A content analysis of commercially prepared thinking skills programs
by Joan Viola Clary

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University
© Copyright by Joan Viola Clary (1992)

Abstract:
The curriculum movement that focuses upon process thinking rather than product has given rise to a plethora of published thinking skills programs. These vary in focus, design, vocabulary, and application. Therefore, the purpose of this study was to conduct a content analysis of eight commercially published programs of the CoRT Program, Philosophy for Children, Odyssey, Building Thinking Skills, Methods of Inquiry: Learning to Learn, Thinking Skills: Making a Choice, Future Problem Solving, and Creative Problem Solving, totalling 1,656 thinking skills lessons, to determine (a) the presence and frequency of thinking skills lessons as determined and categorized by the Core Thinking Skills Framework subskills, (b) the viability of the Core Thinking Skills Framework as a comprehensive criterion of thinking skills to be used in planning thinking skills instruction within existing curriculum and examining other programs, and (c) the existence of a theoretical foundation of each of the published thinking skills programs.

The content analysis revealed seven of the eight programs did contain a high frequency of these thinking skills lessons. The Core Thinking Skills Framework, with its 21 subskills, appeared in six of the eight published programs and is a comprehensive taxonomy of thinking skills useful in curriculum planning of thinking skills instruction and in the analysis of other thinking skills programs. The research and background behind the development of each of the thinking skills programs contributed to a theoretical foundation of each program.

The thinking skills terms, variation of program design, and absence of an accepted knowledge base on thinking skills contributes to a dilemma for the teacher because of the diversity in theory and practice.

The inclusion in the curriculum of published thinking skills programs is not the only way to provide instruction in thinking skills. A teacher's knowledge of the Core Thinking Skills Framework is sufficient to develop effective, efficient thinking skills instruction. Published thinking skills programs and teacher initialed instruction both can meet the needs of students and should not be considered preferable over one another. Separate thinking skills programs instruction should be applied to curriculum subject areas so that students experience the pragmatic use of thinking skills in the curriculum.

A CONTENT ANALYSIS OF COMMERCIALLY PREPARED

THINKING SKILLS PROGRAMS

by

Joan Viola Clary

A thesis submitted in partial fulfillment of the
requirements for the degree

of

Doctor of Education

MONTANA STATE UNIVERSITY
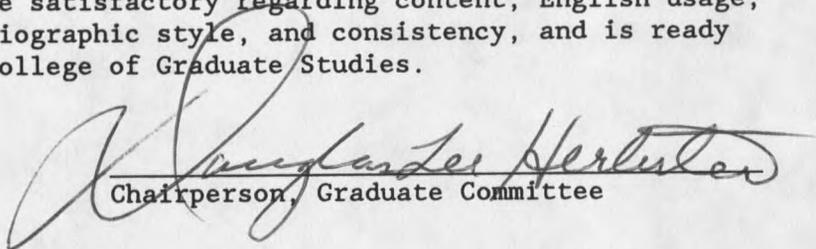Bozeman, Montana

April 1992

ii

APPROVAL

of a thesis submitted by

Joan Viola Clary

This thesis has been read by each member of the thesis committee
and has been found to be satisfactory regarding content, English usage,
format, citations, bibliographic style, and consistency, and is ready
for submission to the college of Graduate Studies.

4/22/92
Date   Chairperson, Graduate Committee
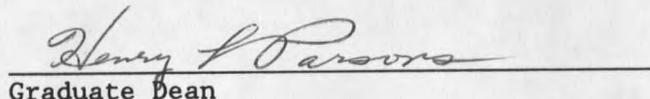

Approved for the Major Department
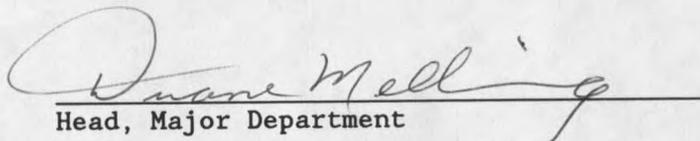
April 22, 1992
Date   Head, Major Department

Approved for the College of Graduate Studies

April 27, 1992
Date   Graduate Dean

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a doctoral degree at Montana State University, I agree that the Library shall make it available to borrowers under rules of the Library. I further agree that copying of this thesis is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for extensive copying or reproduction of this thesis should be referred to University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106, to whom I have granted "the exclusive right to reproduce and distribute copies of the thesis in and from microfilm and the right to reproduce and distribute by abstract in any format."

Signature _____

Date _____

iv

ACKNOWLEDGEMENTS

I wish to express my gratitude to Dr. Douglas Herbster, Chairman of my graduate committee for his help in the completion of this study. Appreciation is also extended to the committee members, Dr. Gary Conti, Dr. Leroy Casagranda, Dr. Robert Fellenz, and Dr. Duane Melling for their suggestions and willingness to serve on this committee.

A special thanks to my colleagues at Gonzaga University for the numerous ways they showed their support and words of encouragement while I was in the "dissertation mode." To Mrs. Barbara Flynn of Word Pro, a very special note of gratitude for her endless patience and technical assistance. Barbara was referred to me as the "best in Spokane at what she does." She is not only the best at what she does, she has also become a good friend.

A special thanks to Irma Tiffany for helping the lines of communication between Montana and Washington.

And last but not least is BVM for her vision and support.

TABLE OF CONTENTS

TABLE OF CONTENTS--(Continued)

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The curriculum movement that focuses upon process thinking rather than product has given rise to a plethora of published thinking skills programs. These vary in focus, design, vocabulary, and application. Therefore, the purpose of this study was to conduct a content analysis of eight commercially published programs of the CoRT Program, Philosophy for Children, Odyssey, Building Thinking Skills, Methods of Inquiry: Learning to Learn, Thinking Skills: Making a Choice, Future Problem Solving, and Creative Problem Solving, totalling 1,656 thinking skills lessons, to determine (a) the presence and frequency of thinking skills lessons as determined and categorized by the Core Thinking Skills Framework subskills, (b) the viability of the Core Thinking Skills Framework as a comprehensive criterion of thinking skills to be used in planning thinking skills instruction within existing curriculum and examining other programs, and (c) the existence of a theoretical foundation of each of the published thinking skills programs.

The content analysis revealed seven of the eight programs did contain a high frequency of these thinking skills lessons. The Core Thinking Skills Framework, with its 21 subskills, appeared in six of the eight published programs and is a comprehensive taxonomy of thinking skills useful in curriculum planning of thinking skills instruction and in the analysis of other thinking skills programs. The research and background behind the development of each of the thinking skills programs contributed to a theoretical foundation of each program.

The thinking skills terms, variation of program design, and absence of an accepted knowledge base on thinking skills contributes to a dilemma for the teacher because of the diversity in theory and practice.

The inclusion in the curriculum of published thinking skills programs is not the only way to provide instruction in thinking skills. A teacher's knowledge of the Core Thinking Skills Framework is sufficient to develop effective, efficient thinking skills instruction. Published thinking skills programs and teacher initialed instruction both can meet the needs of students and should not be considered preferable over one another. Separate thinking skills programs instruction should be applied to curriculum subject areas so that students experience the pragmatic use of thinking skills in the curriculum.

CHAPTER 1

INTRODUCTION

Our changing world suggests new challenges for education to prepare our future citizenry for the expanding and demanding world of today and tomorrow. Factual information can no longer be taught in and for itself but must be a vehicle for igniting new ideas and choices. A critical curriculum area which schools and educational institutions should focus upon is the inclusion of thinking skills. Educational researchers and futurists are suggesting that there is a need to clarify the thinking skills area and that the components of a thinking skills curriculum should be regularly practiced in schools (Costa, 1989; Fergerson, 1980). A new concept of literacy is emerging, a literacy not only encompassing the traditional language arts but a literacy whose emphasis continues to be upon communication with the added ability to think more critically and creatively. Fergerson (1980) describes a paradigm shift from the old assumptions of education when describing the old assumption "of learning as a product, a destination, to learning as a process, a journey" (p. 289).

