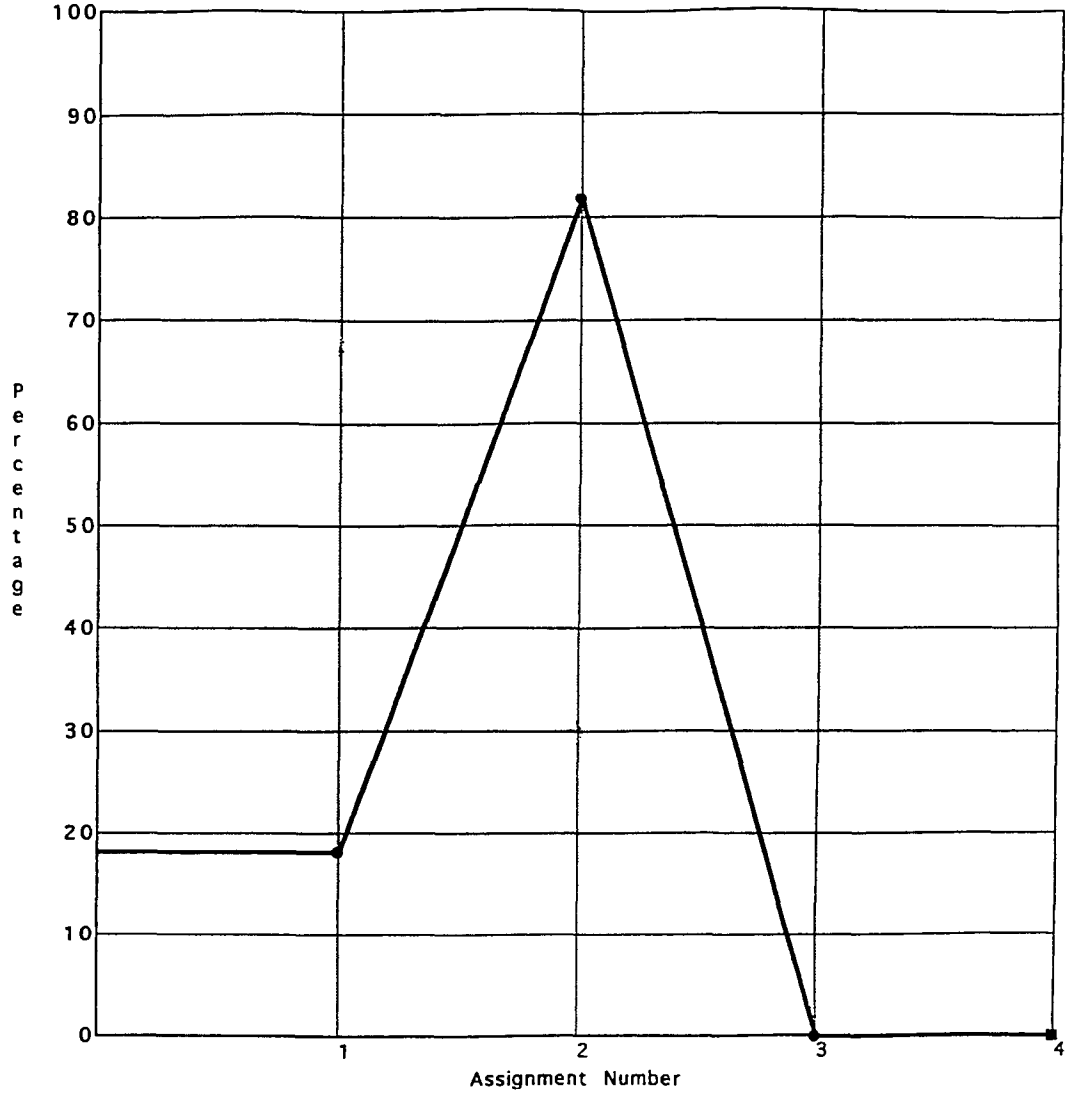
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	19	33
2	No		No	12	33
3	Blank		Blank	2	33
4	Other		Other	0	33

Yes	57.6%
No	36.4%
Blank	6.1%
Other	0.0%

Progress Graph for Question 17

17. Is it possible to know everything?

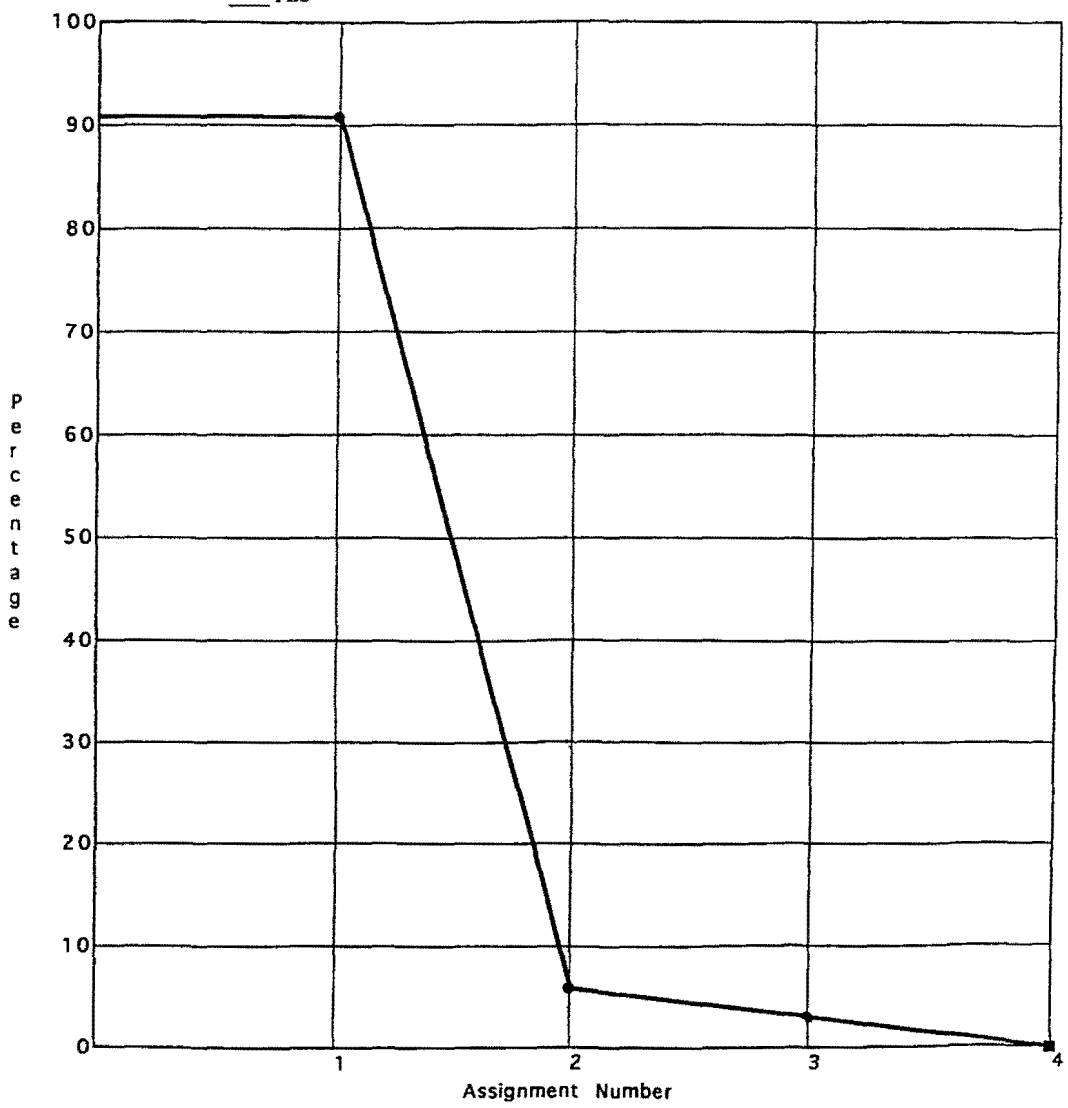
___YES ___NO



#	Assignment	Misc.	Category	Score	Points Possible		
1	Yes		Yes	6	33	Yes	18.2%
2	No		No	27	33	No	81.8%
3	Blank		Blank	0	33	Blank	0.0%
4	Other		Other	0	33	Other	0.0%

