ANALYSIS OF THE EFFECTS OF UTILIZATION OF A THINKING SKILLS CURRICULUM ON ACADEMIC ACHIEVEMENT LEARNING ABILITY AND SELF-CONTROL

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

During the last decade there has been a general trend to move away from the long established product view of intellectual development and functioning. Recent research has produced a view of intellectual competencies as process-oriented and dynamic (Brown and Campione, 1981; Feuerstein, 1980; Gardner, 1983; Sternberg, 1984). Many conventional psychometric instruments utilize a theoretical view of intellectual development which provides for the assessment of static intellectual competencies. Static assessment is viewed as assessment which takes into account only those competencies which the individual demonstrates at the time of testing. This type of product-oriented or static assessment provides a single measure of current functioning of the individual. Static or product-oriented assessment tends to equate the measure of current functioning with the immutable capacity of the individual. Static or product-oriented assessment does not provide the examiner with information relating to those competencies which are within the individual's zone of proximal development. The zone of proximal development is the zone which is created between the level of independent problem solving and the level of problem solving under expert guidance. The dynamic approach allows a view of those competencies which are currently in the process of emerging. Assessment and subsequent intervention which is based on a product-oriented

or static approach utilizes current functioning to project future performance. This approach is not viewed as inaccurate but rather as providing an incomplete assessment (Brown and Campione, 1981; Feuerstein, 1980; Gardner, 1983; Sternberg, 1984). If the purpose of assessment is to provide information and possible intervention in the area of cognitive development, then an understanding of the cognitive processing of information is a necessity.

Process-oriented assessment is conceptualized as a multi-level process in which information is accumulated elucidating the nature of the cognitive strategies which the individual utilized in an attempt to arrive at the decisions which were presented during the assessment. The process-oriented approach to assessment utilizes an individual's demonstrated current performance as a measure of current or manifest independent problem solving skills. As a second step in the multi-level process, the individual is provided with the necessary training to enable adequate mastery of the task at hand. The individual is then afforded a second opportunity to demonstrate performance and possibly utilize the newly acquired information or skills. It is the understanding of the process which opens the possibility to impact later development in a meaningful manner.

Reuven Feuerstein (1979) and Lev Semonovitch Vygotsky (1978) have provided valuable research in the area of cognitive development. The theoretical framework upon which both psychologists base their research is best defined as a process-oriented approach. Their research and well developed theoretical constructs have provided a base from which to view cognitive development, assessment, and subsequent intervention from a wider, more comprehensive perspective.

Reuven Feuerstein (1979) an Israeli psychologist presents us with a view of cognitive development, assessment and intervention. Feuerstein's theoretical framework for cognitive development is based on the premise that the human organism is open and modifiable at all ages and stages of development irrespective of etiology. Intellectual functioning is envisioned as the complex interaction of biogenetic, cultural, experiential, and emotional factors, and, thus, reversibility of poor performance may definitely be anticipated. Feuerstein would suggest that the potential for being modified by learning should be the object of focus in psychometric assessment. The Learning Potential Assessment Device was developed by Feuerstein in order to obtain a dynamic assessment of an individual's abilities, and thus focus on modifiability. Instrumental Enrichment is a curriculum which has been developed by Feuerstein in an attempt to facilitate the cognitive development of low functioning individuals. Research in the area of cognitive modifiability has produced positive results while utilizing Instrumental Enrichment with low performing individuals over a period of years.

The Russian psychologist Lev Semonovitch Vygotsky (1978) was an early advocate for a process-oriented approach to the assessment of intellectual competencies. A primary component of Vygotsky's theoretical framework of cognitive development centers on the belief that learning precedes development. The range of competencies demonstrated by each individual is labeled as the zone of proximal development. The zone of proximal development is the zone, or range, which is manifested by the distance between the level of actual development as determined by independent problem solving and the level of potential development as determined by the level of problem solving under expert guidance.

The practical implications of the zone of proximal development are demonstrated with the following example. Two eight year old students were evaluated upon entrance into an academic environment and the results yielded a mental age of six years for both students. Independently, both students demonstrated mastery of tasks which had been standardized for six year old students. When the examiner provided a variety of demonstrations designed to further develop mastery of the skills in question each child performed quite differently. One student demonstrated mastery with expert guidance at a seven year skill level and thus established a zone of proximal development between six and seven years. The second student demonstrated mastery with expert guidance at a nine year old skill level and thus established a zone of proximal development between six and nine years. Vygotsky (1978), suggests that "the actual level of development characterizes development retrospectively, while the zone of proximal development characterizes mental development prospectively" (p. 87). Vygotsky suggests that it is through careful observation of the competencies demonstrated within an individual's zone of proximal development that the educator obtains a view of the cognitive processes which are utilized in problem solving.

For Vygotsky (1978) the role of language is central to the development of higher psychological processes. He sees the mediating function of language as central to development. With the aid of language the individual gains control over the environment. The individual can view changes in the immediate situation from the point of view of the past activities and can act in the present from the viewpoint of the future. Kendall and Finch's (1979) agreement with this focus on the mediating function of language is reflected in the following quote:

> A child displays nonimpulsive (self-controlled) behavior when, prior to behaving, he/she engages in the cognitive evaluation or response alternatives and having performed such reflection, is then capable of either engaging in the decided act or inhibiting the discarded possibilities. (p. 42)

Kendall views language as providing an avenue for internal mediation and self-control. Kendall utilizes a cognitive-behavioral definition of self-control and asserts that deliberation, problem solving, planning, and evaluation are the active cognitive factors. He further asserts that behaviorally a self-controlled child has the ability, following the deliberation, to execute the behavior that is chosen or to inhibit the behaviors that are cognitively disregarded.

Significance of the Problem

Theoretical Importance

Current views regarding cognitive modifiability (Feuerstein, 1980; Haywood, 1982) and assessment (Brown and French, 1979; Feuerstein, 1979) have resulted in questions about long held views in these areas. The interpretation of development, long accepted in the Soviet Union (Luria, 1976; Vygotsky, 1978) has recently become increasingly popular in the West (Meacham, 1972). Budoff and Corman's (1976), findings that children who perform similarly on intelligence tests may actually differ in their ability to profit from instruction is clearly relevant to Vygotsky's (1978) arguments against the static measures of ability.

Budoff (1976), has bolstered his conclusion in a series of studies using the test-teach-test procedure. He has repeatedly demonstrated that learning potential assessments can differentiate those low-IQ children

who might benefit from instruction (high scorers and gainers) from those who probably could not (nongainers) (Babad and Budoff, 1974). He has shown that the learning potential assessment was more accurate than the IQ scores in predicting either teacher-rated school achievement (Babad and Budoff, 1974) or students' actual gain from academic instruction (Budoff and Corman, 1976; Budoff, Meskin, and Harrison, 1971).

Vygotsky (1978) presents the concept of viewing cognitive development as existing within the zone of proximal development. The zone of proximal development suggests two levels of development; the actual level of development is seen as the level of independent problem solving and the level of potential development is the level of problem solving under expert guidance. This range then between the actual and potential demonstrates the range of proximal development. Vygotsky considers the abilities which children can demonstrate when given assistance as those abilities which are in the process of becoming internalized. "What children can do with the assistance of others might be in some sense even more indicative of their mental development than what they can do alone" (Vygotsky, 1978, p. 85).

Feuerstein (1980) utilizes this concept of the zone of proximal development with the development of his Learning Potential Assessment Device. This assessment instrument utilizes the test-teach-test paradigm in order to identify the zone of proximal development. It is most certainly in the best interest of the student and the educational system to assess not only the actual level of functioning but also the level of potential functioning. Educational assessments and subsequent interventions which view the human organism as exhibiting a range of functioning are embracing the active assessment and intervention philosophy.

With the development of the Instrumental Enrichment (IE) Curriculum Feuerstein (1980) has provided educators with a series of instruments designed to further develop cognitive skills. This IE curriculum is based on the theoretical framework of earlier research and utilizes the results of the assessment instrument, the Learning Potential Assessment Device.

Practical Importance

Gardner (1983), presents us with the view that human intellectual competence must entail an ability to solve genuine problems or difficulties which are encountered. It is this intellectual competence which allows the human organism to adapt and thereby master the environment. Gardner (1983), has identified seven intelligences; musical, bodily-kinesthetic, logical-mathematical, linguistic, spatial, interpersonal, and intrapersonal. Gardner maintains that these multiple human facilities, the Intelligences, are to a significant extent independent. He asserts that we are all born with the potential to develop a multiplicity of intelligences, most of which can be drawn upon to make us competent individuals. With regard to the malleability of intellectual competencies, Gardner suggests that whatever differences may initially exist, early intervention and consistent training can play a decisive role in determining the individual's ultimate level of performance. Gardner (1983), states:

> If a particular behavior is considered important by a culture if considerable resources are devoted to it, if the individual him/herself is motivated to achieve in that area, and if proper means of crystallizing and learning are made available, nearly every normal individual can attain impressive competence in an intellectual or symbolic domain. (p. 316)

Educational assessment and subsequent intervention which incorporates Vygotsky's (1978) concept of the zone of proximal development allows for

a view of the human organism as an open and ever developing system (Costa, 1985; Gardner, 1983; Sternberg, 1984). Assessment which utilizes the test-teach-test paradigm provides the examiner with information regarding not only those skills which have at this moment matured but also allows a view of those skills which are in the process of maturing. This assessment technique of test-teach-test is utilized by Feuerstein throughout the Learning Potential Assessment Device and by Vygotsky in assessing an individuals' zone of proximal development. Specific educational interventions and curriculum planning which are based on the view of the human organism as open and ever developing are basic to the philosophical orientations and theoretical frameworks of both Feuerstein and Vygotsky.

Feuerstein (1979), has developed a curriculum, Instrumental Enrichment, which is composed of content free lessons developed in order to modify inadequate cognitive functioning and render the organism receptive to further cognitive development. The underlying concepts are that intelligence is not static but dynamic, and that adequate cognitive development is the result of mediated learning experiences. Mediated learning experiences are experiences in which an adult or other agent interposes him/herself between the individual and the experience for the purpose of selecting and organizing the stimuli for the individual. Instrumental Enrichment is designed to be utilized in group or individual learning situations over a three-year period. Each instrument or exercise of the curriculum is specifically designed to focus on a particular area of cognitive development. The content free nature of the curriculum allows for the focus to be placed not on the acquisition of specific information but on the development, refinement and crystallization of those functions prerequisite to effective thinking (Link, 1985). The curriculum allows

for the development of appropriate cognitive strategies, which in turn enable the individual to become a more effective learner.

Current research has most certainly established the base to view the human organism as an open and modifiable organism (Butterfield, 1981 Costa, 1984; Feuerstein, 1982; Haywood and Switzky, 1986; Sternberg, 1984). The requirements of the information age clearly affect educational goals and practices. Costa (1984), indicates that, "all human beings have the capacity for learning; that the ability to use intelligent behavior is never fully developed; and that the capacity for a more highly developed intellect continues throughout life" (p. 212). The National Science Board Commission on Pre-College Education in Mathematics, Science, and Technology declared in its report, Educating Americans for the 21st Century:

> We must return to basics, but the basics of the 21st century are not only reading, writing, and arithmetic. They include communication and higher problem-solving skills, and scientific and technological literacy-the thinking tools that will allow us to understand the technological world around us. Development of students capacities for problem-solving and critical thinking in all areas of learning is presented as a fundamental goal. (Costa 1985, p. 3)

The belief that thinking ability can be enhanced through teaching has led to the development of a number of formal programs with this stated goal. The Structure of the Intellect Program (SOI) was developed by Meeker (1985), with a stated goal of equipping students with the necessary intellectual skills to learn subject matter and critical thinking. Odyssey, A Curriculum for Thinking was developed in 1983 by a team of researchers from Harvard University. The goal of the program is to teach a broad range of general thinking skills. Philosophy For Children developed by Lipman (1985) is designed to improve childrens' reasoning abilities by having them think about thinking as they discuss concepts

of importance to them.

Comfort's (1984), research addressed the development of thinking skills in primary age students. The research was conducted utilizing a random sample of second grade students at three participating schools. The treatment group was exposed to the Thinking Skills Curriculum for 30 minutes a day, 5 days a week for 7½ weeks. The results of the research established significant differences at the .05 level of confidence between the treatment and the control group performance in the areas of non-verbal problem solving and educational ability involving spatial perception and comparing. No significant difference existed between treatment and control group performance in the measured areas of academic achievement and educational ability involving vocabulary and numbers. Specific recommendations which Comfort has delineated relate to the replication of the study utilizing students in other grades to establish the accessibility of cognitive modification at various age levels. Comfort indicates that both Feuerstein and Hoffman had expressed concern regarding the random selection of treatment subjects rather than utilization of intact class units. A research design which would allow for the classroom teacher to present the Thinking Skills Curriculum to an intact class would indeed provide for a more natural setting in which to assist the subjects in gaining an awareness of their cognitive processing and the manner in which it affected their performance in academic areas.

It is no longer necessary or prudent to await the development of deficient cognitive strategies before we offer assistance to our children in the area of development of thinking skills. The belief that thinking ability can be enhanced has led to the development of a number of formal programs with this objective in mind. The Thinking Skills Curriculum

which is presented within this research is designed to be utilized by primary age students for the purpose of enhancing cognitive development.

Theoretical Framework

The Thinking Skills Curriculum was designed as an adaptation of the first four units of Reuven Feuerstein's Instrumental Enrichment. Since Feuerstein's Instrumental Enrichment was designed to be utilized by adolescents, this adaptation has allowed for utilization by primary age students. The Thinking Skills Curriculum consists of four units of content free exercises designed to enhance cognitive development. The specific units to be utilized in this research study are Organization of Dots, Spatial Orientation, Comparison and Perceptual Analysis. The units are designed to provide systematic experiences in the development of problem solving strategies so as to render the individual receptive to future learning.

Vygotsky (1978) suggests that learning precedes development when he writes:

> From this point of view learning is not development; however, properly organized learning results in mental development and sets in motion a variety of developmental processes that would be impossible apart from learning. Thus learning is a necessary and universal aspect of the process of developing culturally organized, specifically human, psychological functions. (p. 90)

The Thinking Skills Curriculum is designed to focus instruction within an individual's zone of proximal development. This focus directs itself toward those competencies which are in the process of emerging. The incorporation of a Thinking Skills Curriculum into the daily activities of primary age students provides for direct exposure of the students to activities designed to promote cognitive growth. The aim of the Thinking

Skills Curriculum is to involve the students in learning activities which are within their zone of proximal development and thereby enhance cognitive development.

Problem Statement

The problem examined in this research study is: Will the inclusion of a Thinking Skills Curriculum, taught by the classroom teacher, enhance academic achievement, learning ability and self-control of kindergarten students? An experimental and a control group of kindergarten students representing intact classes participated in the research study. An achievement test and an ability test as well as a self-control rating scale were administered at the conclusion of the research and analyzed for significant differences between groups. Achievement is defined as subtest scores obtained on the Science Research Associates (SRA) Achievement Series, 1978 edition. Ability is defined as subtest scores on the Science Research Associates (SRA) Educational Ability Series Tests (EAS), and the Raven's Coloured Progressive Matrices Test. Cognitive-behavioral self-control rating is defined as the score on the Self-Control Rating Scale as completed by a qualified examiner.

CHAPTER II

REVIEW OF LITERATURE

Introduction

This chapter will include a review of the theories of Vygotsky and Feuerstein. Current research in the areas of cognitive modifiability will be examined as it relates to educational assessment and subsequent curriculum expectations. The theoretical framework upon which the current research is based will be discussed.

Vygotsky

Lev Semonovitch Vygotsky, 1896-1934, was a Russian lawyer and psychologist. He began his professional career in post-revolutionary Russia. The society in which he worked looked to the scientific community for assistance in solving the pressing economic and social problems of the Soviet people.