> What all literate citizens should know will no longer be a major concern. It is not possible to predict exactly the knowledge base required of productive citizens in the global/service-oriented/information age. It is also impossible to "cover" all the information in a human's lifetime. We can be sure, though, that all citizens will

need to solve problems, to think creatively and to continue
to learn. (Costa, 1989, p. vii)

The back-to-basics of the 21st century will require of students

not only the "three Rs" of the past but also the ability to validate

information while thinking critically and creatively.

Rapid expansion of knowledge points to the importance of
curriculums that empower students to locate and process
knowledge rather than simply memorize facts. (Hughes, 1985,
p. ix)

McTighe and Schollenberger (1985) conclude that the goal of

teaching thinking skills should be:

Particularly important for contemporary democracy as local,
national, and international issues become increasingly
complex . . . . The message is clear--educators need to take
renewed action to bring about qualitative improvements in
student thinking. (p. 5)

This new educational focus is also reflected in the popular press.

Megatrends: Ten New Directions to Transform Our Lives (Naisbitt,

1982), itself a content analysis of a changing society; The Third Wave

(Toffler, 1980), a prophetic view of society; and In Search of

Excellence (Peters & Waterman, 1982), a description of contemporary

businesses' needs, all point to a citizenry that must be equipped with

the necessary skills not only to organize and manipulate information

but to evaluate this information both critically and creatively.

Chance (1986) sums it up by writing, "There seems to be a growing

realization among American educators that our society is in the midst

of a profound cultural transformation, one that will provide a world in

which high level thinking is a basic skill" (p. 2). Chance went on to

describe, "[T]his transformation has given rise to an unprecedented

interest in the teaching of thinking" (p. 2).

There are calls for all sections of the cultural arena to develop a more thinking society, a wiser consumer of information. Citizens of tomorrow will not be able to rely upon the competencies of yesterday to meet the challenges of the future.

In the mid-1980s, the Association for Supervision and Curriculum Development (ASCD), an international educational organizational leader, surveyed a sample of its members to determine the educational informational concerns the members requested. Eighty-two percent of the members who answered the survey indicated that the members wanted more information concerning instruction in thinking skills (Chance, 1986). Interest in the improvement of thinking skills also surfaced as the most important of 25 educational goals in the 1985 Gallup Poll on teachers' attitudes toward the public schools (Gallup, 1985).

Background of the Study

The evolution of this study itself became an additional need for this research. While attending classes at Montana State University the academic year 1983-84, professors in several classes stressed the need to include thinking skills within the curriculum. An ERIC search at that time revealed that it was almost impossible to locate pertinent literature because thinking skills had not been incorporated into the system as a descriptor.

The writer obtained a Regional Scholar Award granted by the Northwest Regional Educational Laboratory in Portland, Oregon, to pursue the development of the thinking skills area. The writer also attended the ASCD annual international conference entitled "Thinking

and Learning: A Bridge to the Possible" in San Francisco in 1986, to examine the existing published thinking skills programs. An examination of the displayed programs indicated to the writer the diversity of the thinking skills programs in instructional models, program designs, theoretical foundations, etc. Rather than selecting a specific program to pursue research, it became apparent that the greater contribution to the body of educational research would be to examine a sample of published programs to indicate the presence and patterns of thinking skills as categorized by "Core Thinking Skills Framework," (Marzano et al., 1988, p. 43) an existent criterion.

Statement of the Problem

The curriculum movement that focuses upon process thinking rather than product has given rise to a plethora of published thinking skills programs. These programs are developed upon different theoretical premises, philosophies, perceptions, and definitions of thinking. This has resulted in programs that vary in focus, design, vocabulary, and application. The teacher, the consumer, does not always have sufficient information about all of these programs to choose programs that best match his/her specific instructional needs.

The purpose of the study was:

1. To determine the relationship of the thinking skills as described in the Core Thinking Skills Framework and the thinking skills contained in eight published thinking skills programs.

2. To determine the presence and frequency of the thinking skills as categorized by the "Core Thinking Skills Framework" in the eight programs.

3. To determine the presence or absence of a theoretical foundation for each of the eight published thinking skills programs.

Research Questions to be Investigated

The major research questions asked in this study were:

1. Can thinking skills contained in each of the published programs as categorized by the Core Thinking Skills Framework be identified?

2. Will the use of the Core Thinking Skills Framework be specific enough and inclusive to register the thinking skills in each of the programs?

3. Do the thinking skills located within each program cluster around specific categories?

4. What theoretical foundation was each of the programs built upon?

Importance of This Study

The need for the content analysis of the sample of thinking skills programs is the aggregate of three areas of concern.

First, much attention and concern is being generated from the national surveys and assessments commissions.

> The recent and fairly sudden surge of interest in higher order thinking skills can be explained in part by the national concern over poor test results. A flurry of

high-level government-sponsored reports has indicated that thinking in children has reached an abysmally low level. (Baron, 1987, p. x)

Organizations such as the Education Commission of the States reported, "The pattern is clear; the percentage of students achieving higher order skills is declining" (1982). The National Assessment of Educational Progress reported "Their (students') performance drops substantially when they are asked to infer, integrate and evaluate" (1983). The College Board (1983) and the Nation at Risk (1983) have reported deficiencies in higher level thinking as a major area of concern.

A second area of concern is the absence of substantial and systematic teaching of thinking skills in and through the curriculum. Beyer (1984) has attempted to identify why the teaching of thinking skills are not flourishing in classrooms:

> There are at least five major reasons why we educators have not put to better use the time that we devote to teaching thinking skills. First, we do not agree among ourselves which thinking skills we should teach. Second, too many educators and developers of instructional materials do not understand--or have not defined precisely--the skills that they have elected to teach. Third, despite their best intentions, most teachers never actually provide the kinds of instruction that research suggests are most productive in developing competent thinkers. Fourth, school curricula too frequently suffer from "skills overload"; they bombard students with one-shot exposures to literally dozens of skills at each grade level, apparently on the assumption that children can master these skills on first introduction. Finally, the achievement test currently in use in many schools may actually inhibit the teaching and learning of thinking skills; at the very least, they hinder the consistent evaluation of students' competence in these skills. (p. 486)

Third, the concerns of poor performance in higher level thinking skills coupled with absence of substantial instruction in these areas

prompts opponents to suggest that teachers need help to organize and

unify the various thinking skills content inherent in published

programs.

> What has been missing in current theory and practice is an
> organizing framework for teaching thinking a latticework to
> systematically examine themes common to the different
> approaches and relationships among them. An appropriate
> framework would allow practitioners in different subject
> areas and grade levels to develop a common knowledge base and
> a common language for teaching thinking. (Marzano et al.,
> 1988, p. 3)

The diversity of available thinking skills programs, instead of

offering teachers a gamut of curriculum choices, often restricts the

teachers' choices.

> Currently, there is a great deal of interest in improving
> student thinking abilities, but there is also a great deal of
> confusion about what thinking is, the kinds of experiences or
> programs that advance it. (Presseisen, 1985, p. 43)

To indicate the extent of thinking skills programs available to

teachers, ASCD published Developing Minds: A Resource Book for

Teaching Thinking in 1985. This book describes thinking skills

programs which are only a sample of all the programs in use.