Progress Graph for Question 18

18. Is thinking a process that involves many steps?
____YES ____NO



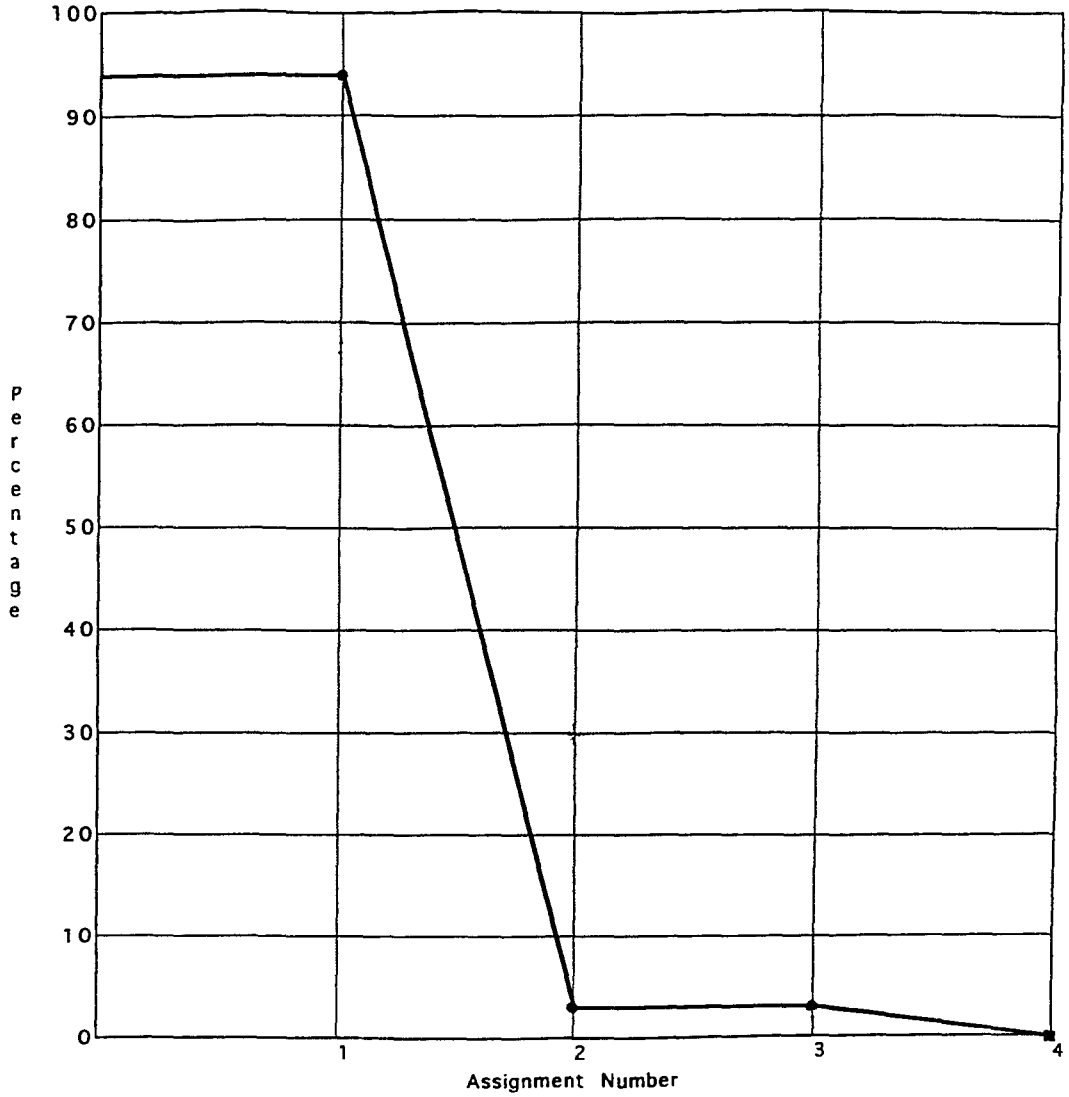
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	30	33
2	No		No	2	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	90.9%
No	6.1%
Blank	3.0%
Other	0.0%

Progress Graph for Question 19

19. Are there different levels of thinking?

___YES ___NO



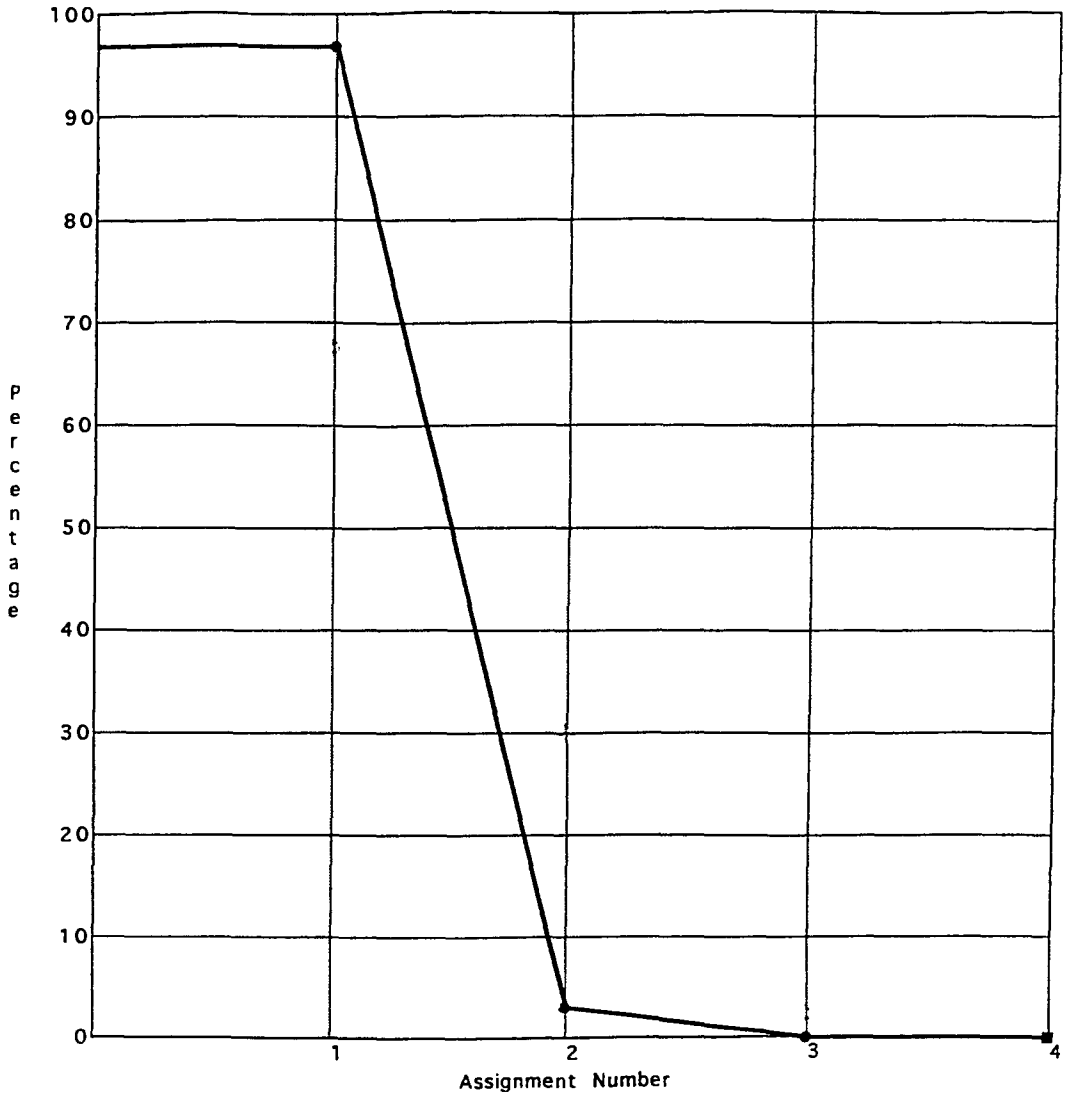
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	31	33
2	No		No	1	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	93.9%
No	3.0%
Blank	3.0%
Other	0.0%