Vygotsky's (1978) theory of learning centers on the belief that learning precedes development. He presents us with the view of development as a process which is characterized by uneveness in the development of different functions. It can be viewed as the transformation of one form into another while allowing for the intertwining of external and internal factors which the individual encounters.

> Child development is a complex dialetical process characterized by periodicity, uneveness in the development of different functions, metamorphosis of qualitative transformations of one form into another, intertwining of external and internal factors and adaptive processes which overcome impediments that the child encounters. (Vygotsky, 1979, p. 73)

Learning versus Development

The most essential feature of Vygotsky's (1978) hypothesis is the notion that developmental processes do not coincide with the learning processes. Rather, the developmental process lags behind the learning process. This sequence then results in the zone of proximal development.

> The zone of proximal development can best be described as the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined by problem solving under expert guidance. (Vygotsky 1978, p. 86)

Vygotsky (1978) suggests that it is the zone of proximal development which should be of concern to educators. The competencies demonstrated within this range are in the process of maturing. Educational programs and curriculum which are implemented following current static psychometric assessment base their projections for performance solely on the present level of functioning. By taking into account only an individual's level of actual performance, we ignore those competencies which are in the process of maturing. We assume a homogeneity of performance which is not necessarily present. Vygotsky (1978) states that "the zone of proximal development includes those functions that have not yet matured but are currently in embryonic state" (p. 86). Assessment and subsequent curriculum planning and implementation which utilizes the theoretical concept of the zone of proximal development allows the individual to be viewed as an emerging organism.

Mediation

A second component of Vygotsky's (1978) theory presents the concept of mediation. From the moment of birth children are in constant interaction with adults who actively seek to incorporate them into their culture and

its historically accumulated store of meanings and ways of doing things. Society organizes and structures the kinds of tasks that growing children face. Individuals who have been inculcated into a society attempt to share that society's organization with others by acting as a mediator for others. The role of the mediator is to act as one who can organize and frame the experience for another.

Shared perceptions of a society are developed as a result of mediated experiences. The expertise of the mediator enables the learner to gain a superstructure or scaffolding upon which to store and eventually organize information as it relates to the experience. With the assistance of a mediator attention can be directed toward significant aspects of the experience. We are taught to seek out and to select stimuli, thereby gaining control over the immediate environment.

Mediation allows us to access available information through shared experiences. As members of a society we profit from the past experiences of that society. It is not necessary for us to arrive at the same deductions or realizations as the masters in the field have made. Language allows for the passing on of the accumulated store of information. While under the expert tutelage of an individual trained in the field we are taught to direct our attention toward the salient points of the work. We benefit from the experiences of the past. Vygotsky (1979) indicates that, "if one changes the tools of thinking available to a child, his mind will have a radically different structure" (p. 126). Once we have viewed the experience through the eyes of an expert, we will have new information available to us when we encounter our next experience. Society provides us with the kinds of tools, both mental and physical, which are necessary to master required tasks. When Vygotsky speaks of changing the tools of thinking

available to the child, he is referring to language.

Language

A third component of Vygotsky's (1978) theory is language. He placed special emphasis on the role of language in the organization and development of the thought process. Vygotsky observes the most significant moment in the course of intellectual development as occuring when speech and practical activity, two previously completely independent lines of development, converge. Language is a tool unique to humans and which differentiates them from all other living things and gives individuals the potential to control their environment. Vygotsky addresses the experiments which were conducted by his collaborator R. E. Lenina noting the task approach of preverbal children, apes, and children who utilized speech. The researchers sought to identify what it is that distinguishes the actions of the speaking child from the actions of the ape when solving practical problems. As a result of this examination Vygotsky (1978) has summarized the following three points: (1) language allows the child to search for and utilize stimuli not necessarily present in the current situation but which can be useful in the solution of the problem, (2) direct manipulation of stimuli is no longer necessary and is successfully replaced by complex mental manipulation through the aid of language, (3) language now not only assists in the manipulation of objects but also serves as a control of the individual's behavior.

Vygotsky (1978) propounded that initially language, just as any other man made tool, assists society (adults) in mediating to the child. As the child develops it is the internalized language itself that mediates to the child. It is through the use of language that an individual is

successfully able to utilize the information with which he/she is constantly being bombarded. The visual field is constantly changing and impinging on each perception. The utilization of language allows for control over the visual field. Language allows the individual to break spontaneous perceptions into meaningful segments of information. Language provides an avenue through which the individual is able to overcome the constant bombardment of the visual field and utilize it advantageously. Unlike other living things, humans are not prisoners of their present physical environment. Language allows individuals to select, frame, and organize information so as to be used at their discretion. Utilization of internal language allows an individual to store information and to alter it as it relates to time. Individuals can call up past experiences, act upon current experiences, and manipulate possible future experiences as they see fit. It is this utilization of language which frees humans from the constraints of the present situation.

Vygotsky (1978) insists that the system of signs restructures the whole psychological process and enables the child to master movement. When Vygotsky speaks of sign systems he is referring to the language system of the individual. This system represents the language specific to the individual although it is influenced by experience. This utilization of sign systems allows the individual to achieve control over the environment in a way peculiar to man. Language allows an individual to analyze the past as well as to project relationships into the future. Language carries within it the generalized concepts that are the storehouse of human knowledge. Language provides us with the most precise and accurate mirror of a culture.

Language and Mediation

Language frees the individual from the structure of the current situation. Language provides the freedom to move beyond the boundaries of the immediate environment. It enables the individual to create a specific plan and achieve a broader range of possible activities. An individual can search for, and prepare such stimuli, as can be useful in the present solution, while also planning future actions. This provides the individual with the opportunity to mediate to him/herself with the aid of internal language. Vygotsky (1978) indicates that it is our individual internal language which eventually assists us in the framing and organizing of information as well as in the control of our behavior. The specific role of a mediator is to act as one who can organize and frame the experience for another. With the novice, whether a young child, or an adult attempting to master a new skill, it is the internal manipulation of language which frees people from the need to physically manipulate the environment. When an individual, child or adult, first attempts to master an activity, it is not uncommon to do so with the aid of another. The individual who is acting as a mediator in a situation is purposefully attempting to assist the untrained individual, in organizing and framing the experience. When an individual's internal language serves to facilitate this activity without the assistance of another it is then that an individual's internal language is mediating the experience.

Summary of Vygotsky

The three primary components of Vygotsky's (1978) theoretical framework are the zone of proximal development, mediation, and language. The zone of proximal development is the zone, or range, which is manifested

by the distance between the level of actual development as determined by independent problem solving and the level of potential development as determined by the level of problem solving under expert guidance. The boundaries of the zone of proximal development are determined following direct observation and interaction between the examiner and the individual. This range can be demonstrated using a test-teach-test paradigm. The level demonstrated initially utilizing standard static assessment instruments is considered the level of actual development. Subsequent to the initial assessment the examiner intervenes and provides the individual with an array of problem solving strategies. The examiner then introduces a second task comparable to the first, and the individual is required to solve the problem. The examiner now has the opportunity to observe the manner in which the individual incorporates the recently provided problem solving strategies into the problem solution. This observation provides the examiner with an estimate of an upper limit of functioning for the individual in question. The examiner can assess general problem solving strategies as well as develop an estimate of the time committment involved in relation to the demonstrated cognitive gains manifested between the initial and final assessment.

The concept of mediation as discussed within Vygotsky's (1978) theoretical framework concerns itself with the constant interaction among individuals for the purpose of developing an accumulated store of meanings and ways of doing things. The individual who is acting as the mediator interacts with the other individual in such a way as to frame and organize the experience for the individual. When the mediator frames and organizes the experience, information is assessed through a shared experience.

Within Vygotsky's (1978) theoretical framework, language is viewed

as a tool which was created by humans and which has subsequently differentiated them from all other living things. It serves to free the individual from the constraints of the immediate environment. It makes direct manipulation of stimuli unnecessary, and serves to control behavior. Language provides the individual with a superordinate structure within which all perceptions are organized. Vygotsky places special emphasis on the role of language as it relates to mediation. He suggests that the utilization of internalized language allows individuals to mediate to themselves internally. The utilization of internalized language allows for internal mediation and thus the individual is able to control his/her own behavior.

Feuerstein

The second theorist to be considered is Reuven Feuerstein (1979, 1980). As Director of Hadassah-Wize-Canada Research Institute, Jerusalem, he developed a model of cognitive functioning based on years of extensive research. Between the years 1950-54, while working with the Youth Aliyah, Feuerstein had the opportunity to assess large numbers of children in Morocco prior to their resettlement in the new country of Israel. During this period of time Feuerstein came into contact with significant numbers of adolescents who evidenced depressed IQ scores. He became increasingly dissatisfied with the predictive validity and practical value of the current psychometric instruments. Feuerstein confides that his faith in changing cognitive structure - indeed, in performing what seems to be mental miracles - was born those decades ago not of empirical evidence but of sheer necessity.

Originating from his growing dissatisfaction with current instruments

and theories, Feuerstein (1979) embarked upon years of research in the areas of cognitive development. His model was forged from his personal tenacity and absolute unwillingness to accept the bleak projections provided for the future young men and women of the new country of Israel by current assessment techniques. Feuerstein (1980) insists that, except in the most severe instances of genetic and organic impairment, the human organism is open to modifiability at all ages and stages of development.

Modifiability

In an unpublished speech presented to representatives of the Cherokee Nation in Tahlequah, Oklahoma, Feuerstein (1985) shared his view on modifiability. He stressed that he considered the primary characteristic of the human organism to be its demonstrated plasticity and flexibility. Feuerstein states, "Human beings change, become modified at will". Human beings are involved in a continual process of modification in order to adapt to the environment. Feuerstein (1985) questions how psychologists can view the plasticity and modifiability in society and yet continue to deny that same trait in the individual. When Feuerstein speaks of cognitive modifiability he is referring to a program of intervention that will facilitate the generation of continuous growth by rendering the organism receptive and sensitive to internal and external sources of stimulation. Feuerstein (1985) states:

> ...manifest low cognitive performance need not be regarded as a stable characteristic of an individual and that systematic intervention, directed at the correlation of deficient functions, will render the condition reversible by producing a change in the cognitive structure of the individual.

Cognitive Development

According to Feuerstein's (1979) theory, cognitive development is

determined by the interaction between the organism and the environment. This interaction between the organism and the environment can be divided into one of two categories--direct exposure to stimuli or mediated learning experiences. Feuerstein and Jenson (1979) indicate that the second category, mediated learning occurs

> ...when an initiated human being, mother, or other caregiving adult interposes himself or herself between the organism and and the stimuli impinging on it and mediates, transforms, reorders, organizes, groups and frames the stimuli in the direction of some specifically intended goal and purpose. (p. 409)

It is Feuerstein's (1979) contention that it is the second category of mediated learning which accounts for the differential cognitive development of individuals. Mediation is the process of framing and organizing an experience so as to facilitate the appropriate situational encounters and further cognitive development. Mediation occurs when other persons interpose themselves between the stimulus and the individual for the purpose of assisting in the framing and organizing of the experience.

Cognitive Functions

Feuerstein (1979) has observed and researched adequate and inadequate cognitive functioning. Cognitive functioning is divided into three areas; input, elaboration and output. Input is the phase of the mental act which involves the quality of data gathered for elaboration purposes. Elaboration is that phase of the mental act which involves making use of available data for problem solving. Output is that phase of the mental act which involves factors that lead to adequate communication of the outcome of the elaboration processes. Comfort (1984) indicates that Feuerstein considers cognitive deficiencies as those deficiencies in the functions

that underlie internalized, representational and operational thought. Cognitive deficiencies are deficiencies in the cognitive functions that interfere with appropriate input, elaboration and/or output of information. Feuerstein has identified and enumerated a list of deficiencies and a description of same, as they occur at the input, elaboration, and output phases of cognitive processing. A list of cognitive deficiencies follows; (Feuerstein, 1979, 1980, 1982)

Input

(1) Blurred and sweeping perception
(2) Impulsivity - unplanned, unsystematic exploratory behavior
(3) Lack of receptive verbal skills
(4) Lack of, or impaired, spatial orientation
(5) Lack of, or impaired, temporal orientation
(6) Lack of, or impaired, conservation constancies
(7) Lack of, or impaired need for, precision and accuracy
(8) Lack of, or impaired use of, two or more sources of information

Elaboration

(1) Lack of experiencing the existence of a problem
(2) Inability to mentally define a problem
(3) Inability to select relevant cues in defining a problem
(4) Lack of, or impaired spontaneous comparative behavior
(5) Narrowness of mental field
(6) Lack of, or impaired need for, summative behavior
(7) Difficulties in projecting virtual relationships
(8) Lack of, or impaired need for, pursuing logical evidence
(9) Lack of, or impaired, interiorization
(10) Lack of, or impaired, planning behavior

Output

(1) Egocentric communicational modalities (thinks the other can read his/her mind)
(2) Difficulties in projecting virtual relationships
(3) Blocking (inability to think caused by perceived failure)
(4) Trial and error responses (random non-goal oriented responses)
(5) Lack of verbal tools for communicating adequately elaborated responses
(6) Lack of a need for precision and accuracy in communicating
(7) Deficiency of visual transport
(8) Impulsive, acting out behavior

Mediation

Mediated learning experiences are designed to promote intentionality, transcendence, competence, meaning and regulation of behavior. Intentionality requires that the mediation is purposeful, goal-directed activity. This is intended to develop in the child an inner need system which searches for and requires organization and purpose. In the area of transcendence the purpose is to move beyond the immediate need and assist the child in developing basic problem solving strategies. Competence allows for the demonstration of competent performance. The mediator intentionally shares with the child the purpose of the proposed action in an attempt to regulate the child's behavior and provide meaning for the action. Feuerstein insists:

> Without adequate mediated learning experiences, an individual has a limited amount of flexibility and adaptability. Like lower animals, his needs stay closely linked to biological needs, and his behavior is automatic and mechanical. Only through Mediated Learning Experiences (MLE) does the individual enlarge both his need system and his schemata so that he can realize the biological capacities of his complicated brain and elaborate the richness and variety of stimuli to which he is exposed. For humanity to develop and rise above the level of the lower animals, interaction with mediational value must occur. (Feuerstein, Hoffman, Rand, and Mintzker, 1981, p. 60).

Learning Potential Assessment Device

The Learning Potential Assessment Device (LPAD) was developed in an attempt to assess the process of learning.

> The assumption that intelligence is a dynamic process and not a static product, the very essence of which is change and not stability, requires that we take a fresh look at our current assessment practices. The LPAD is an attempt to relate assessment to educational concerns, both at the most fundamental level of determining learning potential, and with respect to the ultimate goal of cognitive modifiability. (Feuerstein 1980, p. 20)

The Learning Potential Assessment Device was developed for adolescents who had reached the level of formal operations, and it utilizes the test-teach-test paradigm. The purpose is to assess the child's current level of functioning. During the initial phase of the assessment utilizing the Learning Potential Assessment Device specific deficiencies in cognitive functioning are noted. Following the initial assessment the child is provided with specific strategies in order to enhance his/her ability to deal with the problem at hand. A second problem similar to the first, is then introduced. The examiner now has an opportunity to observe the proportionate rate of time vested by the examiner and student, as well as utilization of supplied strategies, to improvement in the end product. The LPAD's dynamic approach tests the individual in the process of learning. Deficits in cognitive functions are seen as resulting from limited or inadequately mediated learning experiences. The LPAD then is geared toward producing changes within the individual during the testing session in order to permit an ongoing assessment of an individual's ability to learn and become modified relative to his/her own initial level of performance.