> We are struck by the diversity of (thinking skills)
> strategies available to teachers. This raises the question
> of why strategies have not become an integral part of most
> teachers' practices. (Costa, Hanson, Silver & Strang, 1985,
> p. 181)

An outgrowth of the above areas of attention in the thinking

skills arena is the need to provide educators with a common baseline or

an organizing device--a framework. This kind of a unifying instrument

would give practitioners in different subject areas and grade levels,

"A common knowledge base and a common language for teaching thinking"

(Marzano et al., 1988, p. 3).

In summary, (a) the existence of low test scores in thinking skills, (b) the need to provide more instruction in thinking skills, and (c) the need of information to help teachers in the planning of instruction in thinking skills provides the need for this investigation.

> Educators wanted a framework because they were hearing more and more about published programs designed specifically for teaching . . . . If schools were to integrate the teaching of thinking with regular academics instruction, they need to know what aspects of thinking to teach. (Knoll, 1988, p. viii)

General Procedures

Content analysis is a technique where media, print, and/or telecommunication is analyzed to identify specific characteristics. The content analysis in this study is an analysis of a selection of eight available thinking skills programs to: (a) identify the presence and patterns of thinking skills as described by the "Core Thinking Skills Framework," (b) determine whether the Core Thinking Skills Framework is a viable criterion to register a broad array of thinking skills, and (c) further analyze the theoretical foundations of each program.

Literature Search

The review of literature concentrated on current literature published during the 1980s related to the topics: the existence of thinking skills in the present school curriculum, thinking and learning, the problems teachers encounter when attempting to implement

thinking skills into the curriculum and the need to include thinking skills within the curriculum.

ERIC, Dissertation Abstracts, and an extensive bibliography from <u>Developing Minds</u> provided assistance in identifying and locating the critical information. Although a brief consideration of historical references was noted, the emphasis was given to current literature on thinking skills. A discussion of thinking skill areas, critical, and creative thinking is included. The research foundation of the Core Thinking Skills Framework is discussed. The premise for the selection of the published thinking skills programs is discussed. A brief examination of the research design content analysis is also included.

Design Steps

The population, that is, the written language to be analyzed (the text), is contained in the eight available thinking skills programs. These programs were selected and listed in the publication, <u>Developing Minds</u> (Costa, 1985). Using a predesignated list of programs frees the investigator from subjective selection.

Design Procedure

1. A request was sent to each of the publishing companies of the thinking skills programs cited in <u>Developing Minds</u> (Costa, 1985) to use the material on consignment. A sample copy of the request letter is included in Appendix A.

2. The lack of response prompted the investigator to purchase all available material (published material available to teachers and curriculum planners). Some of the programs cited in <u>Developing Minds</u>

were in the form of structured workshops by trainers and not available packages for examination. A criterion text needed to be located to perform the content analysis study on the thinking skills content within each of the published programs. The publication, <u>Dimensions of Thinking: A Framework for Curriculum and Instruction</u>, contained a "Core Thinking Skills Framework." Marzano et al. (1988) stated, "We refer to these more micro-level operations as core thinking skills. They are best described as basic cognitive operations used in metacognitive reflection and in the thinking process" (p. 4). The Core Thinking Skills Framework is contained in Chapter 2.

3. In order to obtain inter-rater reliability, two graduate students were presented a training program and then were given 10 thinking skills lessons to analyze and compare with the principal coder.

4. The reporting procedures are in the form of a narrative and a table indicating content analysis of each of the eight thinking skills programs, followed by a summary of the programs. A summary matrix of the Core Thinking Skills Framework with the percentage of relationship of each of the thinking skills programs is presented.

5. A summary report as to the theoretical foundation of each program is made.

6. Each of the research questions will be addressed in light of the findings of the content analysis.

Limitations of the Study

In the study, only the manifest content (see definition of terms) of the thinking skills program is examined. The researcher examined the most obvious, surface meaning of the thinking skills lessons; there was no attempt to judge the latent content in order to find more subtle meanings. Each of the thinking skills lessons is examined as to the "goodness of fit" to the criterion categories of the "Core Thinking Skills Framework." Many thinking skills lessons are not single-focus skills lessons but present several skills or embedded skills at one time. The thinking skill judged to be critical and the foundation of the lesson is categorized.

The Core Thinking Skills Framework is used as the criterion text (see definition of terms) or standard categories.

The Core Thinking Skills Framework contains eight general categories with 21 sub-thinking skills. Each skill is identified and discussed in Chapters 3 and 4.

The study was restricted to the analysis of the thinking skills programs available for hands-on review by the researcher. The eight thinking skills programs used in the study are described on three different levels in Chapters 3 and 4.

The study used only the thinking skills listed in the "Core Thinking Skills Framework." Each thinking skill lesson will be identified as either within the category or outside of the category, therefore, lessons devoted to other areas will not be treated.

12

The study makes no attempt to evaluate the quality of each program but rather is a survey of particular content. The study identifies the presence or absence of specific thinking skills. The study is descriptive in design and makes no attempt to measure its effectiveness when used with students.

Definition of Terms

The terms listed below will be used throughout the study and are defined as follows:

Categories: "Categories, the 'pigeonholes' into which content units are to be classified . . . should reflect the purpose of the research, be exhaustive, be mutually exclusive, independent, and be derived from a single classification principle" (Holsti, 1969, p. 95).

Coders: Coders were two trained graduate students who analyzed a sample of thinking skills programs.

Coding: Coding is the process whereby raw data are systematically transformed and aggregated into units which permit precise description of relevant content characteristics (Holsti, 1969, p. 94).

Cognition: "Cognition is related to the various thinking processes characteristic of human intelligence" (Costa et al., 1985, p. 312).

Content Analysis: "Content analysis is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (Berelson, 1971, p. 18). "Content analysis is a research technique for making replicable and valid inferences from data to their context" (Kruppendorff, 1980, p. 21).

Content Criterion: Content criterion is the standard text categories used to measure the presence or absence of thinking skills. "A standard with which an object is compared so as to establish what kind or how good" (Kruppendorff, 1980, p. 38).

Context Units: "Context units set limits to the contextual information that may enter the description of a recording unit" (Kruppendorff, 1980, p. 59). Context Units are the thinking skills lessons used to examine and categorize.

Core Thinking Skills: "Core thinking skills are cognitive operations used in thinking processes" (Marzano et al., 1988, p. 143).

Framework: "A framework is a general pool of constructs for understanding a domain, but is not tightly enough organized to constitute a predictive theory" (Anderson, 1983, p. 12).

Manifest Content: "Manifest content is the visible, surface content of a communication" (Babbie, 1983, p. 279).

Recording Units: "Recording units are separately described and can therefore be regarded as the separately analyzable parts of a sampling unit" (Kruppendorff, 1980, p. 58).

Sampling Units: "Sampling units are those parts of observed reality or the stream of source language expressions that are regarded independent of each other" (Kruppendorff, 1980, p. 57).

Thinking Skills: "Thinking skills is the mental manipulation of sensory input to formulate thoughts, reason about or judge" (Costa et al., 1985, p. 312). "Thinking is the operation skills with which intelligence acts upon experience" (debono, 1970, p. 703).

<u>Thinking Skills Lessons</u>: Thinking skills lesson is a set of experiences whereby, "There is the mental manipulation of sensory input to formulate thoughts, reason or judge" (Costa et al., 1985, p. 312).

<u>Thinking Skills Program</u>: Thinking skills program are any of the programs cited in the publication, <u>Developing Minds</u>.

<div align="center"><u>Summary</u></div>

Educators are seeking new ways to equip students with the thinking skills needed to process and manipulate the information deluge.