Progress Graph for Question 20

20. Are some thinking activities easier or harder than others?

___YES ___NO



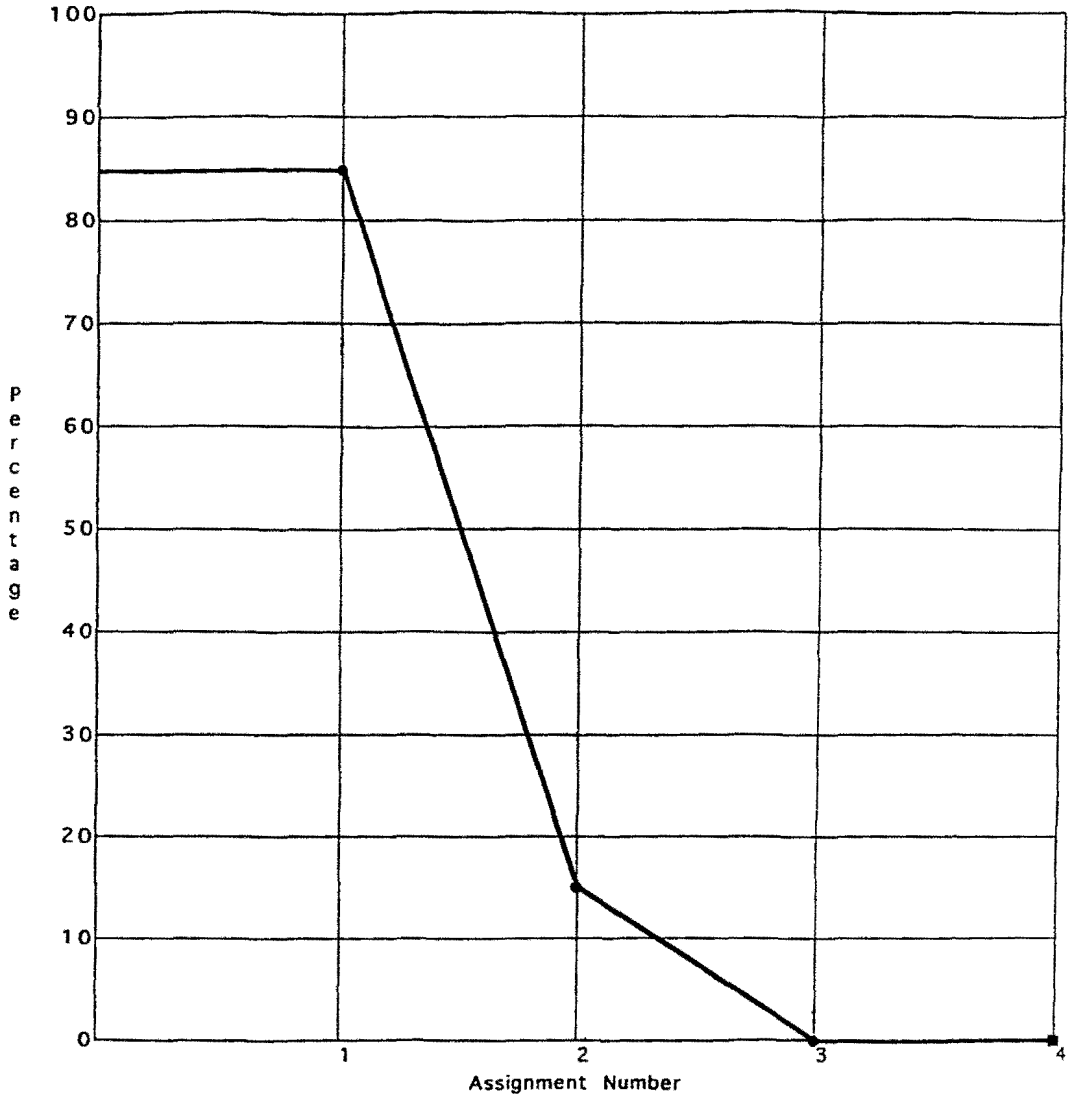
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	32	33
2	No		No	1	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	97.0%
No	3.0%
Blank	0.0%
Other	0.0%

Progress Graph for Question 21

21. Does thinking involve past knowledge or experience?

___YES ___NO



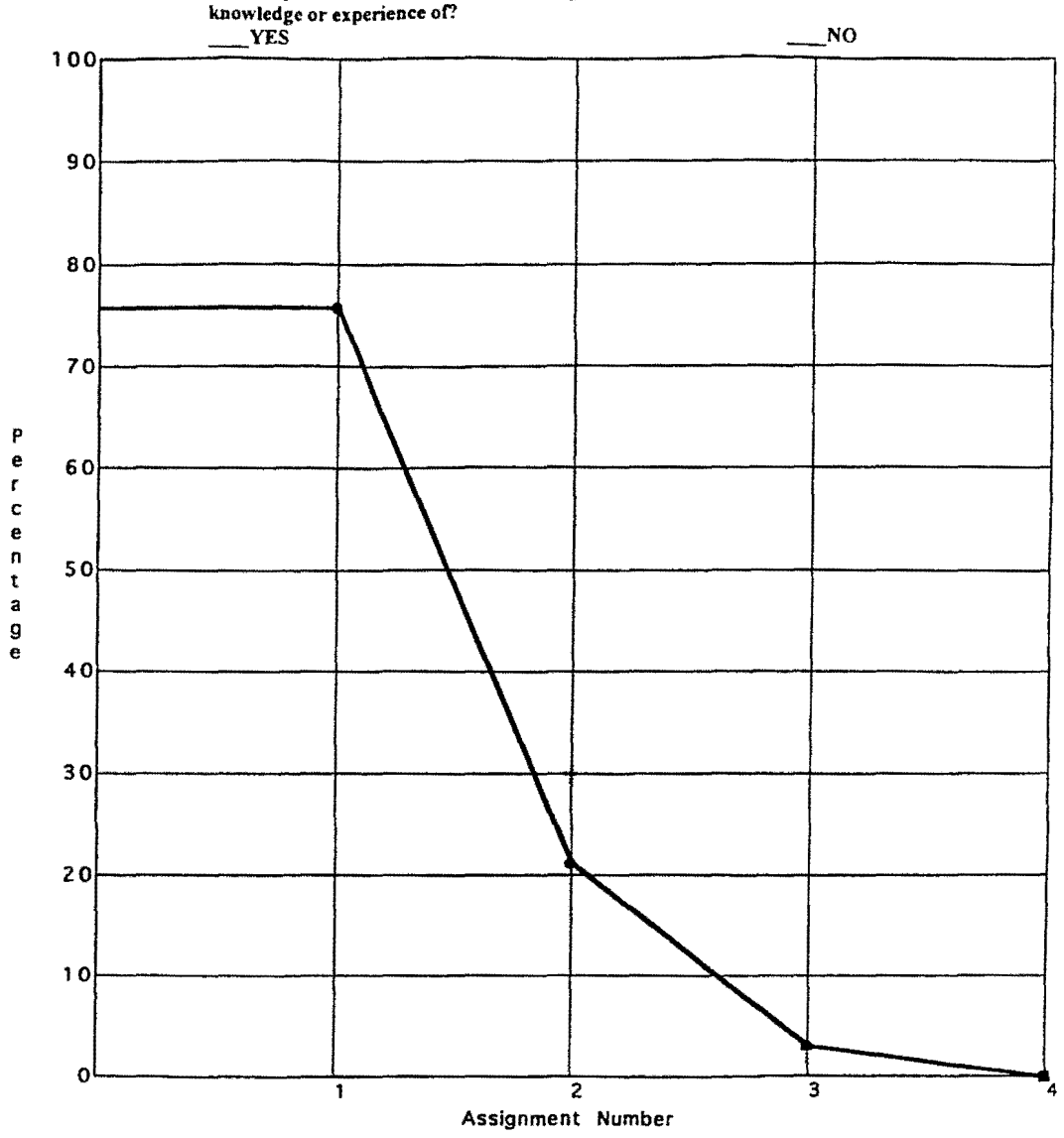
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	28	33
2	No		No	5	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	84.8%
No	15.2%
Blank	0.0%
Other	0.0%