Instrumental Enrichment

Instrumental Enrichment is an intervention program based on classroom and individual utilization of a series of content free paper and pencil exercises. These exercises are specifically designed to produce changes in an individual's cognitive structures. Changes in an individual's cognitive structures are designed to make the individual more receptive to future learning. The enhancement of modifiability can be seen as the primary goal of Instrumental Enrichment. Once again, Feuerstein (1979, 1980, 1985) sees modifiability as a process of rendering the organism

receptive to stimulation.

Summary of Feuerstein

The primary constructs upon which Feuerstein's (1979) theory is based are modifiability and the nature of the process of cognitive development. The human organism is viewed as open and modifiable throughout its existence. Thus modification is possible irrespective of etiology, age, or level of manifest functioning. Cognitive modifiability is envisioned as resulting from a systematic program of intervention that facilitates the generation of continuous growth by rendering the organism receptive and sensitive to internal and external sources of stimulation.

All cognitive development is the result of interaction between the individual and the environment. This interaction is divided into two categories, direct exposure and mediated learning experiences. Direct exposure is evident as an individual experiences the environment and interacts with the stimuli to which the individual is exposed. The very act of exposure and interaction produces changes in the individual.

Mediated learning experiences consist of those experiences in which an adult or other agent interposes him/herself between the individual and the experience. The role of the mediator is to select and organize the stimuli for the individual. Throughout the utilization of mediated learning experiences the individual becomes accustomed to the utilization of certain cognitive strategies. The goal of all mediated learning experiences is to render the organism open to future experiences.

The successful mediator assists the individual in the following ways; focusing of attention, labeling of stimuli, organizing time and space, establishing relationships, and finally in categorizing relationships.

The mediator assists the individual in the focusing of attention and in so doing aids the individual in framing the stimuli. The individual is taught to gather clear and complete information. Systematic exploration of the stimuli is stressed. The labeling of stimuli allows an individual to more clearly internalize and organize information. This labeling of stimuli allows individuals to share perceptions. The mediator encourages the individual to label stimuli in reference to time and space. The mediator stresses the importance of establishing relationships. The individual is taught to compare, to see likenesses and differences, and to relate them to objects and events, and to express the likenesses and differences with appropriate language. Through comparison the individual is taught to categorize relationships. Critical thinking that produces problem solutions is possible only through ability to discern place relationships in a hierarchy. Establishing a need, making a hypothesis, gathering information, summarizing, drawing conclusions occur only through establishing and categorizing relationships.

Feuerstein (1979, 1980, 1982) has identified and listed a series of cognitive deficiencies which results in inadequate cognitive functioning. The Learning Potential Assessment Device was developed in order to assess the process of learning. Instrumental Enrichment is a series of content free lessons designed to correct deficient cognitive functioning as identified during the individual assessment with the Learning Potential Assessment Device.

Current Related Research

Current educational research lends support to the role of language in the development of cognitive strategies (Comfort, 1984; Feuerstein,

1975, 1980, 1982; Gagne, 1984; Kagan, 1966; Kendall and Finch, 1979; Luria, 1961; Meichenbaum and Goodman, 1971; Pressley, Reynolds, Stark, and Gettinger, 1983; Vygotsky, 1962). Vygotsky suggests that language is a socially provided tool which once internalized, serves a mediating function, and forms the basis of children's independent thought. It is language which frees the individual from the constraints of the immediate environment. Language allows the individual to control the environment. The specifically human capacity for language enables the child to provide the auxiliary tools in the solution of difficult tasks, to overcome impulsive action, to plan a solution to a problem prior to its execution, and to master his/her own behavior. Vygotsky suggests that it is at this point that the planning function of speech comes into being in addition to the already existing function of language to reflect the external world.

During World War I, Wolfgang Kohler (Vygotsky, 1978) conducted experiments with apes comparing his observations of apes to direct observations of young children, describing the ape as a "slave of its own visual field". (p. 28) The particular emphasis in Kohler's experiments was on the importance of the structure of the visual field in organizing the ape's practical behavior. The process of problem solving is essentially determined by perception. Animals, unlike humans, are bound to a much greater extent by their visual field.

Vygotsky's (1978) research suggests that at very early stages of development, language and perception are linked. Language allows the child to break spontaneous perceptions into meaningful bits of information. Vygotsky's research indicates that the system of signs restructures the whole psychological process and enables the child to master movement. Movement detaches itself from direct perception and comes under the control

of sign functions included in the choice response. With the manipulation of language the child can view the immediate situation from the viewpoint of the future. The child can accomplish this by verbally controlling attention and thereby reorganizing the perceptual field. The child now embraces not one but a whole series of potential perceptual fields that form successive, dynamic structures over time.

Soviet research and theorizing concerning the developmental relationships between language and behavior (Luria, 1976; Vygotsky, 1962) have contributed to the development of intervention programs designed to modify impulsivity. Vygotsky has suggested that internalization of verbal commands is the critical step in the child's development of voluntary control over his own behavior. One of the primary components of these interventions is teaching impulsive children to use directive self-instructions to slow down and think carefully. Meichenbaum and Goodman (1971) developed a comprehensive program for modifying impulsive behavior. Their self-instructional training procedure was designed to teach impulsive children to replace their maladaptive sequence of behaviors with directive self-instructions and adaptive problem-solving strategies. This theoretical approach to development of cognitive strategies is very similar to the position held by Luria, Vygotsky, and Feuerstein. During the course of Meichenbaum and Goodman's instruction, the children are taught the following problem strategies: (1) defining the problem; (2) focusing attention and response guidance; (3) self-reinforcement; and (4) coping statements. These strategies are compatible with the problem solving strategies introduced by Feuerstein (1980) in his Instrumental Enrichment Curriculum.

A number of researchers have expanded on Meichenbaum and Goodman's

(1971) self-instructional training procedure and have successfully employed it to modify the impulsive cognitive style of school children in the regular classroom. Meichenbaum supports the functional analysis of the subject's thinking process and a careful inventory of the subject's cognitive strategems as related to task parameters. This analysis of the subject's task approach is similar to Feuerstein's (1979) assessment utilizing the Learning Potential Assessment Device. Gagne (1984), suggested that interpersonal instructions serve the following functions: (1) motivating the subject by eliciting an achievement set; (2) helping him identify the criterion performance and the salient parts of the stimulus situation; (3) aiding recall of relevant subordinate performance capabilities necessary to the task; and (4) changing thinking in terms of task-relevant hypotheses and controlling extraneous thoughts and behaviors. Gagne's presentation is similar to the presentation of Feuerstein in his Instrumental Enrichment program designed to address not any specific skill or content area but the process of learning itself.

The Thinking Skills Curriculum which is utilized in this study is an adaptation of the first four Instrumental Enrichment units as developed by Reuven Feuerstein (1979, 1980) for use with adolescents. This curriculum represents an adaptation appropriate for primary age students. The Thinking Skills Curriculum was developed by Mary Comfort Ph.D. and Mary Rineer (1984) under the direction of Mary Joe Keatley Ed.D. The theorists discussed above utilize the development of self-verbalizations in their students in an attempt to enhance cognitive development. It may be that positive self-verbalization effects are actually due in part to the changes in attention they produce. Kendall and Finch (1979) present the notion of conceptualizing impulsivity as a cognitive approach to problem-solving.

It is the contention of both Kendall and Finch, (1979) that there are cognitive and behavioral strategies that are specifically relevant for interventions designed to produce impulse control. Kagan (1966), indicates that many teachers interpret an incorrect inference as indicative of insufficient knowledge and usually do not appreciate the role of an impulsive attitude in determining the quality of the inferential process. Self-verbalization acting as a mediator of the individual's actions is what Vygotsky refers to as the mediating function of language. Reese (1962), suggests

> mediation is a "voluntary" process, as rehearsal is, there may be a stage of development in which subjects have typically not yet learned to use it, and instructions in the use of the process should facilitate the learning of these subjects. (p. 507)

Vygotsky suggests that once children learn to use the planning function of their language effectively, their psychological field changes radically. Language frees the individual from the constraints of the current situation. The utilization of language allows the individual to manipulate the current situation mentally taking into account all of the information of the past and present while moving freely into the domain of the future. A view of the future is now an integral part of their approach to their surroundings.

The specific approach presented by Feuerstein (1979, 1980) attempts to provide a consistent set of cognitive strategies which will assist the individual in a wide range of situations. The most extensive research utilizing Feuerstein's Instrumental Enrichment was conducted in Israel with adolescents, by Feuerstein, Miller, Hoffman, Rand, Mintgker, and Jensen (Feuerstein, 1974, 1982). The results of the study showed significant gains on various cognitive and intellectual measures in the Instrumental Enrichment group in comparison to the control group. Comfort's (1984),

research in the area of thinking skills has established the following;

> Cognitive processes can be taught using a process oriented approach, cognitive modifiability is accessable to second grade students in the Piagetian stage of concrete operational functioning, and cognitive training provides similar benefits to low, medium, and high levels of intellectual functioning. However, improved cognitive functioning did not immediately affect academic achievement. (p. 102)

The results clearly establish significant differences at the .05 level of confidence between the treatment and the control group in the areas of non-verbal problem solving and educational ability involving spatial perception and comparing. The results did not demonstrate significant differences between the treatment and the control group in the areas of academic achievement and educational ability involving vocabulary and numbers. The duration of the study was only 37 days and it is quite possible that the short duration of exposure to the curriculum did not allow enough time for the improved cognitive functioning to sufficiently impact academic achievement.

Thinking Skills Curriculum

The Thinking Skills Curriculum (Comfort and Rineer, 1984) was specifically developed to be utilized with primary age students based on the theoretical framework of Vygotsky and Feuerstein. The curriculum was originally developed and utilized in 1983 in a research project under the direction of Comfort. The Thinking Skills Curriculum was designed to enhance the cognitive development of primary age students. The four units which are utilized in this study are Organization of Dots, Comparing, Perceptual Analysis, and Spatial Orientation. Since the curriculum materials are content free and require no fund of general information on the part of the participating student, past educational experiences are not determinants

of participation.

Cognitive development is viewed as resulting from mediation of the cognitive functions within the framework of an individuals zone of proximal development. Through the use of this Thinking Skills Curriculum this researcher expects to successfully enhance the cognitive development of young children and modify the cognitive structures of those children who are demonstrating inadequate functioning. The Thinking Skills Curriculum provides the individual with guided practice in the initial coding of information, selection of the hypothesis and the psychological characteristic of the response used to communicate his/her answer. It is anticipated that the utilization of the Thinking Skills Curriculum will assist in the establishment of permanent attitudes toward problem solving and strategies of solutions. Through the utilization of the Thinking Skills Curriculum the individual is exposed to problem solving strategies and provided guided practice in the utilization of these strategies within his/her zone of proximal development. The formation and further development of appropriate cognitive strategies allows for the enhanced development of those competencies which the individual is in the process of developing.

Summary

The review of the literature clearly establishes the current trend to view intellectual development and functioning as a dynamic process. The Thinking Skills Curriculum which is utilized in this research is specifically designed to focus instruction toward those competencies which are in the process of developing within an individuals zone of proximal development and thereby enhance cognitive development. It is not necessary, or prudent to await the development of cognitive deficiencies. Enhancement of cognitive development is possible.

CHAPTER III

METHODOLOGY

Introduction

The primary purpose of this research study was to provide empirical evidence regarding the effect of utilization of a Thinking Skills Curriculum as taught by the classroom teacher on academic achievement, learning ability and self-control of kindergarten students as measured by the Science Research Associates Achievement, the Science Research Associates Educational Ability Series, the Raven's Coloured Progressive Matrices and the Self-Control Rating Scale. This chapter contains descriptions of the sample, instrumentation and research design. Data collection procedures and methods of analysis are described and discussed.

Sample

This study was conducted using kindergarten students currently enrolled at a private school in a large southwestern city. The school is an urban school, serving primarily middle class families and designed to provide quality education in a parochial environment. The total student population of the school was three hundred and two (302) and included students in grades kindergarten through eight. Forty-two (42) students were enrolled in the two kindergarten classes. The enrollment in the school is extremely stable, with very little student mobility. During the 1985-86 school year 93% of the kindergarten student population remained constant

throughout the term.

The educational staff assigned as teachers for the kindergarten were both certified elementary education teachers. The established kindergarten curriculum is under the direction of the director of education for the parochial school system. The kindergarten program is designed as a self-contained all day program. The students report to their respective teachers in the morning and remain with that teacher throughout the day. The students move as a class unit from their homeroom class and participate in gym, music, and Spanish for a total of five hours each week.

Both teachers had served as the kindergarten teachers at this school for the two years prior to the initiation of the research. Test data on the primary students for the school years 1984-85 and 1985-86 was made available by the school administration prior to the selection of the school for participation in the current research. Statistical analysis of the test results indicates that there were no significant differences between the mean readiness test scores of the two (1985-1986) kindergarten classes as measured by the Metropolitan II Readiness Test. Statistical analysis of the test results indicates that there was no significant differences between the mean developmental age scores of the two (1985-86) kindergarten classes as measured by the Gesell Developmental Readiness Test.

The students who were applying for admission to the kindergarten program for the 1986-87 school year were screened in the Spring of 1986 prior to admission. The Gesell Readiness Test was utilized as a screening instrument. In compliance with the entrance requirements established by the school board and administration each child accepted into the kindergarten program demonstrated a developmental age of at least five (5) years at the onset

of the 1986-87 school year. The utilization of the results of the Gesell Developmental Readiness Test allowed for control of developmental readiness variables which might be related to gender. The students were randomly assigned to one of two kindergarten classes. Twenty-one students randomly assigned to a class were designated as the treatment group. Twenty-one students randomly assigned to a class were designated as the control group. The sample consisted of forty-two students enrolled in the two kindergarten classes. The gender breakdown was 24 males (57%), and 18 females (43%). Statistical analysis of the test results indicated that there were no significant differences between the mean developmental age scores of the two kindergarten classes as measured by the Gesell Developmental Readiness Test.

Procedure

The experimental group students were exposed to the Thinking Skills Curriculum for thirty minutes a day. The research was conducted for a period of twelve weeks. The purpose of the Thinking Skills Curriculum utilized in this research was to focus instruction toward those competencies which are in the process of developing within an individual's zone of proximal development and thereby enhance cognitive development. The Thinking Skills Curriculum, comprised of four units of study, was designed for implementation with primary students. The four curriculum units were designed as an adaptation of Feuerstein's Instrumental Enrichment Units: Organization of Dots, Orientation of Space, Comparisons, and Analytic Perception. Examples of the Thinking Skills Curriculum are included in the Appendix B.

Organization of Dots was based on a task devised by Andre Rey (Rey

and Dupont, 1953), and adapted by Comfort (1984), for use with primary age students. This unit was composed of fifteen pages. Each page contained one model frame with the remaining frames on the page containing a series of amorphous dots. The students were required to gather the necessary information, define the problem using precise labeling and present a strategy for the solution and a method for checking the final product. This unit was designed to develop the following cognitive strategies and skills:

a. projection of virtual relationships
b. organizational behaviors
c. analysis of characteristics of forms
d. internal representation and mental transformation of forms across variations in orientations
e. planning
f. systematic search
g. use of cues
h. precision and accuracy.

Spatial Orientation was designed as an adaptation of Feuerstein's Instrumental Enrichment unit on Spatial Orientation (1980), and adapted by Comfort (1984). Spatial Orientation was designed to enrich the ability to use concepts and stable systems of reference for orientation relative to one's own body, using body movements as a frame of reference for establishing directional relationships with objects in a visual field. The unit was composed of fifteen pages. Each exercise utilized a group of five figures to assist in the development of directional relationships. The unit was designed to develop the following cognitive strategies and skills:

a. division and organization of space in objective terms
b. dissolve egocentricity by developing the ability to see more than one point of view
c. recognize and identify relationships between objects and events in time and space.