The background of the study describes the writer's personal refining of the study. The statement of the problem describes the dilemma that teachers find in selecting thinking skills programs to be used in the classroom. Research questions are presented, and the importance of the study is delineated under three general areas. The general procedures are described with the limitations of the study. The definitions of the terms in the study are presented.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

> Thought (thinking) is the basic ingredient in learning. It
> is also the basic energy in human history. Civilization is
> put together not by machines but by thought. Similarly,
> human uniqueness is represented not just by our ability to
> make objects but to sort them out and relate them . . . .
> The impotence of the brute alongside the power of the sage is
> represented by thought (thinking). (Cousins, 1986, p. 30)

Rodale's, The Synonym Finder, lists 172 synonyms for the verb

"think" and 82 synonyms for the adjective "thinking" (1978,

pp. 1129-1130). Who has not received the edict, "Think"? It is good

advice, but if a person responded, "How?", one would have great

difficulty imagining what a helpful answer would be. "Clearly, it is

much more difficult to admonish people to think than to tell them how

to do so" (Nickerson, Perkins, & Smith, 1985, p. 3).

It takes a great deal of instruction, coaching, and patience to

become a skilled athlete. Like physical precision, thinking is hard

work. "Unlike athletics, however, thinking is most often idiosyncratic

and covert" (Costa, 1989, p. xi).

In discussing the current state of the teaching of thinking

skills, Beyer (1984) stated, "The teaching of thinking skills is a lot

like the weather, almost everybody talks about it, but few educators

seem to be able to do much to improve it" (p. 486). Perkins (1986) furthers this theme, as he writes, "The knowledge glut and knowledge obsolescence has in part inspired the current attention to the development of student thinking. Students need such skills to manage the flood of information in the modern world" (p. 4).

Educators as well as philosophers and psychologists all have claim to the concept of thinking. Each group has different purposes and approaches, but each helps one to be more concrete in one's thinking about attempts to foster a more purposeful thinking. Philosophers focus upon identifying methods such as comparison, classification, inference, and deduction that allows one to solve the abstract and practical problems of daily existence (Young, 1980, p. ix).

> Man's exploration of the nature of thought, like the rest of psychology, began life in the philosopher's armchair. The study of thought processes, however, took even longer than many other areas of psychology to pull loose from philosophy. It not only had to get up out of the armchair but out of the very head nestled therein. Because of the elusive, private, intensely personal nature of thought, on one hand, and because of its relation to "truth," "knowledge," and "judgment" on the other, the philosopher has been reluctant to part with this providence of the study of man. (Mandler & Mandler, 1964, p. 7)

Psychologists emphasize cognitive structures, metacognition, and suggest that a number of primary structures form the basis of intellectual activity (Young, 1980, p. ix).

Educators have focused on the objectives of formal education.

> Though necessarily attentive to cognitive and philosophical methods, those most concerned with curricula, teaching methods, and assessment of students have tried to define the goals of education in the realm of critical thinking and develop ways of achieving these goals. (Young, 1980, p. ix)

In discussing the integration of the present-day thinking skills content, Swartz (1990) notes, "It is perhaps unfortunate that the two camps (psychology and philosophy) have not met and mingled more. However, at the same time, there are benefits in the ways they contrast with and complement one another" (p. 7). Although there has been a renewed interest in the teaching of thinking skills, this is not new.

> The psychology of thinking and complex learning has held a
> regular, albeit modest, position in the mainstream of
> psychology ever since William James (1890) included a chapter
> on reasoning in his famous textbook. (Mayer, 1983, p. 8)

Dewey (1910) described the need to achieve balance between process and product (p. 217). Dewey also grappled with the formulation of a definition of thinking as he wrote: "No words are oftener on our lips than thinking and thought. So profuse and varied, indeed, is our use of these words that it is not easy to define just what we mean by them" (Dewey, 1910, p. 1). He further wrote, when describing the need to teach thinking skills:

> Since these habits (thinking skills) are not a gift of
> nature; since, moreover the casual circumstances of the
> natural and social environment are not enough to compel their
> acquisition, the main office of education is to supply
> conditions that make for their cultivation. The formation of
> these habits is the Training of Mind. (Dewey, 1910, p. 27)

Oswald (1964) noted another contributor to the expansion of a focus on thinking and cognitive activity in his essay, "The Modern Psychology of Thinking," when he noted:

> Probably the major turning point in the history of thinking
> came with the work of Otto Selz. Although Selz studied with
> some of the Wuzbury psychologists, his magna opesa were
> written . . . and published in 1913 and 1922 . . . . He
> deals with the problem of directed thinking but he is the
> first psychologist who is both willing and able to deal with
> the productive thinking. (Oswald, 1964, p. 215)

As the theory and practice of curriculum began to form, Taba
(1962) (often characterized as the architect of theoretical curriculum
development) also stressed the need to emphasize the "importance of
critical thinking as a desirable ingredient in a democratic society"
(p. 215).

The wide array of approaches to the teaching of thinking skills
gives testimony to the fact that educators and researchers hold
differing opinions as to what constitutes thinking skills and how best
to incorporate them within the curriculum (Nickerson, 1984, p. 26).
Nickerson, Perkins, and Smith (1985) identify the following features
that contrast existing programs:

> Scope - Specific skills addressed - Ages and academic
> abilities of particular students - Amount and distribution of
> class time devoted to the program - Amount of special
> training given to teachers - Amount and type of program
> materials (instruction to teachers, students' exercises, or
> workbooks) - Latitude given to teachers - Completeness and
> availability of documentation - Degree of integration with
> other courses - Amount of emphasis on evaluation - Evaluation
> instruments used - Evidence of effectiveness. (Nickerson,
> Perkins, & Smith, 1985, p. 29)

In addition to the above distinguishing features, Nickerson,
Perkins, and Smith further grouped the existing programs into:

> (1) Cognitive-process approaches, (2) heuristics-oriented
> approaches, (3) approaches that focus on the development
> of formal thinking in the Piagetan sense, (4) approaches
> that emphasize language and symbol manipulation, and
> (5) approaches that focus on thinking as subject matter.
> (Perkins & Smith, 1984, p. 26)

The added burden of describing thinking within the complex
thinking processes such as critical thinking, creative thinking,
problem solving, and decision making adds to the dilemma of teachers
and curriculum planners. "Although there is no one glossary of thinking

terms that serves the many nuances of meaning association with

cognitive operation" (Costa et al., 1985, p. 310), the following are

definitions of the above terms taken from the glossary in _Developing_

Minds: A Resource for Teaching Thinking; these provide a working

framework for discussion.

> Creative Thinking: The act of being able to produce along
> new and original lines.
>
> Critical Thinking: Using basic thinking processes to analyze
> arguments and generate insight into particular meanings and
> interpretations; also known as directed thinking.
>
> Decision making: The process leading to the selection of one
> of several options after consideration of facts or ideas,
> possible alternatives, probable consequences, and personal
> values.
>
> Problem Solve: To define or describe a problem, determine
> the desired outcome, select possible solutions, choose
> strategies, test trial solutions, evaluate the outcome, and
> revise these steps where necessary. (Costa et al., 1985,
> pp. 309-311)

As Swartz and Perkins (1990) and others give another reason why

the teaching of thinking is popular today, they note,

> Psychologists have turned somewhat away from animal
> experimentation and the technical nuances of isolated bits of
> human behavior and turned toward the kinds of complex
> contextual conduct that have significance in the real world.
> Learning, problem solving, writing, and other performances
> important in academic settings have been among their favorite
> concerns . . . . Philosophy, too has come out of the ivy to
> meet teachers and students in the corridors of school.
> (p. 7)

Swartz and Perkins (1990) and others aptly describe the dilemma to

define different kinds of thinking skills as they write, "We suspect

that there is no ideal taxonomy (of thinking skills) because the

complex landscape of thinking can be partitioned in many different

equally reasonable ways" (p. 36).