Progress Graph for Question 22

22. Is it possible to think about something which you do not have any past knowledge or experience of?

___YES ___NO

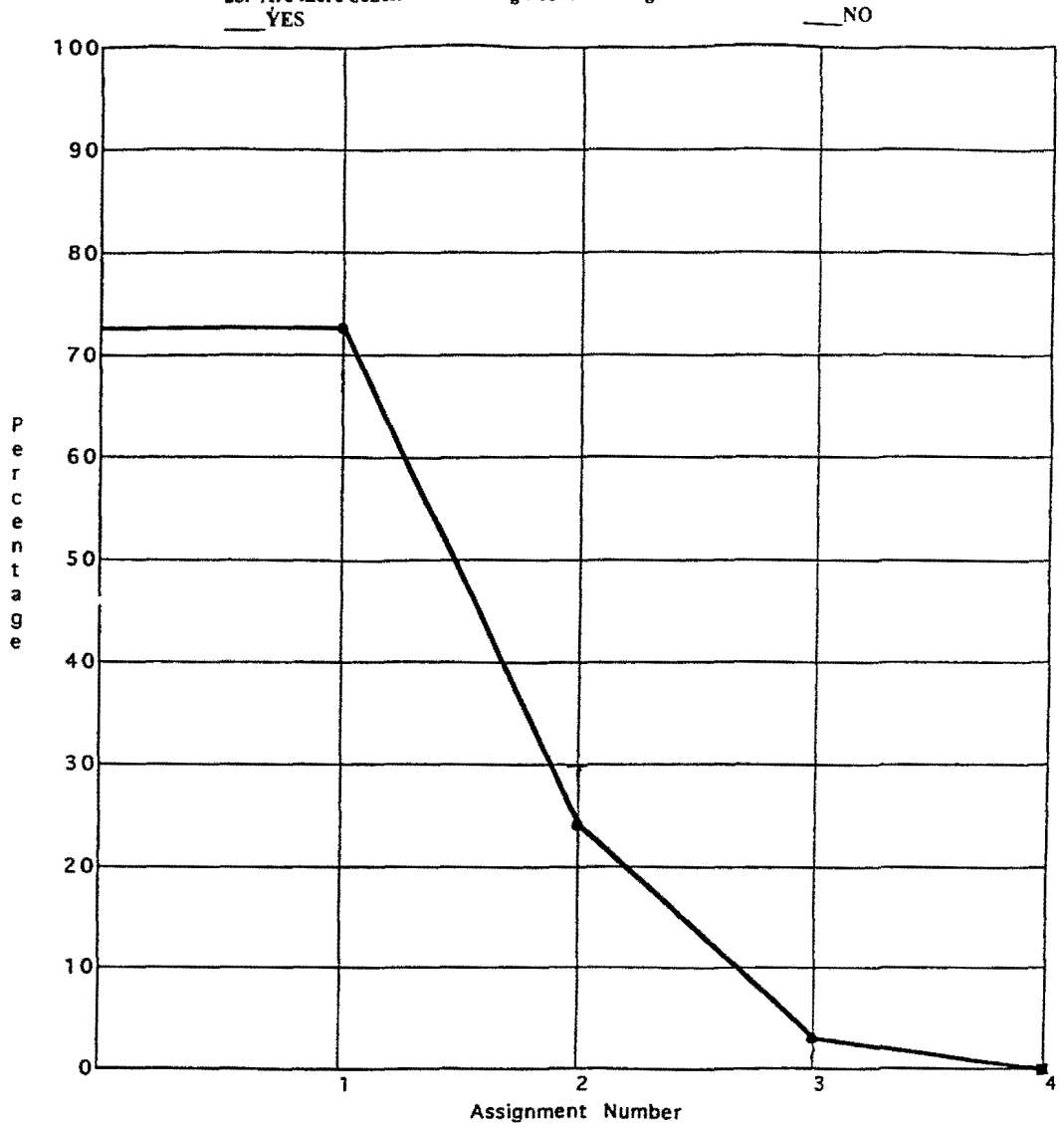


#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	25	33
2	No		No	7	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	75.8%
No	21.2%
Blank	3.0%
Other	0.0%

Progress Graph for Question 23

23. Are there benefits to thinking about thinking?
___YES ___NO



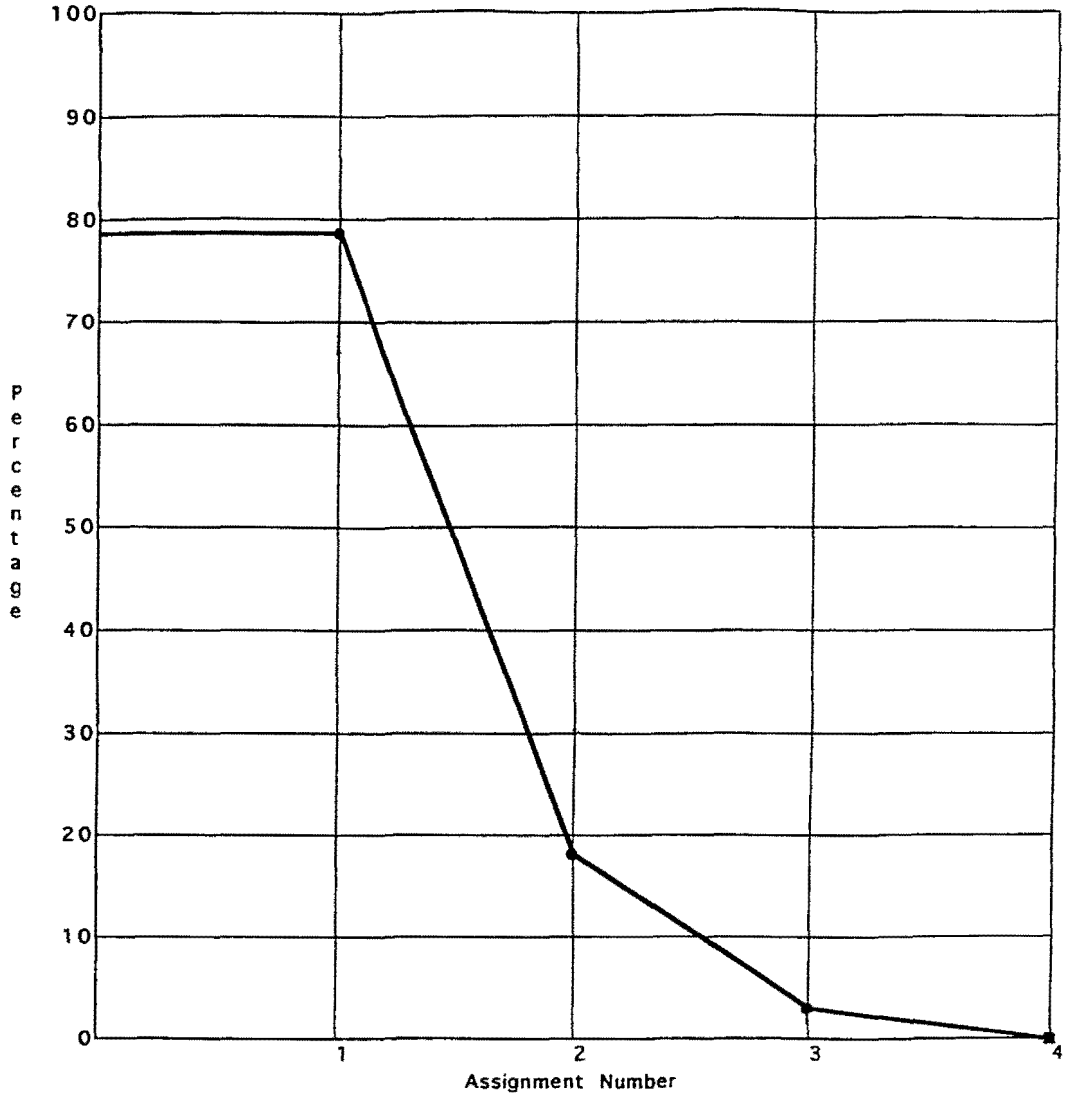
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	24	33
2	No		No	8	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	72.7%
No	24.2%
Blank	3.0%
Other	0.0%