The unit on comparison was designed as an adaptation of Feuerstein's Instrumental Enrichment Unit on Comparisons (1980), and adapted by Comfort

(1984). The unit on Comparison utilized the concept of commonalities and differences. The unit was composed of fifteen pages. The students were required to compare on the following parameters; size, form, number, color and shape. The unit was designed to develop the following cognitive strategies and skills:

a. precision in identifying and describing characteristics of an object, person, event
b. discovery of alternative dimensions of comparing
c. determining relevant and irrelevant dimensions
d. distinguishing between perceptual and semantic characteristics
e. grouping
f. identifying and establishing a continuum of concrete to abstract characteristics.

The unit on perceptual analysis was designed as an adaptation of Feuerstein's Instrumental Enrichment unit on perceptual analysis (1980), and adapted by Comfort (1984). The unit on perceptual analysis was designed to develop the ability to analyze the relationships between a whole and its component parts. The unit was composed of fifteen pages. The activities were designed to develop the following cognitive strategies and skills:

a. analysis of a whole into parts
b. establishing relationships between parts
c. recognizing that a part is a whole unto itself that can be broken into more parts
d. seeing alternative ways of analyzing a whole
e. recognizing equality and inequality of parts of a whole.

The Thinking Skills Curriculum was utilized by the regularly assigned classroom teacher. The classroom teacher participated in twenty (20) hours of training prior to the implementation of the curriculum into the daily activities. The training of the classroom teacher was completed in three phases; introduction, analysis and implementation. The introduction phase allowed for a general familiarization with the works of Vygotsky, Feuerstein, and the most recent research by Comfort (1984). The second phase of analysis allowed for discussion and delineation of the value and practical implications

of the inclusion of a Thinking Skills Curriculum into the basic curriculum of the kindergarten class. The final phase of training implementation was designed to develop teacher familiarity with the lesson plan format and procedures. The specific units of the curriculum and accompanying lesson plans were previewed during this stage.

The first phase allowed for approximately seven hours of instruction. This section of training was designed to allow the teacher an opportunity to become familiar with the general theoretical frameworks of the works of Vygotsky (1978), Feuerstein (1979) and the recent research by Comfort (1984).

An understanding of the works of Vygotsky (1978) provides the classroom teacher with a basic understanding of the framework upon which much of the research in the area of the dynamic nature of development is based. While developing an understanding of the theoretical framework of the works of Vygotsky primary emphasis is placed on the areas of the zone of proximal development, the process of mediation and the role of language in development. Specific demonstrations utilizing kindergarten students enabled the teacher to develop a basic understanding of the potential impact of focusing instruction within the zone of proximal development. It is Vygotsky's (1978) presentation of this zone which allows us a view of development as a dynamic process occuring within a range.

Vygotsky (1978) suggests that from the moment of birth children are in interaction with individuals with the society who actively seek to incorporate children into the culture. The role of the mediator, as developed within Vygotsky's theoretical framework, is to act as one who can organize and frame experiences for another.

Special emphasis is placed on the role of language as it relates

to the development of thought. Vygotsky (1978) presents the role of language as significant in the control of activity. Language allows humans to move beyond their immediate physical environment. Utilization of language allows individuals to be free from the constraints of the present situation and to select, frame, and organize information so as to be used at their discretion.

Presentation of the research of Feuerstein (1980) as it relates to the process of cognitive development allows the classroom teacher to view a theoretical framework which is based on the dynamic process of human development. The focus throughout the presentation of Feuerstein's works is designed to provide an understanding of the constructs of modifiability and the nature of the process of cognitive development as expressed within the current research by Feuerstein.

The constructs of modifiability and cognitive development as presented by Feuerstein (1980) suggest that the human organism is open and modifiable at all ages and stages of development. Feuerstein suggests that the primary characteristic of the human organism is its demonstrated plasticity and flexibility. The process of modification is presented as occuring in two ways either by direct exposure to stimuli or through mediated learning experiences. A special emphasis is placed on the role of mediated learning experiences as they contribute to individual development. The concept of mediated learning experiences are explained and developed through examples and specific demonstrations with the classroom teacher.

The classroom teacher acting as the mediator serves to frame and organize the experience for the student. As the classroom teacher mediates a learning experience the student is directed within the learning experience. In an example provided by Feuerstein (1980, p. 21) he asks us

to consider the difference between the following instructions: "Please buy three bottles of milk" and "Please buy three bottles of milk so that we will have enough left over for tomorrow when the shops are closed." The second quote provides an example of a mediated learning experience in which the mediator demonstrated an intentional attempt to frame and organize the experience for another individual.

Presentation of the recent research by Comfort (1984) allows the classroom teacher to view an adaptation of the instructional strategies developed by Feuerstein (1978, 1980). The adaptation developed by Comfort and Rineer (1984) is appropriate for utilization with primary age students. Comfort's research focuses upon the utilization of a Thinking Skills Curriculum with primary age students. Examination of the curriculum enables the teacher to develop an understanding of the bridge between the theoretical presentation of information as presented by Vygotsky (1978). Examination of the curriculum also allowed the teacher to observe the specific modifications of Feuerstein's approach to development of enhanced cognitive development with adolescents and the curriculum as utilized by Comfort.

The second phase of instruction allowed for discussion and delineation of the value and practical implications of the inclusion of a Thinking Skills Curriculum into the basic curriculum of the kindergarten class. This section allowed for approximately seven hours of training.

Discussion of the dynamic nature of development allows an opportunity to question and occasionally substantially alter our views of development. The presentation of research by Vygotsky (1962, 1978), Feuerstein (1979, 1980) and Comfort (1984) sets the stage to develop a view of the human organism as open and ever changing system with possibilities for modification at all ages and stages of development.

Current research has led to the belief that cognitive development can be enhanced and this belief has led to the subsequent development of a number of programs for development of thinking ability. The classroom teacher is provided with an opportunity to examine specific thinking skills programs which are currently utilized with children. The following programs are presented to the teacher in an attempt to familiarize the teacher with the currently available programs; Instrumental Enrichment - Reuven Feuerstein, Building Thinking Skills - Howard and Sandra Black, Learning To Think Series - Thelma Gwinn Thurstone, and the HOTS CURRICULUM - Dr. Stanley Pogrow.

The final stage of training was designed to develop teacher familiarity with the specific lesson plan format and procedures of the Thinking Skills Curriculum. This section of the training was scheduled to allow for approximately six hours of instruction.

This final stage in the teacher training allowed for time to internalize the role and impact of the teacher as they related to the implementation of the Thinking Skills Curriculum within the daily activities of the kindergarten class. Following stages one and two the teacher was familiar with the basic theoretical constructs upon which the Thinking Skills Curriculum was based. The teacher had had an opportunity to observe specific demonstrations regarding the zone of proximal development and the dynamic nature of development. Specific examples and demonstrations were provided which were designed to develop an understanding of the nature and role of the mediator.

This final stage allowed the teacher to become familiar with the specific format and procedures of the Thinking Skills Curriculum. The daily lessons were presented and each specific lesson was reviewed by

the trainer and the teacher. Subsequent to the completion of this research project the teacher training materials and curriculum will be made available for commercial distribution.

The curriculum which was supplied to the classroom teacher included individual worksheets for each student in the class as well as detailed lesson plans providing specific direction for the classroom teacher. The specific lessons of the Thinking Skills Curriculum were implemented daily at a time scheduled by the classroom teacher. This scheduling by the classroom teacher allowed for flexibility within the kindergarten daily curriculum. The approach to the inclusion of the Thinking Skills Curriculum into the daily activities of the kindergarten class allowed for the thirty (30) minutes a day to be devoted to instruction with the Thinking Skills Curriculum. This instruction with the Thinking Skills Curriculum was designed so as to adhere to the detailed lesson plans which were provided within the curriculum packet. The packet covered a period of sixty (60) days of instruction and provided material in the four areas of instruction. The classroom teacher utilized the specific lesson plans provided which included instruction for fifteen (15) days in each of the four areas covered. The approach to the utilization of the Curriculum allowed for alternating presentation of the four units for a period of five (5) days each prior to rotation to the next unit. The sequence which was utilized was; Organization of Dots, Comparison, Orientation in Space and Perceptual Analysis. This sequence was repeated every five days.

The specific daily scheduling of the instruction in the Thinking Skills Curriculum was flexible and allowed for consideration of the daily activities of the kindergarten curriculum. Specific instruction in the

Thinking Skills Curriculum was restricted to a period of thirty (30) minutes each day. The role of the classroom teacher as the mediator allowed for opportunities throughout the day when the teacher would naturally bridge between concepts discussed within the Thinking Skills Curriculum and a particular class activity. Since the curriculum was presented to an intact class by the classroom teacher it allowed for the possible interaction and subsequent mediation between the teacher and the class as well as between one student and another student. The classroom presentation of the Thinking Skills Curriculum was monitored once a week by this researcher. Weekly meetings were held during which any concerns regarding the implementation of the curriculum were discussed.

At the termination of the research study, the students were administered the following assessment instruments: Science Research Associates Achievement Test, Science Research Associates Educational Ability Test, Raven's Coloured Progressive Matrices Test, and the Self-Control Rating Scale. The Science Research Associates Achievement and Educational Ability Test, Level A, Form I were administered to the intact class by the classroom teacher. The SRA Achievement and Educational Ability tests were hand scored by three school psychologists. The Self-Control Rating Scale was scored by a school psychologist. The Raven's Coloured Progressive Matrices was administered and scored on an individual basis by a school psychologist.

The assessment at the termination of the research yielded thirteen variable scores which were subsequently examined. The Science Research Achievement Test yielded six (6) variable scores. The variables are as follows; Visual discrimination, Auditory Discrimination, Letters and Sounds, Listening Comprehension, Math Concepts, and Composite. The Science Research Educational Ability Test yielded five (5) variable

scores. The variables are as follows; Picture Vocabulary, Numbers, Picture Grouping, Spatial and EAS Total. The Raven's Coloured Progressive Matrices Test yields one (1) variable score. The Self-Control Rating Scale yields one (1) variable score.

Instrumentation

Raven's Coloured Progressive Matrices (Raven's)

The Raven's Coloured Progressive Matrices (Raven's) is a test of a person's capacity at the time of the test to apprehend meaningless figures presented for their observation, see the relationships between them, conceive the nature of the figure completing each system of relation presented, and, by so doing demonstrate a systematic method of reasoning.

The Raven's has been constructed to assess the intellectual process by which young children, mentally defective persons, and very old people are capable. The colored backgrounds on which the problems are printed make the test spontaneously interesting, and relatively independent of verbal instructions. The Raven's is composed of three sets of A, AB, B. Each of the three sets contains twelve matrices arranged in ascending levels of difficulty.

The first standardization of the Raven's was completed in the Burg of Dunfries, England in 1949. The standardization sample consisted of 608 children, one hundred children of each year of age from 5 to 11½. The raw score on the Raven's is converted to percentile scores which are then converted to an intellectual grade ranging from "intellectually superior" to "intellectually impaired" (Raven, 1977).

Reliability correlations for subjects (ages 5½ to 11½ years) range from .80 to .93 (Raven, 1977). Reddington and Jackson (1981) have completed

a normative Queensland study with 737 children around seven mid-year points ($5\frac{1}{2}$ - $11\frac{1}{2}$ years), of whom 693 were white, and 44 aborigines. At the youngest age ($5\frac{1}{2}$) a Cronbach alpha of .80 was reported, with values rising to .93 at age $11\frac{1}{2}$ (Raven, 1977).

In a normative Indian study, Rao and Reddy (1968), with 1,017 pupils in grades 1 to 5, retested a sample of 100 after 2-3 weeks, and found a product-moment correlation of .86 (Raven, 1977). Similarly, Freyburg (1966) reported retest reliabilities of .87, .83, and .81 for samples of 5, 7 and 8 year old pupils respectively (Raven, 1977).

With young children aged 6 to 7 years, Tuddenham et al. (1958) reported internal consistency coefficients ranging from .71 to .90, while with 9 year olds Martin and Wiechers (1954) found high concurrent validity with a correlation of .91 with the SICS (Raven, 1977).

Self-Control Rating Scale (SCRS)

Kendall and Wilcox (1979) have defined cognitive-behavioral self-control as follows:

> A child displays nonimpulsive (self-controlled) behavior when prior to behaving, he/she engages in cognitive evaluation of response alternatives and, having performed such reflection, is then capable of either engaging in the decided act or inhibiting the discarded possibilities. (p. 42)

The Self-Control Rating Scale (SCRS) is a thirty three (33) item instrument in which teachers rate behavior on a seven-point continuum. One word descriptors anchor both ends of the continuum on the scale. Kendall and Wilcox viewed self control and impulsivity as extreme points on a continuum. A high score on the SCRS means greater impulsivity.

For every item a score of 1 indicates maximum self-control and a score of 7 indicates maximum impulsivity. The total SCRS scores are

computed by adding the rating scores for each item. The higher the SCRS score the greater the child's lack of self-control.

To assess reliability and validity of the SCRS, Kendall and Wilcox (1979) randomly selected 110 normal third-grade through sixth-grade students. These students were tested with the SCRS, the Matching Familiar Figure Test (MFFT), the Peabody Picture Vocabulary Test (PPVT) and the Porteus Maze Test. The internal alpha reliability of the SCRS was .98 which suggests a high degree of internal consistency. Test-retest reliability was taken after four weeks with a sample of 24 students. In this sample the reliability was .84.

The authors suggest that one of the reasons for developing the SCRS was the need for a dependent measure that could be used to access the generalization of treatment to settings other than therapy settings. Kendall and Wilcox (1979) feel that the SCRS is supported for such use. Some additional data had been reported to suggest that the SCRS is a measure that is sensitive to treatment. In two studies of the effects of cognitive-behavioral self-control training with non-self-controlled problem children (Kendall and Wilcox, 1980), treatment-produced changes were evidenced on teacher's SCRS ratings. These data are encouraging, yet evidence of SCRS changes as they relate to behavioral generalization changes (e.g. observations in the classroom) is still needed.

Written correspondence between this researcher and Philip C. Kendall Ph.D., Head, Division of Clinical Psychology at Temple University, Philadelphia, Pennsylvania has continued during the term of the 1985-86 school year. During the course of the correspondence Dr. Kendall has described the Self-Control Rating Scale as a new research instrument with many areas open for additional inquiry. He has further requested to

be informed regarding the specific findings of this research. Copies of the correspondence are available in Appendix F.

Science Research Associates Level A Achievement and Educational Ability Series (EAS)

Science Research Associates (SRA) Level A Achievement and Educational Ability Series (EAS) were utilized as dependent variables in order to provide standardized information relating to the effects of treatment on academic achievement and educational ability. Level A Achievement explores the basic skill areas in kindergarten reading readiness (visual, discrimination, auditory discrimination, recognition of letter and sounds, and listening comprehension) and mathematics concepts. Level A Educational Ability Series (EAS) explores the following areas; mathematics concepts, picture vocabulary, number, picture grouping, and spatial perception. The SRA Achievement Series scores are represented in the following manner: National and Local Percentiles, National Percentile Bands, Special Percentiles Stanines, Growth Scale Values, Grade Equivalents, Curve Equivalents and Percentage Correct and Ratios. Growth scales are numeric scales, one for each subject-matter area, that provide continuous measurement of student performance. Each point on the growth scale is a growth scale value (GSV) and all are standard scores. The GSV range from 20 to 780. Normal Curve Equivalent (NCE) are similar to GSV's. The NCE's range from 1 to 99 with a mean of 50 and a standard deviation of 21.06 for all scales. The subtests and their internal consistency reliability coefficients are listed in Table I.