"In getting a sense of which important kinds of thinking are emphasized in a program and which are not, it may be helpful for practitioners to have a map of the domain of thinking which locates these various ingredients in relation to each other" (Swartz & Perkins, 1990, p. 108). "[These] are the categories of thinking that in fact are much used in everyday speech and in the current thinking skills movement" (Swartz & Perkins, 1990, p. 38). The general areas of the thinking domain scheme are creative thinking, critical thinking, decision making, problem solving, and retention and use of information (Swartz & Perkins, 1990, p. 109).

Furedy and Furedy (1985) noted, "Research into critical thinking is difficult, partly because there is no agreed-upon general definition of critical thinking" (p. 52).

In How We Think, Dewey (1910) described a reflective thought as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion which it tends" (p. 9).

Norris and Ennis (1990) include reflective thinking in this current definition, "Critical thinking is reasonable and reflective thinking that is focused upon deciding what to believe or do" (p. 3). The above definition contains critical words. First, "critical thinking" is defined as "reasonable thinking," that is not arbitrary thinking but relies upon the use of good standards. The term "reflective thinking" presupposes that one consciously seeks and uses good reasons. When thinking is focused, it generally is consciously directed. And lastly, the words "decisions about what to believe or

do" indicate that critical thinking evaluates statements (Norris & Ennis, 1990, p. 4). Proponents of critical thinking also suggest that one should possess certain attitudes that promote critical thinking. These abilities can be grouped into four general sets:

- Those involved in thinking clearly.

- Those involved in making and evaluating influences.

- Those needed to establish a sound basis for inference.

- Those involved in carrying out the critical thinking process in an orderly and effective way. (Norris & Ennis, 1990)

The word "creativity" (creative thinking skills) has been applied to accomplishments as minute as a youngster's art work to as grand as the work of Einstein. Psychologists studying creative thinking skills often contribute to the confusion because some define creative thinking skills by citing real-life accomplishments, while others rely on measuring a trait or set of traits central to creative thinking (Mansfield & Busse, 1981, p. ix).

Perkins (1986) sums up this confusion when he writes, "Creativity is a messy and myth-ridden subject. Many of our casual beliefs have prevented an adequate understanding of creative thinking and have thwarted efforts to nourish its development in schools, businesses, and homes" (p. 58). One myth is that creativity (creative thinking) is correlated to intelligence. Another myth is that creativity (creative thinking) implies "ideational fluency"--the ability to produce a large number of appropriate and unusual ideas efficiently (Perkins, 1986, p. 58).

As cited in Brown (1989), Guilford, whose address to the American Psychological Association is viewed as the foundation of contemporary research on creativity, hypothesized that at least eight abilities underlay creativity. He saw creativity as a result of the action of several more or less of the traits listed below.

```
        1.  Sensitivity to problems.
        2.  Fluency.
        3.  Novel ideas.
        4.  Flexibility.
   5. & 6.  Synthesizing and analyzing ability.
        7.  Complexity.
        8.  Evaluation.  (Brown, 1989, p. 5)
```

More recently, Perkins (1985) places emphasis on output when he describes "Creative thinking is thinking patterned in a way that tends to lead to creative results" (p. 60).

As the diversity of definitions of creative thinking exist, authors also differ in describing components of creative thinking. Perkins (1985) categorizes six principles of creative thinking as follows:

1. Creative thinking involves aesthetic as much as practical standards.

2. Creative thinking depends on attention to purpose as much as to results.

3. Creative thinking depends on mobility more than fluency.

4. Creative thinking depends on working at the edge more than at the center of one's competence.

5. Creative thinking depends as much on being objective as on being subjective.

6. Creative thinking depends on intrinsic, more than extrinsic, motivation. (p. 59)

Marzano et al. (1988) presents yet another list of aspects of creative thinking that may be drawn from various theoretical bases as:

1. Creativity takes place in conjunction with intense desire and preparation.

2. Creativity involves working at the edge rather than the center of one's capacity.

3. Creativity requires an internal rather than external locus of evaluation.

4. Creativity involves reframing ideas.

5. Creativity can sometimes be facilitated by getting away from intensive engagement for awhile to permit free-flowing thought. (p. 27)

When studying schooling in general, there is a mixture of sentiment about the nurturing of creativity in that "Schooling generally presents knowledge as a given, rather than as the product of a creative effort to accomplish something. And schooling generally poses to students tasks that do not exercise or even allow creative effort" (Perkins, 1986, p. 61).

It becomes apparent that the breadth of this variation becomes a cause of frustration, rather than offering the teacher extensive opportunities for curriculum planning.

Literature citations expounding the need to infuse thinking skills into the curriculum extends from the commitment of professional educational associations to professional journals to government-sponsored reports on the state of education to the popular press.

The Association for Supervision and Curriculum Development (ASCD) has spearheaded information concerning the concept and the successful

implementation of thinking skills programs through their official organ
Educational Leadership, 1986 National Conference, and regional
workshops. ASCD also formed an Association Collaborative for Teaching
Thinking representing 27 educational organizations. The members of
this collaborative are listed in Appendix B.

ASCD also published three significant works, Developing Minds: A
Resource Book for Teaching Thinking, Dimensions of Thinking: A
Framework for Curriculum and Instruction, and Toward the Thinking
Curriculum: Current Cognitive Research (1989 Yearbook of ASCD).

The expanded version of the ASCD 1984 resolution stated: "Further
development and emphases are needed in teaching skills of problem
solving, reasoning, conceptualization, and analysis, which are among
the neglected basics needed in tomorrow's society" (ASCD, 1984).

Headlines appearing in the November 6, 1985, edition of Education
Week read "Education Groups Join Forces To Improve Students' Thinking
Skills." The news item detailed the formation of a "Collaborative on
Thinking." This was in response to "decline in students' thinking
skills." The list of leading academic societies and administrators'
groups that form the Collaborative is contained in Appendix B.

The article stated that:

Panels made up of representatives of cooperating
organizations would be focusing on the following activities:

• Refining the terms and definitions to describe thinking
  skills and processes so that they are more useful to
  curriculum planners;

• Suggesting changes in preservice and inservice training for
  teachers so that they will be better able to develop
  thinking skills in their students;

- Asking publishers to design tests and textbook materials so that they contribute to the improvement of students' thinking skills;

- Promoting additional research about human thinking and the effectiveness of various instructional approaches and materials for development;

- Soliciting public support for teaching thinking by explaining the need for and value of such programs. (Olson, 1985, p. 4)

The cover article of a New York Times Education Supplement entitled "Teaching to Think: A New Emphasis" illustrates the widespread concern and growing educational response to the teaching of thinking skills. A Business Week article asked the question, "Are You Creative?: Research Shows Creativity Can Be Taught," and "Companies Are Listening" ("Are You Creative", 1985, p. 1).

As the diversity in published thinking skills programs continues to surface, writers and curriculum planners are now discovering that in order to assist teachers to better understand and select specific programs, there is a need to analyze and collect data in a format that could help teachers make more informed instructional decisions. Under the heading "V. Recommendations for Those Who Select or Construct Curricular Materials" (thinking skills program), a report of the Task Force on Thinking by the New Jersey Basic Skills Council cautions:

It is very difficult to evaluate the effectiveness of individual instructional programs in thinking . . . . It is virtually impossible to compare the effectiveness of different programs . . . and many school districts have committed themselves to assessing and teaching long lists of thinking skills--with very little clarity on how each of those skills relates to the others, to an overall concept of the thinking process. (Department of Higher Education, 1986, pp. 34-35)

Although there are over 30 different thinking skills, programs,
and instructional strategies, these programs are useful and show great
strides to draw attention to foster thinking instruction--the number of
options can be confusing (Marzano et al., 1988, p. 3). Rather than
"polarizing debates," Quellmalz (1987) calls for a "focus instead on
identifying a manageable framework of common (thinking) skills that
clearly generalize across academic and practical areas" (p. 86).