Progress Graph for Question 24

24. Is it important for students to learn thinking skills in school?

____YES ____NO



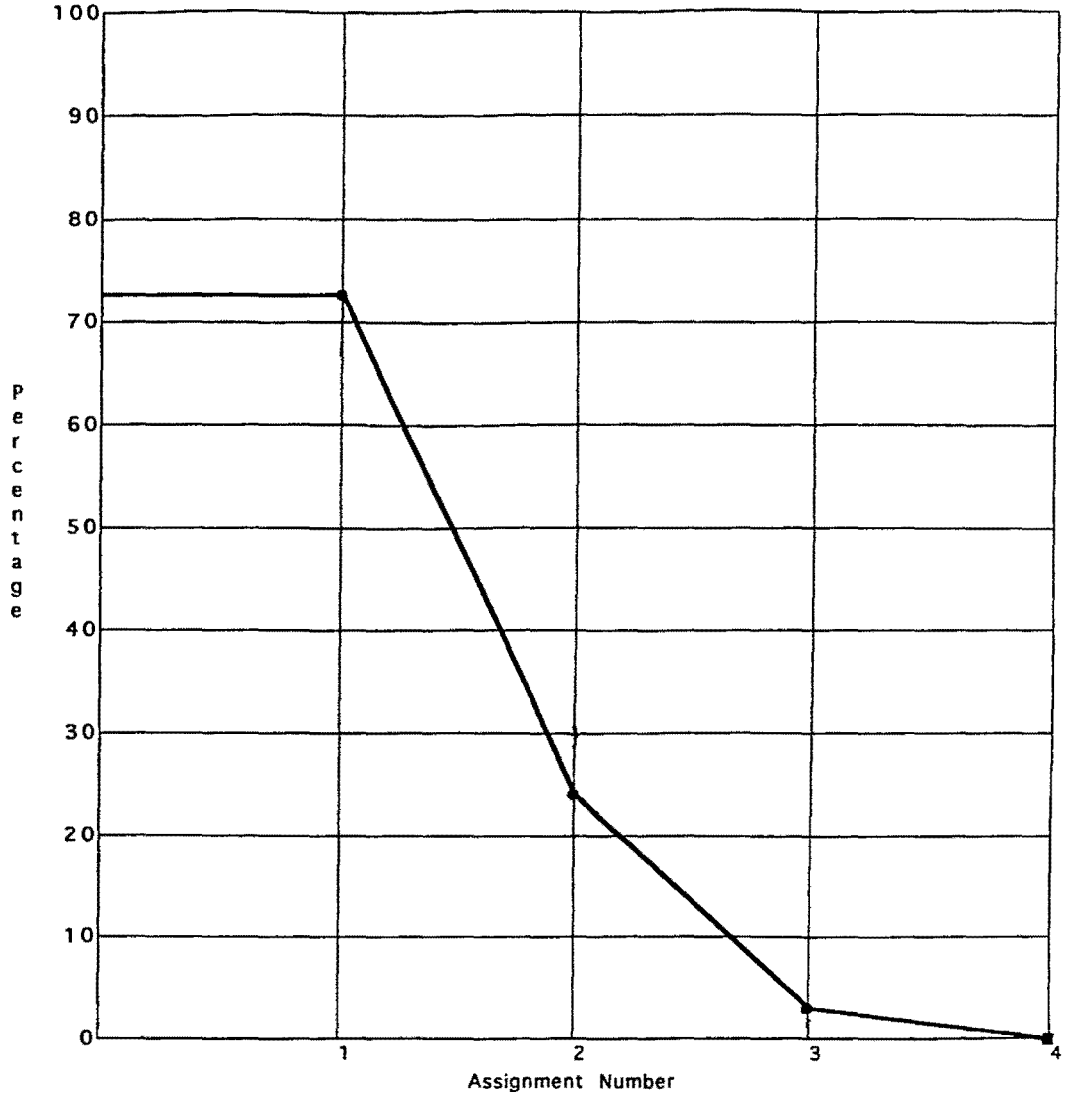
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	26	33
2	No		No	6	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	78.8%
No	18.2%
Blank	3.0%
Other	0.0%

Progress Graph for Question 25

25. Is it important for teachers to teach thinking skills to students?

____YES ____NO



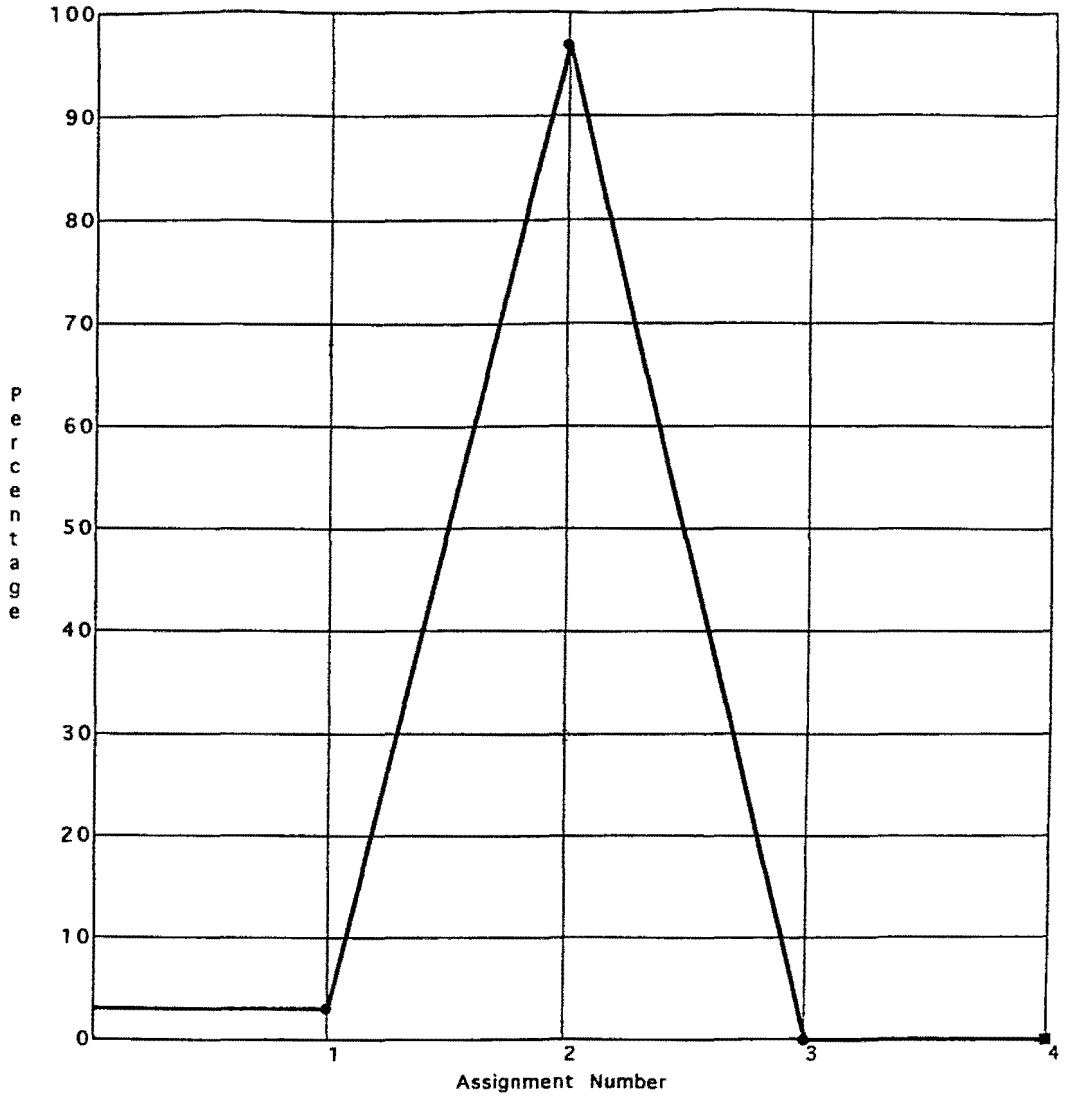
#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	24	33
2	No		No	8	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	72.7%
No	24.2%
Blank	3.0%
Other	0.0%