The fall 1978 standardization sample consisted of 129,000 students in 457 schools in 92 districts. Complete data (for students who took all the

tests in the battery) available for 106,418 students were used for all subsequent analyses. As part of the 1978 standardization sampling and analysis, schools were identified as belonging to special subpopulations of the national norms groups. The schools were grouped to develop norms for the following subpopulations; Large City, Nonpublic and Title I. The Large City norms group consisted of 19,003 students from 74 public schools in 7 public school districts with student populations of 100,000 or more. The Nonpublic norms group consisted of 38,299 students from 99 schools (10 private and 89 church related). The Title I norms group consisted of 34,821 students of 101 public and 9 nonpublic schools.

Internal consistency (KF-20) reliabilities for subtest, test, and composite raw scores and standard errors of measurement for raw scores, growth scale values (GSVs) and grade equivalents (GEs) were calculated from summary data from the national samples. Summary statistics for SRA Level A Series for kindergarten students who took the test during the fall 1978 standardization consisting of means and standard deviations and reported as growth scale values are presented in Appendix E.

TABLE I

RELIABILITY DATA OF
SRA SUBTESTS

Test	Reliability Coefficients
RD Visual Discrimination	.92
RD Auditory Discrimination	.91
RD Letters/Sounds	.82
RD Listening Comprehension	.78
Reading Total	.94
Math Concepts	.81
Math Total	.81
EAS	.78
Composite Score	.95

Source: SRA Technical Report #1, 1978, p. 9.

Studies were made of the correlations between the SRA Achievement Series test scores and the appropriate course grades, and for a limited sample, with scores on other achievement tests. Brief descriptions of the schools and the communities in which they were located precede the correlational data. The samples are not necessarily representative of the standardization sample or national student population.

The majority of the correlations were between test scores and course grades and ranged between .43 and .79. These results are consistent with the magnitude of relationships expected between test scores and course grades. The majority of the correlations between reading scores and reading/English grades ranged between .59 and .78; for social studies scores and grades, the correlations ranged between .46 and .78; and for science scores and grades, the correlations ranged between .43 and .65 (SRA Technical Report #1, 1981).

Correlations of the SRA Achievement Series and other achievement test scores were done for samples of students in grades 3, 5, and 7 and in high school. (Correlations of EAS scores with other ability test scores are not yet available.)

The correlations of Achievement Series test scores and those from other achievement test batteries were generally high. There were only three values less than .60. As expected, the total battery score correlations were in the .80s and .90s, and the individual test score correlations were in the .70s and the .80s. The results indicate a general consistency in scores across test batteries (SRA Technical Report #1, 1981).

Research Design

An experimental post test only control group design was used. The

following is a representation of the design.

R X O

R O

As reported by Campbell and Stanley (1963), the post test only control group design controls for the following sources of threats to internal and external validity; history, maturation, testing, instrumentation, regression, selection, morality, interaction of selection and maturation, interaction of testing and X. Campbell and Stanley have indicated possible areas of concern relating to this research design are interaction of selection and X and reactive arrangements.

The term interaction of selection and X refers to the possibility that the effects validly demonstrated hold only for that unique population from which the experimental and control groups were jointly selected. This possibility becomes more likely as a researcher has more difficulty in getting subjects for our experiment. Campbell and Stanley state, "if we were to conduct a study within a single volunteered school, using random assignment of subjects to experimental and control groups, we would not be concerned about the 'main effect' of the school itself" (p. 19). The current research design and situation is identical to the example cited by Campbell and Stanley, indicating limited threat to main effect. The term reactive arrangements refers to the possible unrepresentativeness of the experimental setting and the student's knowledge of participation in an experiment. The Hawthorne Effect is said to occur when an individuals involvement in a research project makes them feel and act differently compared to individuals who are not participating in the research project. The Hawthorne Effect is not thought to effect this research project since the classes are contained in two separate rooms. The age and grade of

the students served to provide an environment in which since this was their first school experience all occurrences were novel. The Thinking Skills Curriculum was introduced as a part of the daily curriculum activities. The current research design was selected and implemented in order to control for both interaction of selection and X and reactive arrangements. Since the research allows for the regular classroom teacher to administer the treatment in the form of the Thinking Skills Curriculum to an intact class as part of the regular school curriculum the educational environment is not compromised thus limiting any possible interaction of selection and X. Campbell and Stanley (1963), suggest that experimentation within schools must be conducted by regular staff of the schools concerned whenever possible especially when findings are to be generalized to other classroom situations (p. 21).

Hypothesis

The research conducted in this experiment sought to compare the performance of two groups of kindergarten students following the inclusion of a Thinking Skills Curriculum into the daily classroom activities.

Hypothesis: There is no significant difference in the scores of kindergarten students who are exposed to the Thinking Skills Curriculum training and those who are not in terms of academic achievement, cognitive development and cognitive-behavioral self-control.

Data Analysis

SPSS Discriminant Analysis was utilized. Discriminant analysis allows the researcher to examine the differences between two or more groups in relation to several variables simultaneously. The data analysis

allowed for the examination of the thirteen variables which were yielded as a result of the assessment at the termination of the research study. The Science Research Achievement Test yields six (6) variable scores. The variables are as follows; Visual Discrimination, Auditory Discrimination, Letters and Sounds, Listening Comprehension, Math Concepts, and Composite. The Science Research Educational Ability Test yields five (5) variable scores. The variables are as follows; Picture Vocabulary, Numbers, Picture Grouping, Spatial and EAS Total. The Raven's Coloured Progressive Matrices yields one (1) variable score. The Self-Control Rating Scale yields one (1) variable score. Data analysis was based on the raw scores which were yielded from the assessment at the termination of the research study. Discriminant analysis calls for the formation of a canonical discriminant function which is a linear combination of the discriminating variables. Particular emphasis is placed on interpreting the discrimination space in terms of the variables contributing most heavily to separation of the groups in that space.

Of the original 42 cases no cases were dropped from analysis owing to missing data. It is recommended that the sample size of the smallest group should exceed the number of predictor variables (Tabachnick and Fidell, 1983, p. 299). The potential problem of multicollinearity and singularity is avoided with the utilization of stepwise discriminant analysis by the tolerance test at each step. Robustness can be expected for discriminant analysis with respect to violation of the assumptions of equal variance - covariance matrices with equally sized or larger samples. (Tabachnick and Fidell, 1983, p. 300).

Tabachnick and Fidell (1983) suggest that discriminant analysis procedures are viewed as robust to violations of assumptions of normality

and homogeneity of equal variance - covariance when sample size is equal and when the smallest group includes 20 cases. The current research utilized two groups with 21 cases in each group. Consequently the necessary assumptions have been met.

Summary

Kindergarten students who were applying for admission to a private southwestern school were screened on the Gesell Readiness Test. The students were randomly assigned to either a treatment or control group. The treatment group was exposed to the Thinking Skills Curriculum for 30 minutes a day for a period of 12 weeks.

The dependent variables were academic achievement (as measured by the SRA Achievement Test Level A, 1978 Edition), educational ability (as measured by the Educational Ability Series of the SRA Level A, 1978 Edition), non verbal problem solving (as measured by the Raven's Coloured Progressive Matrices) and cognitive-behavioral self-control (as measured by the self-control rating scale). The hypothesis was tested using discriminant analysis.

CHAPTER IV

RESULTS

Introduction

An experimental post test only control group design was utilized to analyze the data. The problem examined in this research was: Will the inclusion of a Thinking Skills Curriculum, taught by the classroom teacher, enhance academic achievement, learning ability and self-control of kindergarten students?

At the termination of the research study the students were administered the following assessment instruments: Science Research Associates Achievement Test, Science Research Associates Educational Ability Test, Raven's Coloured Progressive Matrices Test, and the Self-Control Rating Scale. The Science Research Associates Achievement Test is composed of six scales; Composite (COMP), Visual Discrimination (VD), Auditory Discrimination (AD), Letters and Sounds (LET), and Math Concepts (MTH). The Science Research Associates Educational Ability Test is composed of five scales; Picture Vocabulary (PIV), Numbers (NOS), Picture Groupings (PIG), Spatial (SPAT) and Educational Ability (EAS). The Raven's Coloured Progressive Matrices Test and the Self-Control Rating Scale each yield one scale. The analysis allowed for examination of all thirteen scales. Descriptive statistics, using raw scores, including means and standard deviations for control, treatment and combined group scores on specific variables are located in Tables II, III, IV, and V.

TABLE II

DESCRIPTIVE STATISTICS FOR SRA ACADEMIC ACHIEVEMENT TEST SUBTEST SCORES

Scales		Control N=21	Experimental N=21	Combined N=42
Visual Discrimination	$\bar{X}$	20.714	22.000	21.357
	SD	4.562	3.646	4.130
Auditory Discrimination	$\bar{X}$	19.142	21.809	20.476
	SD	3.772	4.365	4.249
Letters and Sounds	$\bar{X}$	16.809	16.333	16.571
	SD	3.429	4.127	3.755
Listening Comprehension	$\bar{X}$	25.666	26.857	26.261
	SD	3.439	4.819	4.179
Math Concepts	$\bar{X}$	23.428	23.761	23.595
	SD	3.749	4.504	4.096
Composite	$\bar{X}$	105.761	110.761	108.261
	SD	13.494	16.816	15.270

$\bar{X}$ = Mean Score

SD = Standard Deviation

TABLE III

DESCRIPTIVE STATISTICS FOR SRA EDUCATIONAL ABILITY SERIES (EAS) SUBTEST SCORES

Scales		Control N=21	Experimental N=21	Combined N=42
Picture Vocabulary	$\bar{X}$	15.095	14.095	14.595
	SD	1.997	2.879	2.499
Numbers	$\bar{X}$	2.619	3.380	3.000
	SD	0.804	1.283	1.126
Picture Grouping	$\bar{X}$	4.190	4.000	4.095
	SD	1.167	0.894	1.031
Spatial	$\bar{X}$	2.666	3.619	3.142
	SD	1.591	1.687	1.690
EAS Total	$\bar{X}$	24.095	25.095	24.595
	SD	2.736	4.403	3.656

$\bar{X}$ = Mean Score

SD = Standard Deviation

TABLE IV

DESCRIPTIVE STATISTICS FOR RAVEN'S COLOURED PROGRESSIVE MATRICES (RAVEN'S)

Scales		Control N=21	Experimental N=21	Combined N=42
Raven's	$\bar{X}$	16.857	19.047	17.952
	SD	3.581	3.556	3.695

$\bar{X}$ = Mean Score

SD = Standard Deviation

TABLE V

DESCRIPTIVE STATISTICS FOR SELF-CONTROL RATING SCALE (SCRS)

Scales		Control N=21	Experimental N=21	Combined N=42
SCRS	$\bar{X}$	89.047	51.904	70.476
	SD	31.289	18.335	31.541

$\bar{X}$ = Mean Score

SD = Standard Deviation

Discriminant Analysis

SPSS DISCRIMINANT ANALYSIS (Nie, 1983) was used for analysis. Discriminant analysis is a statistical technique which allows the researcher to study the differences between two or more groups with respect to several variables simultaneously. This technique is especially useful in analyzing experimental data when assignment to a "treatment" group is presumed to affect scores on several criterion variables (Klecka, 1980, p. 12).

Discriminant analysis was utilized in order to allow this researcher to engage in interpretation while examining the ways in which the two groups differ. A stepwise discriminant function analysis was performed using Rao. Rao produces at each step the largest increase in distance between groups as measured by Rao's V. Groups included the treatment group which received instruction in the Thinking Skills Curriculum and the control group which did not receive instruction in the Thinking Skills Curriculum. Scales included six scores of the Science Research Associates Achievement Test, five scores of the Science Research Associated Educational Ability Test, and the scores of the Raven's Coloured Progressive Matrices Test and the Self-Control Rating Scale.

Within a single discriminant analysis a number of orthogonal dimensions are extracted. The maximum number of dimensions extracted is the lesser of either the number of groups minus one, or equal to the number of predictor variables. With respect to this research the maximum number of dimensions is stated as the number of groups minus one or 2 - 1 to yield one discriminant function. One discriminant function was calculated $X^2(6) = 30.431$, $p < .001$. (See Table VI).

Data analysis indicates that there was statistically significant

discrimination between the two groups on the first discriminant function. A significant difference was found to exist between the treatment and control groups.

Hypothesis: There is no significant difference in the scores of kindergarten students who are exposed to the Thinking Skills Curriculum training and those who are not in terms of academic achievement, cognitive development and cognitive-behavioral self-control. The null hypothesis was rejected. (See Table VI).

The canonical correlation of 0.7487 (See Table VI) indicates that the discriminant function provides a high degree of association between discriminant function scores and group membership. This canonical correlation is a measure of association which summarizes the degree of relatedness between the groups and the discriminant function. A value or zero would denote no relationship at all, while large numbers represent increasing degrees of association with 1.0 being the maximum. The canonical correlations squared indicates the portion of variance shared between grouping variables and predictor variables on that dimension (See Table VI). The canonical correlation arrived at in this research is 0.7487. The canonical correlation is, or course, the measure of association, and it is identical to the Pearson product-moment correlation between the two linear combinations in the pair (Klecka 1980, p. 37). When that canonical correlation is squared it indicates that 56% of the variance which is demonstrated between the groups is accounted for by the first and only Discriminant Function.

TABLE VI

CANONICAL DISCRIMINANT FUNCTION

Function	Canonical Correlation (R)	Canonical Correlation Squared (R^2)	Chi Squared	D.F.	Significance
1	0.7487	0.5605	30.431	6	0.0001

Discriminant analysis attempts to statistically distinguish between two or more groups. The particular groups are defined by the research situation. Discriminant analysis attempts to distinguish the groups by forming one or more linear combinations of the discriminating variables, known as "discriminant functions". Statistical analysis indicates that six of the thirteen scales which were measured reflect significant contributions to the discriminant function. The six scales which were found to contribute to the successful discrimination between the groups are; Self-Control Rating Scale (SCRS), Numbers (NOS), Educational Ability (EAS), Math Concepts (MTH), Raven's Coloured Progressive Matrices (RAV), and Visual Discrimination (VD). (See Table VII).

TABLE VII

DISCRIMINANT FUNCTION - SUMMARY TABLE

Step	Action Entered	Removed	Wilks' Lambda	Sig	Rao's V	Change in V
1.	SCRS		0.6448	0.0001	22.03	22.03
2.	NOS		0.5816	0.0001	28.77	6.740
3.	EAS		0.5166	0.0001	37.42	8.650
4.	MTH		0.4948	0.0001	40.83	3.407
5.	RAV		0.4606	0.0001	46.83	6.009
6.	VD		0.4393	0.0001	51.04	4.209

Standardized coefficients allow us to view the contributions of the individual scales. If we are interested in the relative importance of the variable, examination of the standardized canonical discriminant function coefficients is called for. (See Table VIII). Standardized coefficients are obtained by converting the raw data into standard form. These standardized coefficients assist in determining the variables which contribute most to determining scores on the function. The larger the magnitude the greater is that variable's contribution. The standardized coefficients are listed in Table VIII.

TABLE VIII

STANDARDIZED CANONICAL DISCRIMINANT
FUNCTION COEFFICIENTS

	Func 1
SCRS	.95653
NOS	.89710
MTH	.78958
EAS	.56801
VD	.43676
RAV	.42990

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary of the Investigation

Theories of cognitive development and the concept of cognitive modifiability within the zone of proximal development were examined within the context of this study. This chapter includes a summary of the research study under investigation. Specific conclusions, implications and areas of future research are also presented.

The theoretical framework of cognitive development upon which both Feuerstein (1979, 1980) and Vygotsky (1978) base their work is described as a dynamic or process oriented approach. An understanding of Vygotsky's concept of the zone of proximal development is a prerequisite to the understanding of the dynamic and process oriented nature of cognitive development. The zone of proximal development suggests two levels of development; the present level of development is seen as the level of independent problem solving while the level of potential development is viewed as the level of problem solving under expert guidance. Vygotsky (1978) suggests that consideration of the zone of proximal development allows for the observation of those abilities which the individual is in the process of internalizing.