Although literature points to the diversity of approaches and
programs, the need for a unifying model, Young (1980), Presseisen
(1985), and Costa (1989) reinforce the need to unify the thinking skill
information into a manageable unit for effective and efficient
instructional decision making.

The content used for examination in this study was taken from two
publications of ASCD. The criterion categories selected to use as the
measuring device were the thinking skills listed in the publication
entitled <u>Dimensions of Thinking: A Framework for Curriculum and
Instruction</u> called Core Thinking Skills Framework. The Core Thinking
Skills Framework lists 8 general categories with 21 subskills as listed
in Chapter 3 with an explanation. The 21 subskills were used as the
text categories to identify and group the skills present published in
the eight Thinking Skills Programs.

Attendance in 1986 of the ASCD National Convention entitled
"Thinking and Learning: Bridge to the Possible" was made to identify a
thinking skill program to work with for research. The writer noted the
extent and variety of programs purporting to teaching all aspects of
thinking. The material ranged from single booklets to extensive

programs. It was then that the writer sensed a need for some helping device for teachers. In order to narrow the examination of specific thinking skills programs, only the programs cited another ASCD publication, <u>Developing Minds: A Resource Book for Teaching Thinking</u> were used.

In addition to a content analysis of the cited programs, the investigator further examined each program as to the theoretical foundations of each program as suggested by Presseisen (1987, p. 71).

<center>Summary</center>

Chapter 2, The Review of the Literature, cites the contributions of philosophy and psychology to the present day thinking skills movement. The chapter also cites various proponents of discussion of thinking skills. A discussion of the general areas of thinking skills followed. The recent emphasis on the thinking skills movement is presented.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

Many authors, such as Costa (1989), Marzano et al. (1988), and
Olson (1985), are requesting a shift in focus in American education to
meet the challenges of the 21st century; this shift is from a focus
upon the accumulation of knowledge to a focus upon the cognitive
process of knowing. The current literature highlights the need to
incorporate within the curriculum instructional opportunities that will
provide experience whereby students have the possibility to develop
various thinking skills, coupled with the need to provide assistance to
teachers to meet these needs by identifying materials that provide such
instruction.

The purpose of this study was to analyze eight published thinking
skills programs to identify the presence and frequency of thinking
skills as listed in the Core Thinking Skills Framework. The theoretical
foundations of each program was described. The information acquired
from this content analysis was collected and unified into a summary
matrix in order to give to teachers a concise document highlighting the
"thinking skills" strands contained in each program. This led to an
explanation of the theoretical foundation behind the development of

each program and the content and design of the programs. The final

summary matrix is a descriptive device to relate program content.

Procedures

This study utilized a descriptive research design. Specifically,

content analysis was used to analyze and evaluate the thinking skills

purported to be contained in established published programs. The Core

Thinking Skills Framework was used as a criterion to identify specific

thinking skills contained in each program.

Research Methodology and
Descriptive Research

Descriptive research has been described as observation with

insight. The researcher essentially does two things:

> S/he observes with close scrutiny the population which is
> bounded by research parameters; [and] second, s/he makes a
> careful record of what s/he observes so that when the
> aggregate record is made, the researcher can then return to
> the record to study the observations that have been
> "described" there. (Leedy, 1980, p. 133)

One method used in descriptive research is content analysis.

"Content analysis is a formal system for doing something that we all do

informally rather frequently, drawing conclusions from observations of

content" (Stempel, 1981, p. 119). Analysis of content as a research

technique "is a multipurpose research method developed specifically for

investigating any problem in which the content of communication serves

as the basis of inference" (Holsti, 1969, p. 2). "The problem of

inference lies at the heart of all systematic inquiry, including that

conducted by means of content analysis" (Holsti, 1969, p. 109).

The research schema of content analysis is flexible and involves several constructs. "Truly, communication is at the heart of civilization" (Kuhn, 1963, p. 151). The study of communication content has been analyzed from a variety of perspectives over the years. "As a research technique, content analysis involves specialized procedures for processing scientific data. Like all research techniques, its purpose is to provide knowledge, new insights, a representation of 'facts'" (Kruppendorff, 1980, p. 21). Budd, Thorp, and Donahew (1967) note that "the numerous uses of content analysis, and the wide range of materials amenable to these techniques and uses makes content analysis a tool which could be useful to almost everyone interested in communication research" (p. 11).

A review of technical literature indicates that the definition of content analysis "has largely grown as a result of the uses to which it has been put, and these have changed considerably over the years" (Carney, 1972, p. 22). An early and often-cited definition is Berelson's (1952): "Content analysis is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (p. 488). "There is a group which accepts the distinction between 'quantitative' and 'qualitative,' but which insists that systematic documentary studies of the latter type constitute an important, and perhaps more significant, form of content analysis" (Holsti, 1969, p. 6). Another long-standing definition of "content analysis is any technique for making inferences by objectivity and systematically identifying specified characteristics of messages" (Stone & Kirsch, 1966, p. 14); this indicates that inference is the

major purpose of content analysis. Thus, a suitable definition,

derived from both definitions might be that content analysis is a

technique for the description of a text that is objective, systematic,

and quantitative and which can permit valid and reliable inferences

from the analysis of the data. While content analysis may be flexible

and adaptable to a variety of research needs, it is still a relatively

precise, demanding research technique.

The steps or processes involved in the content analysis technique

can vary according to the interest and design of the researcher and the

complexity of the investigation. Bowers (1970) has described nine

basic steps for conducting a content analysis:

> In general, content analysis consists of the following steps:
> (1) formulating general hypotheses; (2) selecting the sample
> of message to be analyzed; (3) selecting categories and
> units; (4) if necessary, selecting a control or normative
> sample of messages to be analyzed; (6) reformulating general
> hypotheses in terms of categories and units; (7) selecting
> the criterion for accepting or rejecting hypotheses;
> (8) tabulating; (9) applying the criterion. These steps do
> not necessarily occur in this order. (p. 293)

Similarly, Budd, Thorp, and Donahew (1967) describe content

analysis studies as usually involving six stages:

> First, the investigator formulates the research question,
> theory, and hypotheses. Second, he selects a sample and
> defines categories. Third, he reads (or listens to or
> watches) and codes the content according to objective rules.
> Fourth, he may scale items or in some other way arrive at
> scores. Next if other factors are included in the study, he
> compares these scores with measurements of the other
> variables. And finally, he interprets the findings according
> to appropriate concepts or theories. (pp. 12-15)

Thus, the procedures for content analysis are designed for two

ends. First, this method seeks to obtain answers posed by the research

questions. Second, it does so in an objective, systematic, and precise

manner. In this study, the content of eight published thinking skills

programs was analyzed using the categories listed in the Core Thinking

Skills Framework.

Method of Selecting Sampling Units

The sample of thinking skills programs used in this study were the

available programs presented in the ASCD publication, Developing Minds.

This source listed eight programs. These were (a) CoRT, (b) Philosophy

for Children, (c) Future Problem Solving, (d) Thinking Skills: Making

a Choice, (e) Creative Problem Solving, (f) Odyssey, (g) Learning to

Learn, and (h) Building Thinking Skills. A letter was sent to each

publisher on two different occasions stating the nature of the study

and requesting the use of the materials on consignment. Since only two

companies responded, all of the companies cited in Developing Minds

were contacted, and all of the programs available to teachers and

curriculum planners were purchased. Thus, the sampling units for this

analysis consisted of the eight programs which included a total of

1,637 thinking skills lessons. A brief description of each thinking

skills program is presented here. Additional detailed program

information is located in Chapter 4 and in Appendix C.