Progress Graph for Question 26

26. Does everyone think in the same way?

____YES ____NO

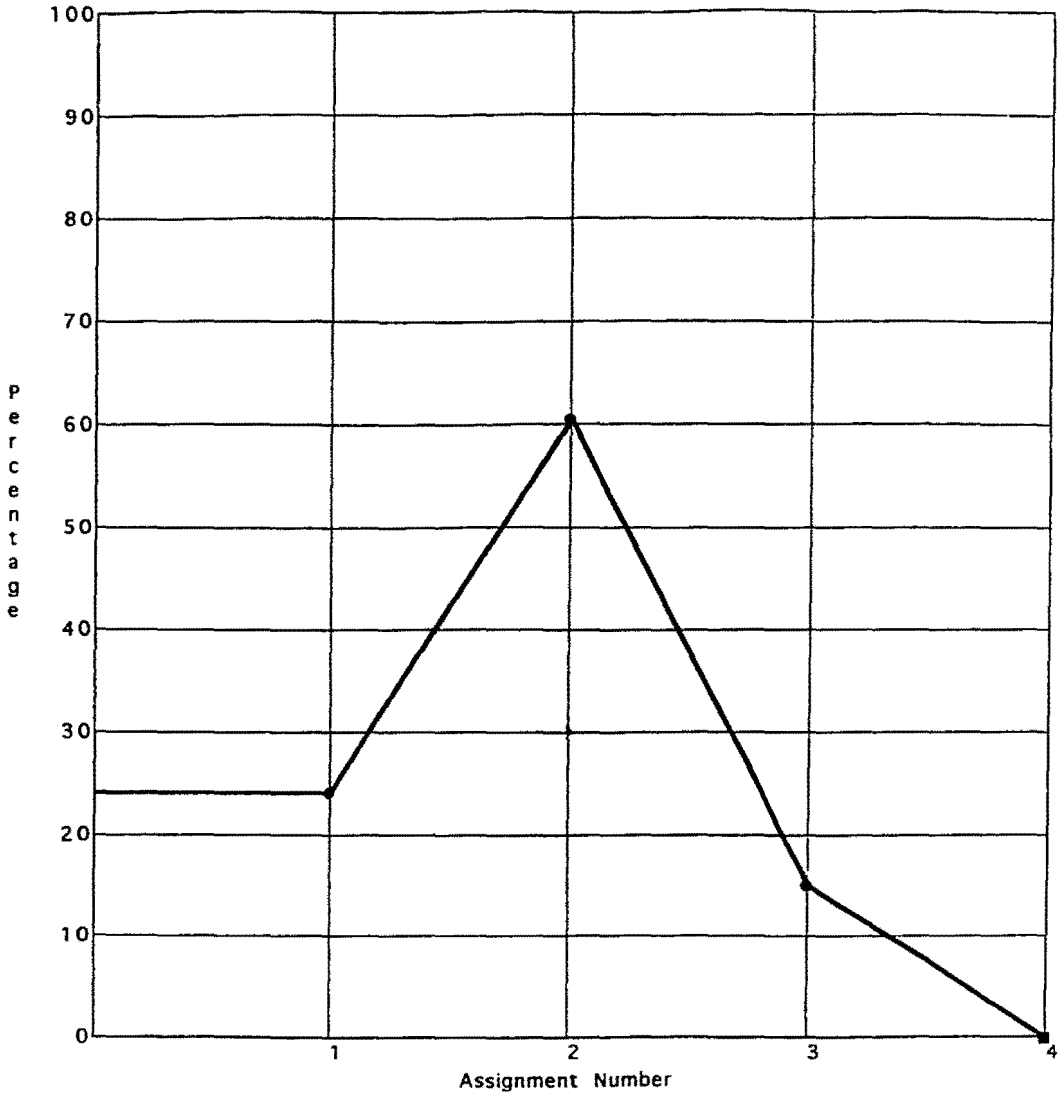


#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	1	33
2	No		No	32	33
3	Blank		Blank	0	33
4	Other		Other	0	33