As Feuerstein (1979, 1980) incorporates the concept of the zone of proximal development into his theoretical framework regarding the nature of cognitive development he affirms his view of the human organism as

an open and ever changing system. Feuerstein (1979, 1980) and Vygotsky (1979) view cognitive development as a dynamic process which occurs within an individual's zone of proximal development. Both theorists contend that the human organism is open and modifiable at all ages and stages of development.

Cognitive development and modifiability are viewed as occuring in two ways, direct exposure to stimuli or mediated learning. Direct exposure occurs when an individual is exposed to a stimulus and interacts with it. Mediated learning occurs when an organism interposes him/herself between the stimulus and the individual for the purpose of assisting in the framing and organizing of the experience. Mediated learning experiences enable the individual to become accustomed to the utilization of certain cognitive strategies. The goal of all mediated learning experiences is to render the organism open to future experiences.

Vygotsky (1979) has suggested that internalization of verbal commands is the critical step in the child's development of voluntary control over behavior. Miechenbaum and Goodman (1971) have utilized the concept of internal mediation through language and have developed a comprehensive program for modifying impulsive behavior in children. The program as designed by Miechenbaum and Goodman includes self instructions and adaptive problem solving strategies. Effective utilization of language allows for internal mediation and development of cognitive self control.

The Thinking Skills Curriculum is an adaptation of the first four units of Instrumental Enrichment developed by Reuven Feuerstein (1979, 1980) for use with adolescents. The Thinking Skills Curriculum as developed by Comfort and Rineer (1984) represents an adaptation of Instrumental Enrichment which is appropriate for primary age students.

This experimental study was designed to investigate the effects of inclusion of a Thinking Skills Curriculum as a part of the daily curriculum activities of kindergarten students. The Thinking Skills Curriculum was designed to provide an individual with exposure to problem solving strategies and guided practice in the utilization of those strategies within his/her zone of proximal development.

This research study was conducted with an experimental post test only control group design. The sample consisted of forty-two students enrolled in a large southwestern city. The Thinking Skills Curriculum consists of four units; Organization of Dots, Orientation in Space, Comparison, and Analytic Perception. These units were included in the daily activities of the treatment group for a period of twelve weeks. During the course of the twelve weeks the students received instruction with the Thinking Skills Curriculum for thirty minutes a day. This instruction was provided as part of the regular school activities and taught by the classroom teacher.

At the termination of the research study, the students were administered the following assessment instruments; Science Research Associates Achievement Test, Science Research Associates Educational Ability Test, Raven's Coloured Progressive Matrices Test, and the Self-Control Rating Scale. SPSS Discriminant Analysis (Nie, 1983) was used for analysis of data. Interpretation and discussion of the scales which contribute to the discrimination between groups is facilitated with discriminant analysis.

Conclusions

This section includes a discussion of the specific conclusions which

arose from the analysis of statistical information resulting from this experimental research study. Data analysis indicates a significant difference between the scores of the two groups. The performance of the group which received instructions in the Thinking Skills Curriculum is statistically different from the performance of the group which did not receive instruction in the Thinking Skills Curriculum. The findings of this study indicated that inclusion of a Thinking Skills Curriculum as part of the daily activities of kindergarten students had a significant effect on the treatment group in each of the areas under consideration. This positive performance on the part of the treatment group is evidenced in the three areas which were under consideration, academic achievement, learning ability and self control. Academic achievement was measured by the SRA Level A Achievement Test, 1978 Edition. Learning ability was measured by the Educational Ability Series of the SRA Level A, 1978 Edition and the Raven's Coloured Progressive Matrices. Self-control was measured by the Self-Control Rating Scale.

The Science Research Associates Achievement Test is composed of six scales; Composite (COMP), Visual Discrimination (VD), Auditory Discrimination (AD), Letters and Sounds (LET), and Math Concepts (MTH). The Science Research Associates Educational Ability Test is composed of five scales; Picture Vocabulary (PIV), Numbers (NOS), Picture Groupings (PIG), Spatial (SPAT) and Educational Ability (EAS). The Raven's Coloured Progressive Matrices Test and the Self-Control Rating Scale each yield one scale.

A total of thirteen scales in the three areas were measured at the termination of the research study. Measurement of these thirteen scales facilitated discrimination between groups and subsequent interpretation of those differences. Scales in each of the three areas of academic

achievement, cognitive development, and cognitive behavioral self control were found to assist in discrimination between the groups.

Analysis of the statistical data allowed for the calculation of one discriminant function. This discriminant function successfully differentiates the treatment and the control groups. The utilization of stepwise discriminant function analysis allows for the production of an optimal set of discriminant variables.

This research study sought to analyze the effects of the inclusion of a Thinking Skills Curriculum on academic achievement, learning ability and self-control of kindergarten students. Statistical analysis indicates that six of the thirteen scales which were measured reflect significant contributions to the discriminate function. The six scales represent each of the three areas under consideration; academic achievement, learning ability and self-control.

The expressed purpose of the Thinking Skills Curriculum was to provide instruction which is focused toward those competencies which are in the process of developing within an individual's zone of proximal development and thereby enhance cognitive development. The results of this research study indicate that inclusion of the Thinking Skills Curriculum impacts cognitive development. This impact on cognitive development is evidenced by the significant contributions of the six scales to the discriminate function. The six scales which are found to successfully discriminate between the two groups are Math Concepts, Visual Discrimination, Numbers, Educational Ability, Raven's, and the Self-Control score.

Interpretation of the results calls for a careful task analysis of the requirements of those six scales which statistical analysis found to successfully discriminate between the two groups of students.

Examination of the scales reveals that a significant contribution to the discrimination between the groups is made by the scale labeled Self-Control. The subjective nature of this Self-Control Rating Scale, or any rating scale, used in research demands careful consideration. Items on the Self-Control Rating Scale are designed so as to reflect the performance of the child in daily activities as perceived by the teacher. The score on the scale can be viewed as a measure of cognitive-behavioral self-control as rated by the classroom teacher. A low score on the Self-Control Rating Scale is said to reflect demonstrated ability on the part of the student in the area of cognitive-behavioral self-control. According to the authors of the Self-Control Rating Scale, a child displays self-control when prior to behaving, he/she engages in cognitive evaluation of response alternatives. The very design of the Thinking Skills Curriculum is established so as to encourage and indeed foster an approach to problem solving which requires careful reflection prior to the initiation of action. Consider the logo presented by Feuerstein in his program Instrumental Enrichment "Just a minute..Let me think". Incorporation of this logo has been very carefully built into the approach utilized within the Thinking Skills Curriculum. This reflective approach to problem solving is nurtured throughout the presentation of the Thinking Skills Curriculum.

Analysis of the remaining five scales which are found to assist in successful discrimination between groups reveals well founded commonalities. Successful completion of each of the five scales; Math Concepts, Visual Discrimination, Numbers, Educational Ability, and the Raven's calls for demonstrations of certain cognitive strategies. Each of the above mentioned scales calls upon the student to perceive a situation and subsequently grasp certain relationships among the items presented.

The scales rely heavily on a nonimpulsive approach to problem solving which calls upon the students to analyze the stimuli and then respond according to certain predominately visually presented relationships.

In each of the four units of the Thinking Skills Curriculum which was utilized within this research project, the students were encouraged to develop certain strategies for problem solving. Instruction with the Thinking Skills Curriculum seeks to encourage the student to gather the necessary information, define the problem using precise labeling and present a strategy for the solution and a method for checking the final product.

There are seven remaining variables which are not found to assist in the formation of the discriminant function. These variables are split with the treatment group receiving numerically higher mean scores than the control group on four of the seven scales. This arrangement appears to present a result which could well reflect chance occurrence. It should be noted however that the overall performance of the groups reflects the fact that the treatment group has numerically superior mean scores than the control group in ten of the thirteen scales measured.

Seven of the thirteen scales were not included within the discriminate function. These scales were not included due to their lack of contribution to the successful discrimination between the groups. The scales which were not included in the discriminant function are as follows; Auditory Discrimination, Letters and Sounds, Listening Comprehension, Picture Vocabulary, Composite, Picture Grouping and Spatial. Five of the scales listed above require significant involvement on the part of the student in the area of acquired skills. The Thinking Skills Curriculum is not designed to provide instruction in specific content areas. Feuerstein (1979, 1980) stated that two years of treatment, one

hour, three times each week, is needed to obtain significant improvement in academic achievement. The five scales which rely heavily on acquired language skills are Auditory Discrimination, Letters and Sounds, Listening Comprehension, Picture Vocabulary, and the Composite. The acquired skills needed for successful mastery of these areas are typical of content information which children receive following specific instruction in the area of readiness or pre-reading instruction. A sample of the content covered within these areas includes rhyming, vowels, identification of vowel sounds, and detailed listening comprehension skills. Although these scales were not found to successfully discriminate between the two groups, the group which was exposed to the Thinking Skills Curriculum did receive numerically higher scores than the group which was not exposed to the curriculum in three of the five scales.

Of the areas which focus heavily on receptive language skills five scales are reviewed. The scales on which the Thinking Skills group did receive numerically higher scores than the group which was not exposed to the Thinking Skills Curriculum follow; Auditory Discrimination, Listening Comprehension, and the Composite. Even though these particular scales were not found to contribute significantly to the discriminate function and the ability to discriminate between groups they did indicate numerically higher scores than the group which was not exposed to the Thinking Skills Curriculum.

There are two scales which rely heavily on content specific related skills which do not contribute to the discrimination between the groups and on which the group which was not exposed to the curriculum did demonstrate higher scores. These two scales are Letters and Sounds and Picture Vocabulary. In the area of Letters and Sounds the student is

asked to identify not only specific letters but also specific sounds following pronunciation by the examiner. In the area of Picture Vocabulary the student is asked to identify specific pictures following a brief statement by the examiner. Although the group which did not receive instruction in the curriculum did demonstrate a higher numerical score in these areas the scores of the groups did not differ by more than one point.

There are two scores in the area of learning ability as measured by the EAS of the SRA which were not found to contribute to the successful discrimination of the two groups. The two scales are Spatial and Picture Grouping. The group which received the instruction in the curriculum demonstrated a numerically higher score than the group which did not receive instruction in the curriculum in the area of Spatial. As with the scales which were found to assist in the discrimination between the groups, this scale required that the students demonstrate an ability to visualize the relationship between one shape and another. Although the group which received instruction in the curriculum was found to receive a numerically higher score than the group which did not receive instruction this scale did not contribute to the discrimination between the two groups.

The scores on the scale Picture Grouping was also not included in the discriminate function. The scores on this particular scale were not found to successfully discriminate between the two groups. The mean scores on this particular scale are within one tenth of a point of one another for each of the groups measured.

In summary, the analysis of the data supports the contention to view intellectual development and functioning as a dynamic process. Enhanced

development of those competencies which were in the process of developing within an individuals zone of proximal development was demonstrated through this experimental research study. This enhanced development was demonstrated across the areas of academic achievement, cognitive development and cognitive behavioral self-control.

General Conclusions and Implications

This experimental research study was designed to facilitate the examination of questions regarding the nature of cognitive development in young children. Will the development of appropriate cognitive strategies allow for internal mediation of behavior in young children and thus serve to control impulsive behavior? Will cognitive training positively affect development within an individuals zone of proximal development? Will the effects of cognitive training effect individual academic performance? The following sections include a presentation of general conclusions and implications based on the results of the experimental research study.

Vygotsky (1978) suggests that language plays a central role in the organization and development of the thought process. He supports the notion that it is the utilization of internalized language which allows an individual to gain control over his/her behavior. The instructional strategies of Meichenbaum and Goodman (1971) center on the development of training procedures for impulsive children. These strategies focus on the development of self-instructions, or what Vygotsky would refer to as internal mediation.

The findings in this research study support the role of cognitive strategies in reducing impulsive behavior. Following instruction with

the Thinking Skills Curriculum the treatment group was described as demonstrating significantly greater self-control than the control group. The function of language and internal mediation as influencing self-control calls for analysis of our present approach to development of cognitive strategies in young children.

As the children receive instruction with the Thinking Skills Curriculum they are exposed to a new repetoire of cognitive strategies. With each lesson the students are instructed and encouraged to utilize the newly acquired cognitive strategies. Students are encouraged to gather the necessary information, define the problem using precise labeling and present a strategy for the solution and a method for checking the final product. The incorporation of these strategies requires a more reflective, less impulsive approach to problems.

Initially, the cognitive strategies and general approach called for the teacher to mediate each action. As the children developed an understanding of the process, they tended to assist one another in developing an appropriate approach to the task at hand. The children were observed to move toward internal mediation. Internal mediation allows the individual to successfully mediate to himself with the assistance of language.

Following the completion of the research project a discussion group was held. Each of the students who participated in the research project and received instruction in the Thinking Skills Curriculum was represented at the discussion by one or both parents. During the discussion group the parents of the children who had been involved in the Thinking Skills Curriculum instruction shared their observations. The consensus on the part of the parents was that they had observed transference of the skills

presented in the Thinking Skills Curriculum to the home situations. Many of the parents shared personal experiences in which their child had demonstrated decreased impulsivity and increased perseverance in problem solving situations encountered in their daily lives. An additional statement presented by a number of the parents related to a more flexible approach to problem solving. These young children were described by their parents as frequently demonstrating the consideration of alternative points of view prior to making a decision.

The results of the current research may well generate discussions regarding our current approach to instruction which focuses primarily on content. If our academic curriculum is oriented toward content to the exclusion of the development of generalizable strategies we could very easily find ourselves lacking the necessary skills for appropriate adaptation in tomorrows world. Utilization of an approach to instruction which requires a dynamic and process oriented view of development may serve to offer our students an opportunity to develop both content skills and cognitive strategies designed to promote generalization of abilities.

The concept of the zone of proximal development as presented by Vygotsky (1978) suggests that it is this zone of proximal development which should be of central concern to educators. The importance of monitoring and enhancing those competencies which are in the process of maturing within an individuals zone of proximal development is viewed as a necessary consideration. The Learning Potential Assessment Device and Instrumental Enrichment as developed by Feuerstein (1979, 1980) places special emphasis on the dynamic and process oriented nature of cognitive development. Comfort's (1984) research also lends support to the accessability of cognitive modification with children in the concrete

operation stage of development.

The findings of this research study lend additional support to the positive impact of cognitive training on enhanced development within an individuals zone of proximal development. Three of six scales measured within the area of cognitive development reflect significant contributions to the discriminant function thus indicating the impact of cognitive training. The three scales are Numbers, Educational Ability and the Raven's.

Over the twelve week period of instruction with the Thinking Skills Curriculum, the scores demonstrated that the scales in the areas of Numbers, Educational Ability, and Raven's were found to assist in the successful discrimination between the groups of students. In line with the theoretical framework presented by both Vygotsky and Feuerstein, the framework of the Thinking Skills Curriculum endeavors to focus instruction within the individual's zone of proximal development. By focusing our attention on those competencies which are in the process of developing we provide instruction within an appropriate range.

The Instrumental Enrichment Program developed by Feuerstein (1979, 1980) presents a series of content free exercises designed to focus on a particular area of cognitive development. The curriculum focuses not on the acquisition of specific information but on the development, refinement and crystalization of functions which are prerequisite to effective thinking.

The results of the analysis of the current research study reveal that cognitive training impacts the area of academic achievement. The two scales in the area of academic achievement which contributed to the discrimination between the groups were Math Concepts and Visual Discrimination.

These scales are scales which require extensive utilization of cognitive strategies to discern appropriate relationships. Inclusion of these two scales within the discriminate function lends support to the generalizability of the cognitive strategies developed within the Thinking Skills Curriculum. By requiring generalization of past information, analysis of current information and presentation of a hypothesis regarding a relationship, these scales are viewed as excellent measures of the generalizability of the Thinking Skills Curriculum. Unlike many of the other scales included in the measure of academic achievement these two scales require little content knowledge. The remaining four scales in the area of academic achievement are more heavily laden in content knowledge. The Thinking Skills Curriculum group was found to receive numerically higher scores than the group which did not receive instruction in all of the measures of academic achievement with the exception of Letters and Sounds.