The CoRT Program, developed by Edward debono, M.D., consists of a

series of six sets of student work cards or workbooks containing 60

teacher-directed, thinking skills lessons. The intended audience is

"ages 8 to 22, all ability levels" (deBono, 1985, p. 204).

The Philosophy for Children Program, which was developed by

Matthew Lipman, consists of a set of four children's novels with an

extensively prepared teacher's manual. It uses "structured discussion plans, exercises, and games" (Lipman, 1985, p. 213). One thousand fifty-five thinking skills lessons were examined. Each teacher's guide contained a teacher-directed lesson for every five sentences of the children's novel. For example, the children's novel, <u>Suki</u>, was 150 pages long. There were 185 teacher-directed lessons. Each lesson contained activities to be used with 20-25 sentences of the novel.

The Future Problem Solving Program consists of a set of teacher training/resource guide books. The guide book entitled "The Activity Book," which contains 87 thinking skills lessons, was examined. The intended audience for this program is "regular program grades 4-12, Primary division K-3" (Crabbe, 1985, p. 218).

The Thinking Skills: Making a Choice Program, which was developed by Charles E. Wales, Anne H. Nardi, and Robert A. Stager, consists of one teacher/student resource workbook containing eight thinking skills lessons. The intended audience for this program is "upper elementary through college and adult learners" (Nardi & Wales, 1985, p. 221).

The Creative Problem Solving: The Basic Course, which was developed by Sidney J. Parnes and based on the works of Alex E. Osborn, consists of a teacher/student resource/workbook containing 48 thinking skills lessons. The intended audience for this program is "middle [especially for the gifted] and secondary levels [all]" (Parnes, 1985, p. 231).

The Odyssey: A Curriculum for Thinking, which was developed by Bolt Beraneh, Harvard University research team, and Newman Inc., consists of a series of books containing 86 thinking skills lessons.

The intended audience for this program is "middle level students" (Wright, 1985, p. 224).

The Learning to Learn Program, which was developed by Marcia Heiman and Joshua Solmianko, consists of one teacher/student resource/workbook containing 28 thinking skills lessons. The intended audience for this program is "junior and senior high school students" (Heiman & Solmianko, 1985, p. 228).

The Building Thinking Skills Program, which was developed by Howard and Blach, consists of a series of student workbooks with an accompanying teacher's manual. Four workbooks were examined; they contained 265 thinking skills lessons. "The program fosters analysis skills at the elementary and secondary levels" (Baker, 1985, p. 236).

Method of Establishing the Core Thinking Skills Framework Categories

The categories identified to group the materials in the thinking skills lessons were chosen from Dimensions of Thinking: A Framework for Curriculum and Instruction (Marzano et al., 1988). This publication presents a Core Thinking Skills Framework--a register of 21 thinking skills areas or categories. In describing the rationale for the inclusion of skills within the "Framework," the authors state:

> We have tried to draw from many scholarly works to identify
> the "dimensions" that appear to be threads running through
> both research and theory-perspectives that can be used to
> analyze various approaches to teaching thinking and to
> provide directives for planning curriculum and instructions.
> (Marzano et al., 1988, p. 3)
>
> They [Core Thinking Skills Framework] are best described as
> basic cognitive operations used in metacognitive reflection
> and in the thinking process . . . . We chose them because

they reflect the various domains of thinking as they are understood in terms of current research. (p. 4)

The thinking skills are used on the criterion as follows: Each [skill] is documented in various strands of psychological research or in philosophy as important to learning or thinking. Each [skill] appears to be teachable, as established through research studies, field testing, or widespread use in the classroom. Each [skill] is valued by educators as important for students to learn. Using these criteria, we have identified 21 thinking skills grouped into 8 categories. (p. 69)

The authors stress that the skills included within the Core Thinking Skills Framework are not to be considered inviolate. "It is an effort to highlight skills that appear to be in the repertoire of the learner" (Marzano et al., 1988, p. 70).

The categories or criterion text of the Core Thinking Skills Framework were used in this study for two purposes. First, they served as an existing criterion to analyze and categorize the thinking skills lessons within each of the published programs. Second, they were used to determine whether the Core Thinking Skills Framework was specific enough to register the thinking skills within thinking skills programs.

The Core Thinking Skills Framework consists of 8 general areas and of 21 subskills. A brief description of each category is presented in Table 1.

The Core Thinking Skills Framework describes the various ways that information can be acted upon intellectually. Information can be selected, gathered, stored, recalled, arranged, clarified, connected, combined, assessed, and used to generate new ideas. The Core Thinking Skills Framework "are those essential to the functioning of other dimensions. They may be used in the service of metacognition, the

Table 1. Core Thinking Skills Framework.

A. <u>Focusing Skills</u> - Attending to selected pieces of information and ignoring others.

   1. <u>Defining Problems</u>: Clarifying needs, discrepancies, or puzzling situations.

   2. <u>Setting Goals</u>: Establishing direction and purpose.

B. <u>Information Gathering Skills</u> - Bringing to consciousness the relevant data needed for cognitive processing.

   3. <u>Observing</u>: Obtaining information through one or more sense.

   4. <u>Formulating Questions</u>: Seeking new information through inquiry.

C. <u>Remembering Skills</u> - Storing and retrieving information.

   5. <u>Encoding</u>: Storing information in long-term information.

   6. <u>Recalling</u>: Retrieving information from long-term memory.

D. <u>Organizing Skills</u> - Arranging information so it can be used more effectively.

   7. <u>Comparing</u>: Noting similarities and differences between or among entities.

   8. <u>Classifying</u>: Grouping and labeling entities on the basis of their attributes.

   9. <u>Ordering</u>: Sequencing entities according to a given criterion.

   10. <u>Representing</u>: Changing the form but not the substance of information.

Table 1.. (Continued).

E. Analyzing Skills - Clarifying existing information by examining parts and relationships.

   11. Identifying Attributes and Components: Determining characteristics or parts of something.

   12. Identifying Relationships and Patterns: Recognizing ways elements are related.

   13. Identifying Main Ideas: Identifying the central element; for example, the hierarchy of key ideas in a message or line of reasoning.

   14. Identifying Errors: Recognizing logical fallacies and other mistakes and, where possible, correcting them.

F. Generating Skills - Producing new information, meaning, or ideas.

   15. Inferring: Going beyond available information to identify what reasonably may be true.

   16. Predicting: Anticipating next events or the outcome of a situation.

   17. Elaborating: Explaining by adding details, examples, or other relevant information.

G. Integrating Skills - Connecting and combining information.

   18. Summarizing: Combining information efficiently into a cohesive statement.

   19. Restructuring: Changing existing knowledge structures to incorporate new information.

H. Evaluating Skills - Assessing the reasonableness and quality of ideas.

   20. Establishing Criteria: Setting standards for making judgments.

   21. Verifying: Confirming the accuracy of claims.

---

cognitive processes, or critical and creative thinking" (Marzano et al., 1988, p. 68).

The eight general discussions of the Core Thinking Skills Framework are built around the intellectual control and/or the manipulation of information. The thinking skill called Focusing Skills is defined as "attending to selected pieces of information and ignoring others" (Marzano et al., 1988, p. 147). Collecting and gathering information can be related to the thinking skill called Information Gathering Skills, which is defined as "bringing to consciousness the relevant data needed for cognitive processing" (Marzano et al., 1988, p. 147). Storing and recalling information can be related to the thinking skill called Remembering Skills, which is defined as "storing and retrieving information" (Marzano et al., 1988, p. 147).

Another manipulation of information is the "arranging information so it can be used more effectively" (Marzano et al., 1988, p. 147), which is the Organizing Skills thinking skill. The Analyzing Skills describes the "clarifying existing information by examining parts and relationship" (Marzano et al., 1988, p. 147), another management for information.