Yes	3.0%
No	97.0%
Blank	0.0%
Other	0.0%

Progress Graph for Question 27

27. Is thinking difficult?
____YES ____NO

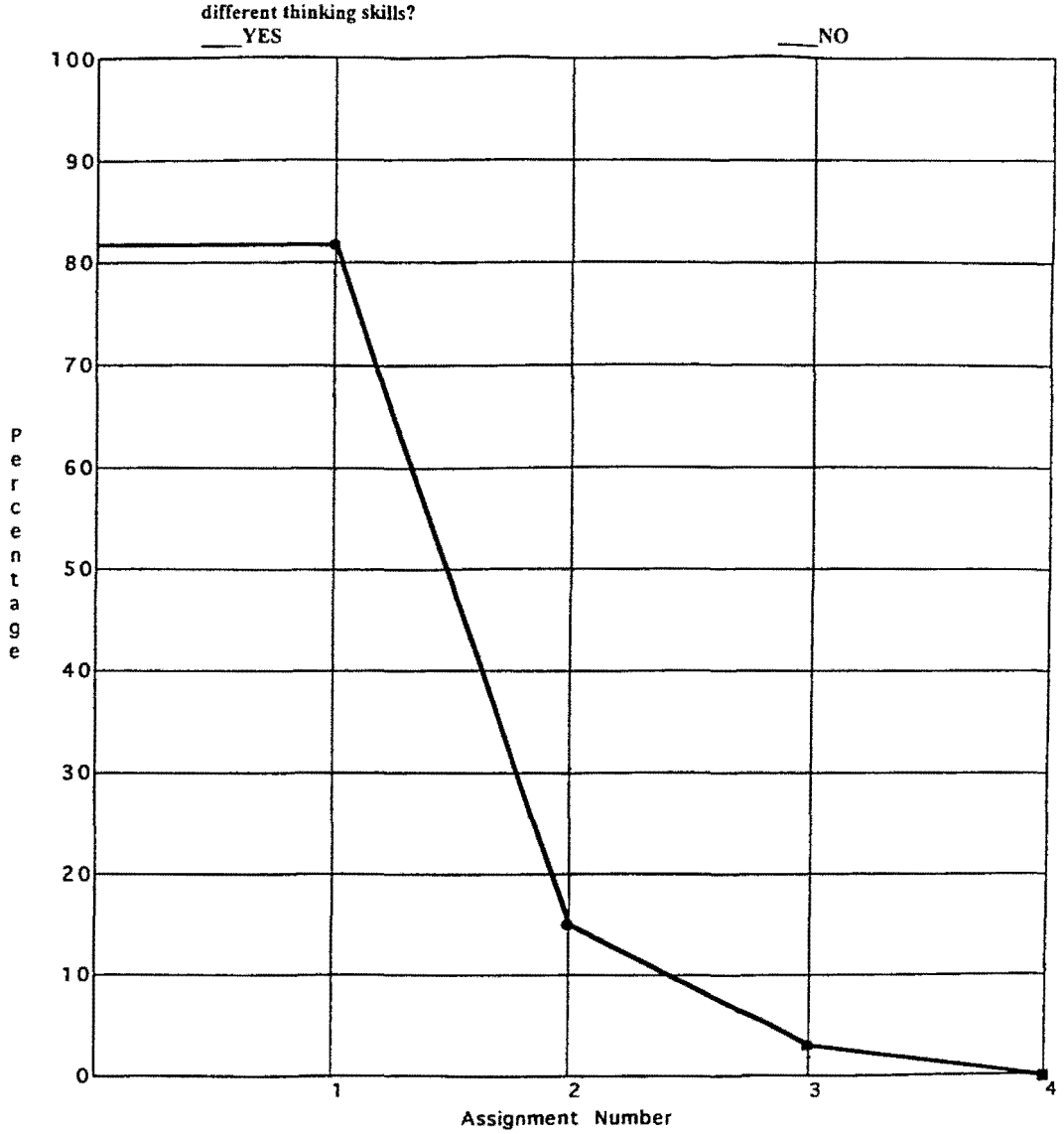


#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	8	33
2	No		No	20	33
3	Blank		Blank	5	33
4	Other		Other	0	33

Yes	24.2%
No	60.6%
Blank	15.2%
Other	0.0%

Progress Graph for Question 28

28 a. Do you agree that Bloom's Taxonomy of Thinking includes all the different thinking skills?



#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	27	33
2	No		No	5	33
3	Blank		Blank	1	33
4	Other		Other	0	33

Yes	81.8%
No	15.2%
Blank	3.0%
Other	0.0%

Personal Responses

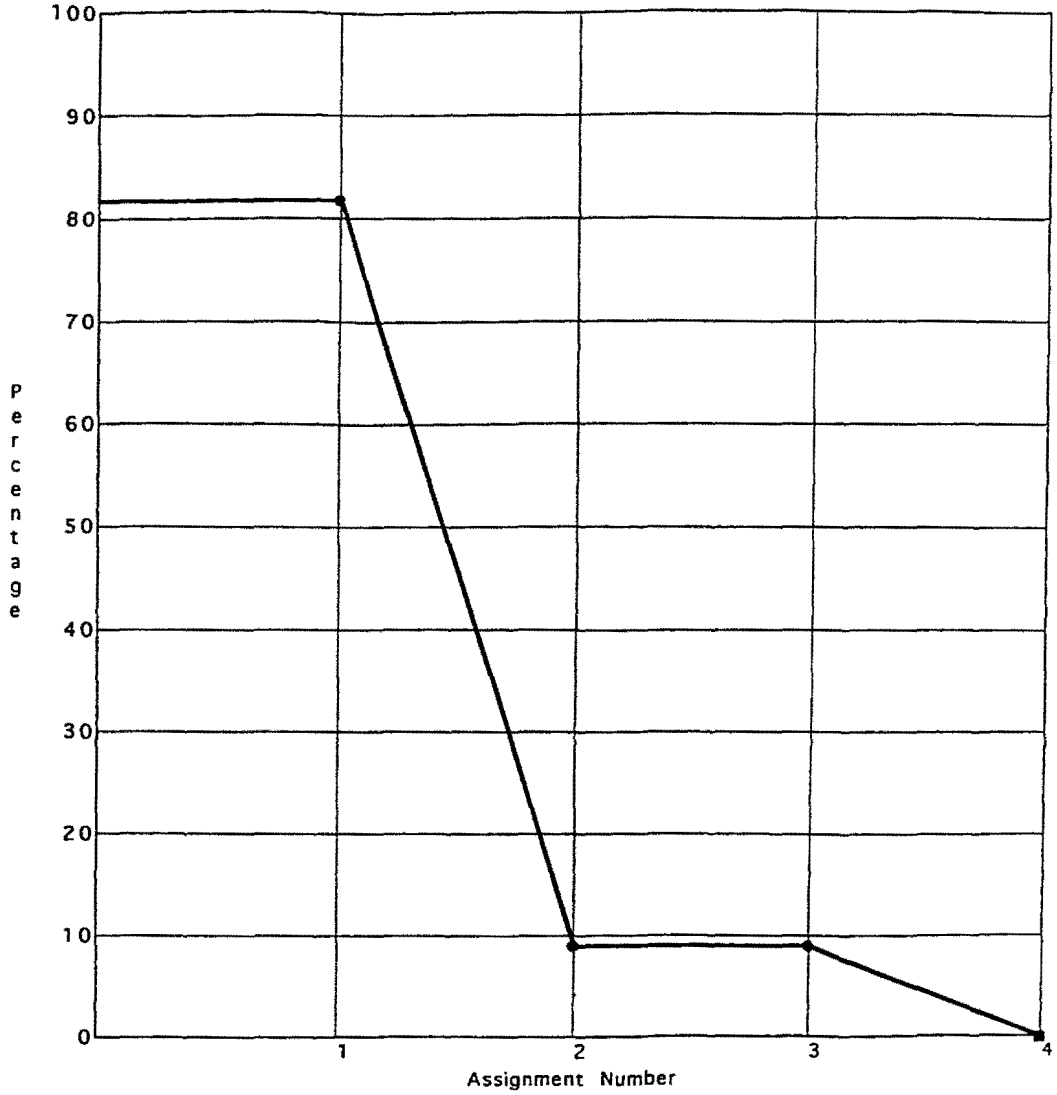
28 b. IF NO, WHAT THINKING SKILLS ARE NOT INCLUDED IN BLOOM'S TAXONOMY?

Respondent Number	Response
#12-	"Us[i]ng your own ability to think."
#18-	"Dreaming."
#19-	"Dreaming."
#31-	"Right or Wrong."
#33-	Blank.

Progress Graph for Question 29

29 a. Do you agree with the difficulty levels of Bloom's Taxonomy?

___YES ___NO



#	Assignment	Misc.	Category	Score	Points Possible
1	Yes		Yes	27	33
2	No		No	3	33
3	Blank		Blank	3	33
4	Other		Other	0	33

Yes	81.8%
No	9.1%
Blank	9.1%
Other	0.0%

Personal Responses

29 b. IF NO, IDENTIFY WHAT LEVEL YOU DO NOT AGREE WITH.

Respondent Number	Response
#15-	"Some people are better at 'say' Synthesis than Analysis! So you can't really put it into an order because each person is individual!!!"
#16-	"Synthesis."
#33-	Blank.

Personal Responses

30. Identify someone you know personally who is a good thinker and give one reason why you believe he or she is a good thinker?

Respondent Number		Response
#1-	Family member-	"Because she thinks things through and tries to identify what problems may occur"
#2-	Peer-	"Because she concentrates on what she is doing and learns it and gets the most benefit from it."
#3-	Mom-	"Because she had more experience then I have."
#4-	Peer-	"I think she is a good thinker because she has so many things to say."
#5-	Blank-	
#6-	Male-	"He is a good thinker because he analy[zes] the subject."
#7-	Peer-	"She's always thinking, she asks a lot of questions, she explains lots of different things. [She is] interesting to talk to."
#8-	Peer-	"She is very good in school and can concentrate at music."
#9-	Male-	"Because he don't get anyone to help him he just fig[g]er[s] out how to get something or to solve something."
#10-	Peer-	"She can think of stuff really fast, she's smart, and good at music and math."
#11-	Brother-	"Because he work[s] hard."
#12-	Teacher-	"Because she gave us this survey."
#13-	Peer-	"She has a way of thinking of a small word and developing them into a word that is above level."
#14-	Mom-	"It seems she's always thinking and she always knows the answers or reasons why something is."
#15-	Male and Female-	"Knows a lot about everything and is alway[s] wanting to learn more."
#16-	Male-	"He is always thinking of what he can improve on."
#17-	Dad-	"[He is] really creative and ha[s] good ideas."
#18-	Humans-	"I think everyone is a good thinker in their own way."
#19-	Mom-	"Because everyday my mom helps me to think better and that's why my mom is a good thinker."
#20-	Dad and 2 Peers-	"Hard worker."
#21-	Mom-	"Gives very good ideas for things to set up."