Implications

The incorporation of a dynamic and process oriented view of cognitive development presents ramifications for the subsequent alteration of the framework upon which much of our current educational process is based. If after careful analysis of the current research and the projected needs of individuals within the next century we move away from a product oriented view and toward a process oriented view we will necessarily be required to reexamine our educational strategies and curriculum.

The implications of the research in the area of cognitive development have provided researchers with a variety of increasingly complex viewpoints regarding the nature of cognitive development. The concepts

of assessment and cognitive development and prospects for modifiability have emerged as central issues in the area of educational research. Within a parallel frame society has moved from the industrial era into the information age and this movement has brought with it sweeping changes in daily life as well as an extraordinary rate of emerging knowledge. The changes in the society itself as well as the current research call upon us to examine the way in which we as a society choose to prepare our children to face the demands of the future.

Howard Gardner (1983) has presented a view of cognitive development which focuses on a theory of multiple intelligences. He asserts that intellectual competence entails an ability to solve genuine problems or difficulties which are encountered. Cognitive development of multiple intelligences allows for adaptation within the environment. Feuerstein (1979, 1980) has stressed the view of the human organism as open and modifiable at all ages and stages of development. This concept of modifiability as presented by Feuerstein represents the individual as capable of changing or becoming modified at will. It is this plasticity of the individual which serves the society well in times of rapid change and transformation.

In an attempt to explain the continuing effects of cognitive training on an individual Feuerstein (1980, p. 403) has utilized an example provided by Rabbi Yehuda when describing the excellence of one of the sages. His train of thought is likened to "a heap of stones" once disturbed: "When a person removes one from the pile they all go tumbling over each other." Feuerstein envisions that the potential for cognitive change is similar in individuals. Once we have changed the original structure or organization it affects the whole system.

The educational implications which arise from incorporation of the process oriented rather than the product oriented view of cognitive development will serve to enlarge our view of development and the role of education in that development process. Currently in educational programs which focus on the product approach, we observe teachers who seek a "single" correct answer or product following instruction. The simple "single" answer to the question is not what will allow us to expand our horizons. An incorporation on the part of today's educators of the theoretical framework relating to the dynamic, process oriented nature of cognitive development may produce changes in the way those educators view the process of education. The impact will arise not from the incorporation and utilization of any particular curriculum designed to instruct in the area of thinking skills. The impact will arise from the change of focus from the product to the process oriented view of cognitive development.

The risk is not in not knowing the questions, the risk is in not questioning. The risk is in not developing in our children those competencies which will allow them to adapt to the world of tomorrow. "The uniqueness of each individual turns his fate into the fate of the world - his world." Feuerstein (1980, p. 332) A focus on the process of the development of cognitive strategies is what will allow our children to face the problems of tomorrow.

Limitations

The primary limitation of this study was the length of time available for instruction with the Thinking Skills Curriculum as part of the daily curriculum. During the course of the research study the children

were exposed to instruction utilizing the Thinking Skills Curriculum for a period of twelve weeks. The results reflect the formation of a discriminant function which adequately discriminates the treatment and control groups after including scales from each area under investigation. It is believed however that the brevity of treatment was a primary contributing factor to the inclusion of only six of the thirteen measured scales in the formation of the discriminant function.

A second limitation is the lack of random selection of a school to participate in the research study. The school was selected based on willingness to participate. Willingness to participate in a research study which requires adaptation of current educational approaches suggests a certain level of flexibility and openess to change. This level of flexibility may not be typical of all educational staffs and administrators.

A third limitation is the small number of participants in the research study. The participation of a school with a limited number of kindergarten students necessarily limited the number of students included within the sample.

Recommendations

The following are recommendations for further research, based upon the outcome of this study:

(1) Replication of the study utilizing the Thinking Skills Curriculum for a period of a full school year. The current research lends support for the inclusion of a Thinking Skills Curriculum as part of the daily activities to which children are exposed. Allowing the students to participate in training with the Thinking Skills Curriculum for a full

school year would offer an opportunity for researchers to observe and evaluate longitudinal effects.

(2) Replication of the study utilizing random selection of schools and classes to participate in the instruction with the Thinking Skills Curriculum. Replication with schools and classes which were randomly selected would provide researchers with additional information on the effect of the Thinking Skills Curriculum.

(3) Replication of the study utilizing a larger sample of students at kindergarten, first, second and third grades. Researchers would benefit from specific information as it relates to the accessibility of enhanced cognitive development at various grade levels.

A SELECTED BIBLIOGRAPHY

Arbitman-Smith, R., and Haywood, N. C. (1980). Cognitive education for learning-disabled adolescents. Journal of abnormal child psychology, 8(1), 52-64.

Arter, Judith A., and Jenkins, Joseph. (1979). Differential diagnosis-prescriptive teaching: A critical appraisal. Review of educational research, Fall, 49(4), 517-555.

Babad, E., and Budoff, M. (1974). Sensitivity and validity of learning-potential measurement in three levels of ability. Journal of educational psychology, 66, 439-447.

Bender, N. N. (1976). Self-verbalization versus tutor verbalization. Journal of educational psychology, 68(3), 347-354.

Bigge, M. L. (1982). Learning theories for teachers. New York: Harper & Row.

Borkowski, J. G., Levers, S., and Gruenenfelder, T. M. (1976). Transfer of mediational strategies in children: The role of activity and awareness during strategy acquisition. Child development, 47, 779-786.

Brown, A. L. and Campione, J. C. (1981). Inducing flexible thinking: The problem of access. In M. P. Friedman and N. O'Connor (Eds.), Intelligence and learning. New York: Plenum Press.

Brown, A., and French, L. (1979). The zone of potential development: Implications for intelligence testing in the year 2000. In R. Sternberg and D. Detterman (Eds.), Human intelligence. New Jersey: Ablex Publishing Corp., 213-252.

Budoff, M., and Corman, L. (1976). Effectiveness of a learning potential procedure in improving problem-solving skills of retarded and non-retarded children. American journal of mental deficiency, 81, 260-264.

Budoff, M., Meskin, J., and Harrison, R. (1971). Educational test of the learning potential hypothesis. American journal of mental deficiency, 76, 159-169.

Butterfield, E. (1981). Instructional techniques that produce generalized improvements in cognition. In P. Mittler (Ed.) Frontiers of knowledge in mental retardation (Vol. 1). Baltimore: University Park Press.

Campbell, D. T., and Stanley, J. C. (1963). Experimental and quasi-experimental designs for research. Dallas: Houghton-Mifflin.

Chance, P. (1981). The remedial thinker. Psychology today, October, 15(10).

Comfort, M. E. (1984). The effects of a thinking skills curriculum on learning ability and achievement of second grade students. Unpublished doctoral dissertation, Oklahoma State University, Stillwater, Oklahoma.

Costa, A. L. (1985). How can we recognize improved student thinking? In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Costa, A. L. (1984). Mediating the metacognitive. Educational leadership, November, 42(3), 57-62.

Costa, A. L. (1985). Teacher behaviors that enable student thinking. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Costa, A. L. (1985). Teaching for, of, and about thinking. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Costa, A. L. (1985). The behaviors of intelligence. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Costa, A. L. (1985). Toward a model of human intellectual functioning. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Feuerstein, R. (1975). A dynamic approach to the causation, prevention and alleviation of retarded performance. In C. Haywood (Ed.), Cultural aspects of mental retardation. Appleton: Century Crofts, Educational Division, Meredith Corp.

Feuerstein, R. (1980). Instrumental enrichment. Baltimore: University Park Press.

Feuerstein, R. (1973-1975). Mediated learning experiences: An outline of the proximal etiology for differential development of cognitive functions. International understanding. New York: President International Council of Psychologists, Inc.

Feuerstein, R. (1979). Ontogeny of learning in man. In M. Braizier (Ed.), Brain mechanisms in memory and learning: From the single neuron to man. New York: Raven Press.

Feuerstein, R. (1979). The dynamic assessment of retarded performers. Baltimore: University Park Press.

Feuerstein, R. (1985, May). The theory of mediated learning seminar. Paper presented at the Smithsonian Institution Kellogg Project and The Cherokee National Museum Presentation, Tahlequah, Oklahoma.

Feuerstein, R., Huffman, M., Rand, Y., and Mintzker, Y. (1981). Cognitive modifiability in adolescents: Cognitive structures and the effects of intervention. Journal of special education, 15(2).

Feuerstein, R., and Jensen, M. (1979). Instrumental enrichment: theoretical basis, goals and instruments. The educational forum, 42(6).

Gagne, R. M. (1984). Learning outcomes and their effects. American psychologist, 39(4), 377-385.

Gardner, H. (1983). Frames of mind. New York: Basic Books, Inc., Publishers.

Gay, L. (1981). Educational research. Columbus, Ohio: Merrill Publishing Co.

Guillford, J. (1967). The nature of human intelligence. New York: McGraw-Hill.

Haywood, H. (1982, March). Cognitive modifiability. Paper presented at Learning Potential Assessment Device Workshop, Nashville, Tennessee: Vanderbilt-Peabody University.

Haywood, H., Filler, J., Shifman, M., and Chatelenat, G. (1975). Behavioral assessment in mental retardation. Advances in psychological assessment. San Francisco: Josey-Bass, 54, 110-116.

Haywood, H. C., and Switzky, H. N. (1986). The malleability of intelligence: Cognitive processes as a function of polygenic-experiential interaction. School psychology review, 15(2), 245-255.

Hobbs, N., and Robinson, S. (1982). Adolescent development and public policy. American psychologist, 37(2), 212-223.

Ilg, R. L., and Ames, L. B. (1972). School readiness. New York: Harper & Row.

Kagan, J. (1966). Reflection-impulsivity: The generality and dynamics of conceptual tempo. Journal of abnormal psychology, 71(1), 17-24.

Kagan, J., Rosman, B. L., Day, D., Albert, J., and Phillips, W. (1964). Information processing in the child: Significance of analytic and reflective attitudes. Psychological monograps: General and applied, 78(1), 1-37.

Kendall, P. C., and Finch, A. J. (1978). A cognitive-behavioral treatment for impulsivity: A group comparison study. Journal of consulting and clinical psychology, 46(1), 110-118.

Kendall, P. C., and Finch, A. J. (1979). Developing nonimpulsive behavior in children: Cognitive-behavioral strategies for self-control. In P. Kendall and S. Hollon (Eds.), Cognitive-behavioral interventions theory, research and procedures. New York: Academic Press.

Kendall, P. C., Padawar, W. J., and Zupan, B. A. (1980). Developing self-control in children: A manual of cognitive behavioral strategies. Minneapolis, Minnesota: University of Minnesota.

Kendall, P. C., and Wilcox, L. E. (1979). Self-control in children: Development of a rating scale. Journal of consulting and clinical psychology, 47(6), 1020-1029.

Klecka, W. R. (1980). Discriminant analysis. In J. L. Sullivan (Ed.), Quantitative applications in the social sciences. Beverly Hills: Sage Publications.

Link, R. (1980). Instrumental enrichment: The classroom perspective. The educational forum, 26, 14-26.

Link, F. R. (1985). Instrumental enrichment. In A. L. Costa (Ed.), Developing minds. Alexandria Virginia: Association for Supervision and Curriculum Development.

Lipman, M. (1985). Philosophy for children. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Luria, A. R. (1976). Cognitive development: Its cultural and social foundations. Cambridge: Harvard University Press.

McTighe, J., and Schollenberg, J. (1985). Why teach thinking: A statement of rationale. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Meeker, M. N. (1985). SOI. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Meacham, J. (1972). The development of memory abilities in the individual and society. Human development, 15, 205-228.

Meichenbaum, D. H., and Asarnow, J. (1979). Cognitive-behavioral modification and metacognitive development: Implications for the classroom. In P. Kendall and S. Hollon (Eds.), Cognitive-behavioral interventions theory, research, and procedures. New York: Academic Press.

Meichenbaum, D. H., and Goodman, J. (1971). Training impulsive children to talk to themselves: A means of developing self-control. Journal of abnormal psychology, 77(2), 115-126.

Nickerson, R. S. (1984). Kinds of thinking taught in current programs. Educational leadership, September, 42(1), 26-36.

Nie, N. H. (1983). SPSS user's guide. New York: McGraw-Hill.

Presseisen, B. A. (1985). Thinking skills: Meanings and models. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum development.

Pressley, M., Reynolds, W., Stark, K. D., and Gettinger, M. (1983). Cognitive strategy trining and children's self-control. In M. Pressley and J. Levin (Eds.), Cognitive strategy research. New York: Springer-Verlag.

Rand, Y., Tannebaum, A., and Feuerstein, R. (1979). Effects of instrumental enrichment on the psychoeducational development of low-functioning adolescents. Journal of educational psychology, 71(6), 751-763.

Rankin, S. (1985). Evaluating efforts to teach thinking. In A. L. Costa (Ed.), Developing minds. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Raven, J. (1977). Coloured progressive matrices, Sets A, AB, and B. London: H. K. Lewis.

Reese, H. W. (1962). Verbal mediation as a function of age level. Psychological bulletin, 59, 502-509.

Rey, A., and Dupont, J. (1953). Organization de groupes de points en figures geometriques simples. Monographes de psychologic appliquee.

Snart, R. (1985). Cognitive-processing approaches to the assessment and remediation of learning problems: An interview with J. P. Das and Reuven Feuerstein. Journal of psychoeducational assessment, 3, 1-14.

SRA achievement series, examiners manual. (1978). Level A, Form 1 (with EAS). Chicago: Science Research Associates, Inc.

SRA achievement series technical report #1. (1981). Chicago: Science Research Associates, Inc.

Sternberg, R. (1984). How can we teach intelligence? Educational leadership, September, 42(1), 38-48.

Sternberg, R. (1981). Intelligence as thinking and learning skills. Educational leadership, October.

Sternberg, R. (1982). Who's intelligent? Psychology today, April, 16(4).

Swenson, L. C. (1980). Theories of learning. Belmont, California: Wadsworth.

Tabachnick, and Fidell. (1983). Using multivariate statistics. Harper and Row.

Vygotsky, L. (1978). Mind in society. Cambridge: Harvard University Press.

Vygotsky, L. (1962). Thought and language. Cambridge: M. I. T. Press.

APPENDIXES

APPENDIX A

COGNITIVE FUNCTIONS

COGNITIVE FUNCTIONS

Input

(1) Focuses clearly and precisely on details of stimuli

(2) Uses systematic investigative strategies before starting a task

(3) Uses efficient verbal skills to label incoming stimuli

(4) Perceives spatial concepts and relationships accurately

(5) Effective use of spatial concepts to organize the environment

(6) Effective use of temporal concepts to organize the environment

(7) Conserves the constancy of objects across variations in orientation and dimensions

(8) Strives to gather precise and accurate data

(9) Uses two or more sources of information simultaneously

Elaboration

(1) Recognizes the existence of a problem through spontaneous comparing

(2) Ability to define a problem

(3) Selects relevant cues to clarify ambiguities and seek a solution

(4) Engages in spontaneous comparing behavior

(5) Applies varied units of information alternately to seek a solution (hypothetical, divergent thinking)

(6) Organizes stimuli through summative processes to produce

relationships

(7) Applies established relationships when investigating possible solutions for a new problem

(8) Searches for logical evidence to support a hypothesis

(9) Thinks abstractly by imagining an object without having it present

(10) Plans and sequences steps necessary to reach a goal

Output

(1) Views listener (other) as distinct from oneself (elaborates a limited response, supplies evidence for a claim or argument)

(2) Pursues a problem solution in spite of failure/ambiguity (perseveres toward goal)

(3) Searches systematically for relevant cues/relationships that are goal oriented

(4) Uses appropriate language in communicating mental operations

(5) Strives to communicate accurately and precisely

(6) Completes the design/picture/solution by visually transporting the appropriate missing part

(7) Responds in a deliberate manner

The above corresponding functions are the work of Dr. Mary Joe Keatley and Mary Comfort.