Information can be used to produce new information. The thinking skill which addresses this management of information is labelled Generating Skills, which is defined as "producing new information, meaning, or ideas" (Marzano et al., 1988, p. 148). "Connecting and combining information" (Marzano, 1988, p. 148) describes Integrating Skills and indicates another management of information. The last manipulation of information as described by the Core Thinking Skills

Framework is entitled Evaluating Skills. Within this thinking skill is

the skill of "assessing the reasonableness and quality of ideas"

(Marzano, 1988, p. 148).

Units of Analysis

"The first task of any empirical research is to decide what is to

be observed, recorded, and thereafter considered a datum. Unitizing

involves defining these units, separating them along their boundaries,

and identifying them for subsequent analysis" (Kruppendorff, 1980,

p. 57). The units of analysis to be used in this study were thinking

skills lessons. This study was limited to the analysis of the

instructional material, and it was not within the purview to designate

other learning outcomes but only the presence of thinking skills as

categorized by the Core Thinking Skills Framework.

Each of the eight programs had a different configuration.

Therefore, that which constituted a thinking skills lesson was located

under different labels. Each, consisting of a set of experiences

whereby there is the mental manipulation of sensory input, was analyzed

throughout that program. Each thinking skills lesson was read and then

compared to each of the 21 sub-thinking skills to indicate whether

there was a match or not. Each was then categorized and tallied on a

tally sheet. The tally sheet was then summarized to indicate the

presence, absence, or patterns of thinking skills lessons.

Each of the programs was examined to locate that area of the

program devoted to thinking skills lessons. Other areas of the

programs given to discussion, examples, or suggestions for the transfer

of the skill to another area of the curriculum were not analyzed. Each
program was treated separately, indicating individual content analysis
presentation. In order to show the relationship of these individual
analyses, a summary matrix indicating the thinking skills patterns of
all eight programs was constructed.

Another dimension of content analysis was to analyze each program
to identify the theoretical foundation of each program. Presseisen
(1987, p. 71) suggests that the theoretical underpinnings will effect a
program's inclusion of thinking skills, teaching methods and
implementation requirements; therefore, it is important for the teacher
to know the learning theory upon which a program was built.

Method of Collecting the Data

Each of the eight thinking skills programs was examined to
identify frequency of thinking skills as described by the Core Thinking
Skills Framework. Each program was broken down into lessons. Each
lesson was read to identify the lesson's main thinking skill. Although
certain lessons occasionally had more than one skill embedded in the
lesson, only the main thinking skill was tabulated.

Presentation of Data

Each of the thinking skills programs were reported separately.
Interrated results were also reported.

After it is known what the data mean or what they indicate,
there is the need

- to summarize the data, to represent them so that they can
  be better comprehended, interpreted, or related to some
  decision the user wishes to make

- to discover patterns and relationships within data that the
  "naked eye" would not easily discern. (Kruppendorff, 1980,
  p. 909)

The analysis of each of the programs, the relationship to the Core

Thinking Skills Framework, the theoretical foundation, and answers to

research questions were described. The results from the analysis of

each program was presented. The theoretical foundation of each program

and the answers to each research questions are reported.

CHAPTER 4

ANALYSIS OF PROGRAM CHARACTERISTICS

Introduction

There is a growing concern for the greater incorporation of thinking skills within the curriculum. While the eight programs examined in this study address many of the situations, the sample used in this investigation is by no means exhaustive of the published thinking skills programs. However, those identified in Developing Minds: A Resource Book for Teaching Thinking (Costa, 1985) were used.

In order to present a commonality in the analysis of these programs, two criterion were followed: (a) only the text designated as student activities or lessons containing thinking skills lessons was examined because some programs contained information not part of the thinking skills lesson itself, and (b) only the major thinking skills lesson was recorded because of the unevenness of some thinking skills lessons, resulting in some lessons being very skill-focused while other lessons contained several embedded skills.

Reliability Data

Interrater reliability was used to establish the accuracy and dependability of the investigator in the categorizing of the thinking

skills programs. For this procedure, two graduate students from Gonzaga University were chosen. The graduate students were similar in the following characteristics: (a) both completed their bachelor's degree and returned to Gonzaga to obtain their teacher certificates, (b) both had been exposed to the incorporation of thinking skills within the curriculum through the course EDTE 452, Methods in Social Studies, (c) both had performed superior work in several of the investigator's classes, and (d) both were presently teaching school. The graduate students were dissimilar in the following ways: Graduate Student #1 could be considered a traditional student, age-wise. Upon the completion of the bachelor's degree, this student continued to pursue certification and a master's degree. Graduate Student #2, considered a non-traditional student, returned to school after raising a family. Graduate Student #2 is teaching in elementary school, while Graduate Student #1 is teaching in high school. Student #1 is teaching in a parochial school, and Student #2 is teaching in a public school. Both students have had the same professional development, yet each brought different experience to the activity. Both students expressed an interest in the investigator's study and viewed the interrater reliability experience as an opportunity to enrich their professional development.

During the training session, the scope of the investigation was explained, the Core Thinking Skills Framework was explained, and several lessons not included in the interrater reliability procedure were selected as a demonstration and practice exercise. Lessons 1-5 of the CoRT program and Lessons 1-5 of the Building Thinking Skills

(Primary) were used to measure the interrater reliability. Each of the graduate students categorized these 10 lessons into the general eight thinking skills areas. The actual ratings of the graduate students and the investigator are shown in Table 2.

Table 2. Interrater Reliability Results.

Thinking Skills Lessons	CoRT					Building Skills				
	1	2	3	4	5	1	2	3	4	5
G.S. #1	4	2	7	6	1	5	4	2	2	4
G.S. #2	4	2	8	6	1	4	6	2	2	5
Investigator	4	2	-	6	1	4	-	2	2	4

Overall, the ratings of the graduate students and that of the investigator were similar. The ratings of Graduate Student #1 and the investigator were identical for 70% of the lessons. In two of the lessons, there was a difference of categories because the investigator felt that the lesson did not contain any thinking skill to fit into the eight categories. The categories which were selected were different in only one lesson in Building Thinking Skills. The exact same pattern existed for the ratings of Graduate Student #2 and the investigator. Thus, the investigator's ratings were consistent with those of the Graduate Students analyzing the lessons. The ratings of the Graduate Students with each other are the same in six of the lessons; they only

differed by one in three of the lessons and by two in one lesson.
Thus, the ratings between the Graduate Students and those between each
of the Graduate Students and the investigator were comparable.

Content Analysis

Each of the thinking skills programs was individually analyzed for
the presence of the 21 thinking skills of the Core Thinking Skills
Framework included it.

The CoRT Program

The CoRT program consists of six books with accompanying
workcards. The six books are entitled, CoRT-1: Breath, CoRT-2:
Organization, CoRT-3: Interaction, CoRT-4: Creativity, CoRT-5:
Information and Feelings, and CoRT-6: Action. Each book contains 10
lessons. It is suggested that 35 minutes be spent on each lesson. Of
the 60 lessons examined, there were 44 lessons that could be
categorized by the Core Thinking Skills Framework. Sixteen lessons did
not fall within the criterion categories. For example, CoRT-5
Information and Feelings registered only five lessons identified by the
Core Thinking Skills Framework. Lesson 4 of CoRT-5 deals with big
guessing as opposed to little guessing. While this exercise can be
helpful to students, this lesson is not identified by the Core Thinking
Skills Framework. Lesson 8 of CoRT-5 deals with emotions, and Lesson 9
of CoRT-5 contains a lesson about high valuing and low valuing. These
are examples of lessons that were not categorized by the Core Thinking
Skills Framework.