#22-	Mom-	"Has a lot of past experienced, [she] finish[ed] a lot [of] school, [she] reacts quickly."
#23-	Grandfather-	"He is older than me so that means he has been learning longer than me."
#24-	Peer-	"[He] has very good focus."
#25-	Dad-	"He concentrates on his work [and] has many good ideas."
#26-	Blank-	
#27-	Blank-	
#28-	Peer-	"Because he is always on top of his game. He is alway[s] looking to strive further by thinking and using his mind."
#29-	Peer-	"Because he can come up with amazing ideas."
#30-	Blank-	
#31-	Blank-	
#32-	Male-	"[He] always comes up with a lot of different possibilities."
#33-	Blank-	

Personal Responses

31. Why do humans think?

Respondent Number	Response
#1-	"To get by in life. To make decisions and to solve problems."
#2-	"It is a natural skill which humans need to function in everyday life."
#3-	"Because they need to so we know what we are doing."
#4-	"Humans think because if we didn't we wouldn't need schools."
#5-	"Humans think so they can go about everyday life."
#6-	"Because if we didn't think we would just be guessing."
#7-	"Humans have to think all the time. If you don't think you could not live."
#8-	"Humans think because they need to."
#9-	"Because it is just what happens if you are having a problem in a subject, you think about it."
#10-	"Humans think because that's the only way that they get through life, if they don't they'll end up with nothing."
#11-	"Because if we didn't think we wouldn't be able to do anything."
#12-	"Humans think because if they didn't they'd be lost."
#13-	"To solve problems."
#14-	"Because thinking is like moving body parts, you need it to live. If we didn't have it we would probably not live long."
#15-	"To survive and learn."
#16-	"To see what they know."
#17-	"Because if we didn't, how would anyone know what to do!"
#18-	"To get information from your head."
#19-	"Because if they didn't think the world would be crazy."
#20-	"To problem-solve."
#21-	"For ideas."
#22-	"To be successful."
#23-	"So you can fully function-your body."
#24-	"To stay alive."
#25-	"So they don't do something stupid like walking off a cliff or eating something poisonous."
#26-	"Humans think to solve problems."
#27-	Blank
#28-	"To get through life."
#29-	"So they can make up ideas."
#30-	"Humans think to enhance their thoughts or learning."
#31-	Blank
#32-	"To decide different things."
#33-	Blank

Personal Responses

32. What does thinking mean to you?

Respondent Number	Response
#1-	"Thinking means to me that my brain is complex and has many uses dealing with everyday life."
#2-	"Thinking means using my brain to do anything."
#3-	"To put thoughts into words."
#4-	"Think means, to me, understanding what you know."
#5-	Blank
#6-	"Thinking means you can make a better choice."
#7-	"Thinking means lots of different things, it teachers you how to learn (lots [of] other [things])"
#8-	"To come up with ideas."
#9-	"Thinking means solving problems."
#10-	"To use your brain!"
#11-	"It means using your brain."
#12-	"Thinking means solving problems."
#13-	"Solving problems, dreaming, more than my memory right at the time."
#14-	"It means breaking down to the most logic[al] answer or reason."
#15-	"Nothing."
#16-	"Something that helps you if you are working on a test."
#17-	"Something that uses your brain and mind together."
#18-	"Thinking means getting information in your brain that you know."
#19-	"It means a lot to me because I know if I think I could be smart."
#20-	"It means using your brain."
#21-	"Processing."
#22-	"Thinking to me means being successful."
#23-	"Thinking means to me that when you['re] doing something like sleeping, your brain is still working."
#24-	"Thinking means to think."
#25-	"It means that I can learn and do things like this survey."
#26-	"Thinking means to create ideas."
#27-	Blank
#28-	"It means using your brain to complete a task."
#29-	"It means a lot."
#30-	"Thinking means that I can learn more and understand things better."
#31-	Blank
#32-	"It means all kinds of decisions and other options I have."
#33-	Blank

Personal Responses

33. What have you learned about thinking from this unit?

Respondent Number	Response
#1-	"That there is many different steps to thinking and that we need it for everyday life."
#2-	"I've learned that thinking is a complicated skill which deserves more thought than I've given it."
#3-	"That you think the thoughts then you speak them."
#4-	"That there are different ways to think."
#5-	"That there are a lot of different steps to thinking."
#6-	"That sometimes it can be harder than others."
#7-	"I learned that you always need thinking for everything."
#8-	"Thinking is boring at times."
#9-	"That it is not as hard to think as I thought it was."
#10-	"Levels of thinking!"
#11-	"You need to think a lot even when you['re] not doing something easy."
#12-	"Thinking could be easy and hard."
#13-	"Bloom's Taxonomy."
#14-	"You can't live without it and it plays a HUGE part in life."
#15-	"All the different levels and to stop and think about [things] when you['re] thinking."
#16-	"Sometimes it's easy to think. Sometimes it's hard."
#17-	"That there is many different kinds of thinking."
#18-	"Different kinds of way[s] to think."
#19-	"How to remember better."
#20-	"It's good to think."
#21-	"There are very many steps for thinking."
#22-	"I've learned that thinking isn't easy, it's a very hard process."
#23-	"I have learned that there are many levels of thinking."
#24-	"Many thing."
#25-	"The different levels and difficultly of thinking."
#26-	"I learned that you [can] think about everything."
#27-	Blank
#28-	"That without thinking it would be hard if not impossible to get through life."
#29-	"That thing-about what thinking is a very hard project."
#30-	"I have learned that thinking is important and that there is a lot of different steps and ways of thinking."
#31-	Blank
#32-	"That there are many kinds of thinking steps."
#33-	Blank

Personal Responses

34. What do you still want to know about thinking?

Respondent Number	Response
#1-	"How to become an even more brilliant thinker?"
#2-	"How to improve your thinking skills?"
#3-	"Nothing."
#4-	"Nothing, unless there is more to know?"
#5-	Blank
#6-	"I'm not sure. I'll have to think about it."
#7-	"I think we already learned lots of stuff. We've covered almost everything. But there's probably stuff I don't [k]now so I would like to [k]now more."
#8-	"Nothing!!!!!!!!"
#9-	"How you can improve it."
#10-	"Nothing!!!"
#11-	"How do we automatically think?"
#12-	"Whatever is left."
#13-	"Nothing."
#14-	Blank
#15-	"To tell the class that humans don't use all of their brain and if we did we would know just as much as God!!"
#16-	"Nothing."
#17-	"I don't really know what else there is."
#18-	"Nothing."
#19-	"[How] do we think?"
#20-	"I don't want to [know] any more."
#21-	"What is the point of thinking?"
#22-	"I want to know how our brain works."
#23-	"What triggers your brain to do something like raise your hand in class?"
#24-	"Not much more."
#25-	"That's about it."
#26-	Blank
#27-	Blank
#28-	"How your brain work[s] / act[s] when you['re] thinking?"
#29-	"Nothing."
#30-	Blank
#31-	Blank
#32-	"Anything we haven't learned in this unit."
#33-	Blank

Other Comments:

"No, thank you M[is]s. Soranno."

"Thank you very much. You're welcome!!!"

"You're welcome Miss Soranno."

"You're welcome."

"You're welcome."

"Good Luck."

"You are welcome Teach."

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