APPENDIX B

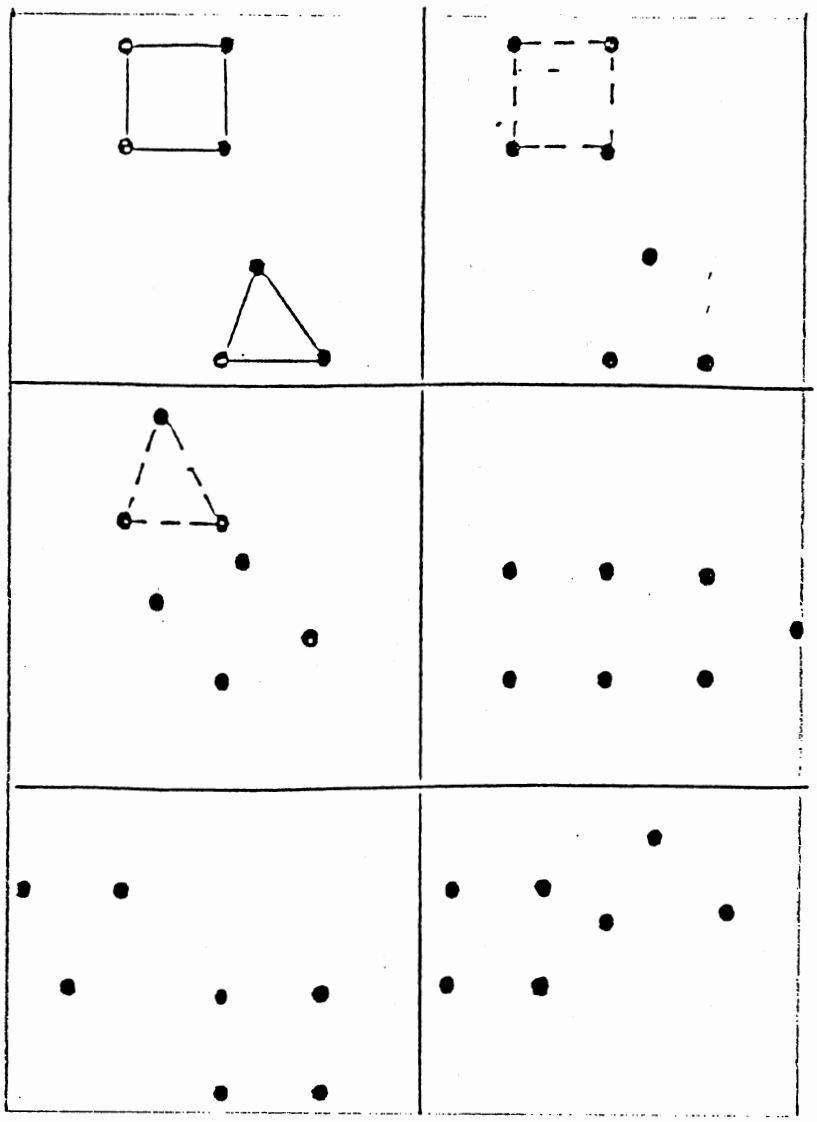
EXAMPLES OF THINKING SKILLS EXERCISES

ORGANIZATION OF DOTS

Description

Organization of Dots is based on a task devised by Andre Rey (Reyt and Dupont, 1953), and adapted by Comfort and Rineer (1984), for use with primary age students. This unit is composed of fifteen pages. Each page contains one model frame with the remaining frames on the page containing a series of amorphous dots. The students are required to gather the necessary information, define the problem using precise labeling and present a strategy for the solution and a method for checking the final product. This unit was designed to develop the following cognitive strategies and skills;

a) projection of virtual relationships
b) organizational behaviors
c) analysis of characteristics of forms
d) internal representation and mental transformation of forms across variations in orientation
e) planning
f) systematic search
g) use of cues
h) precision and accuracy

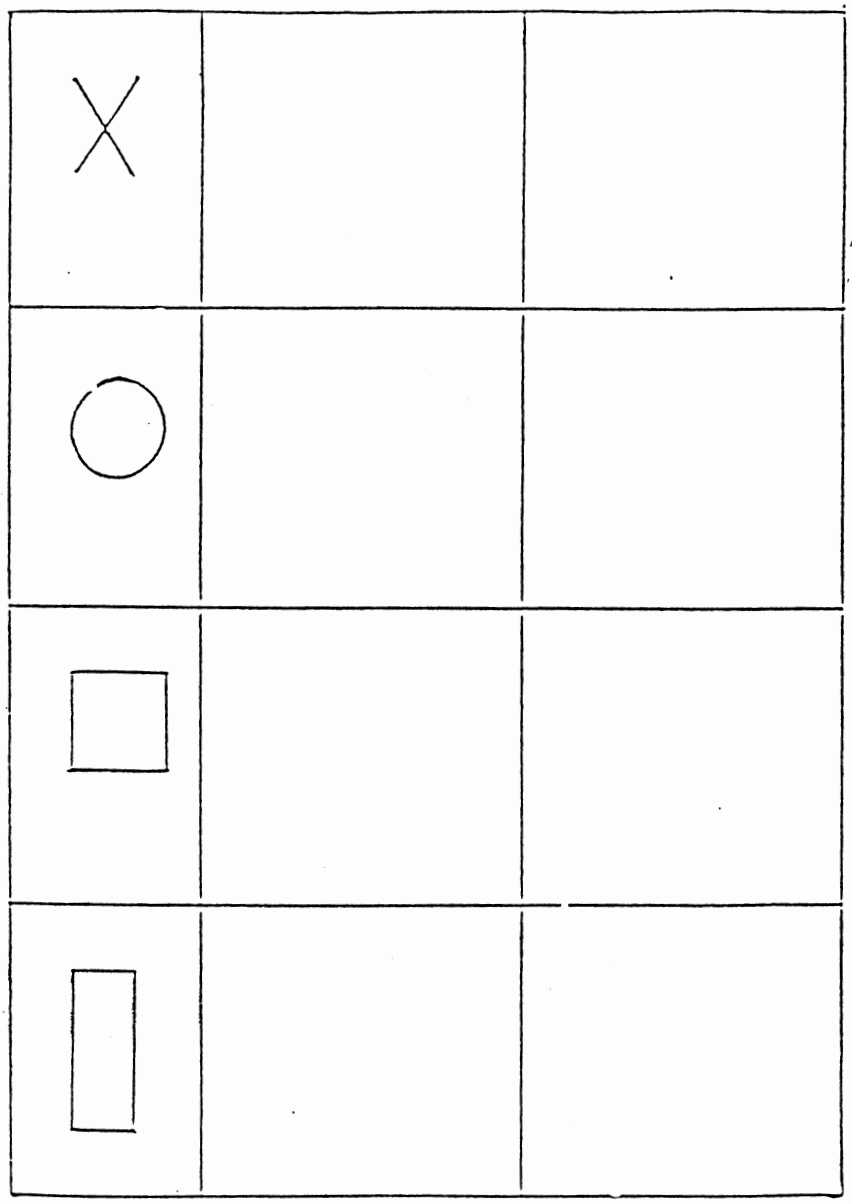


COMPARISONS

Description

Comparisons was designed as an adaptation of Feuerstein's Instrumental Enrichment unit on Comparisons (1980), and adapted by Comfort and Rineer (1984), for use with primary age students. The unit on Comparison utilizes the concept of commonalities and differences. The unit is composed of fifteen pages. The students are required to compare on the following parameters, size, form, number, color and shape. The unit was designed to develop the following cognitive strategies and skills;

a) precision in identifying and describing characteristics of an object, person, event
b) discovery of alternative dimensions of comparing
c) determining relevant and irrelevant dimensions
d) distinguishing between perceptual and semantic characteristics
e) grouping
f) identifying and establishing a continuum of concrete to abstract characteristics



SPATIAL ORIENTATION

Description

The unit on perceptual analysis was designed as an adaptation of Feuerstein's Instrumental Enrichment unit on perceptual analysis (1980), and adapted by Comfort and Rineer (1984), for use with primary age students. The unit on perceptual analysis was designed to develop the ability to analyze the relationships between a whole and its component parts. The unit is composed of fifteen pages. The activities were designed to develop the following cognitive strategies and skills;

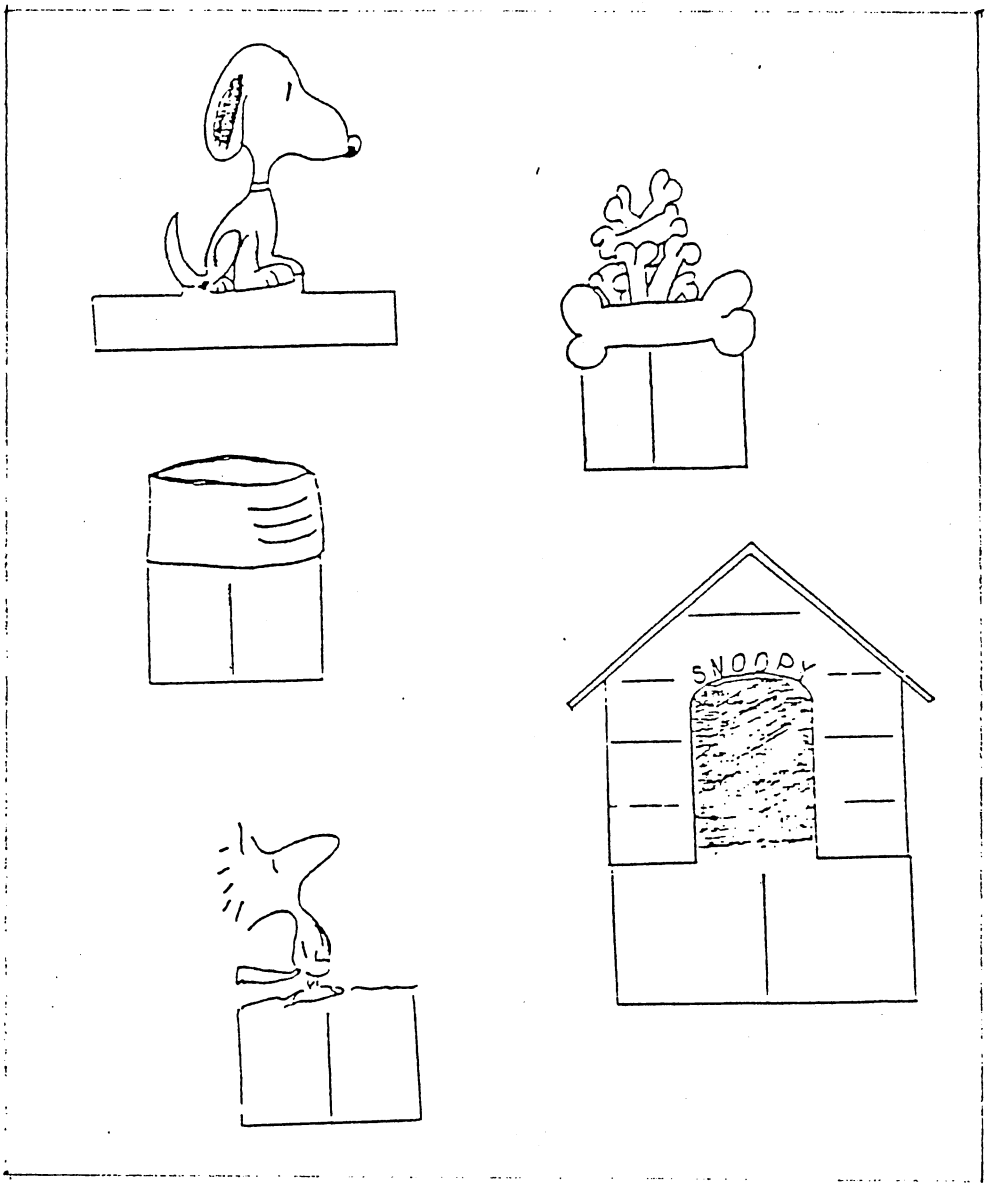
a) analysis of a whole into parts

b) establishing relationships between parts

c) recognizing that a part is a whole unto itself and can be broken into more parts

d) seeing alternative ways of analyzing a whole

e) recognizing equality and inequality of parts of a whole


SNOOPY

PERCEPTUAL ANALYSIS

Description

Spatial Orientation was designed as an adaption of Feuerstein's Instrumental Enrichment unit on Spatial Orientation (1980), and adapted by Comfort and Rineer (1984), for use with primary age students. Spatial Orientation was designed to enrich the ability to use concepts and stable systems of reference for orientation relative to one's own body, using body movements as a frame of reference for establishing directional relationships with objects in a visual field. The unit is composed of fifteen pages. Each exercise utilizes a group of five figures to assist in the development of directional relationships. The unit was designed to develop the following cognitive strategies and skills;

a) division and organization of space in objective terms

b) dissolve egocentricity by developing the ability to see more than one point of view

c) recognize and identify relationships between objects and events in time and space

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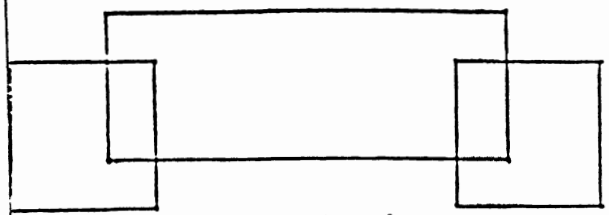
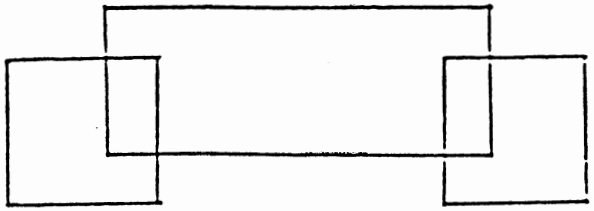
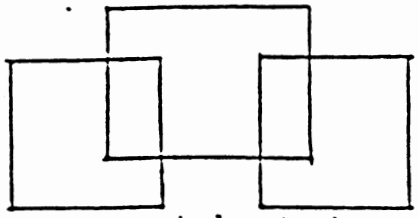
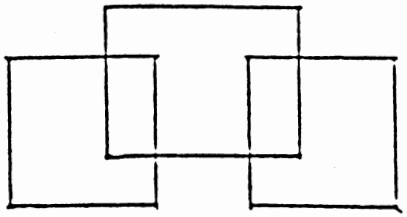




The whole is divided into _____ parts.





The whole is divided into _____ parts.

APPENDIX C

ROLE OF THE THINKING SKILLS TEACHER

ROLE OF THE THINKING SKILLS TEACHER

The Thinking Skills Curriculum is a curriculum which was specifically developed by Comfort and Rineer (1984) and designed to be utilized with primary age students. This Thinking Skills Curriculum is based on the theoretical framework of Vygotsky and Feuerstein. Successful utilization of the Thinking Skills Curriculum requires an understanding of the theoretical framework upon which the curriculum is based.

Prior to initiation of usage of the Thinking Skills Curriculum within the regular school curriculum the classroom teacher participated in twenty hours of training activities. The training of the classroom teacher was completed in three phases; introduction, analysis and implementation. The first phase introduction allowed for familiarization with the theories upon which the curriculum was based. The second phase analysis included discussion and delineation of the value and practical implications of inclusion of a Thinking Skills Curriculum into the basic curriculum. The final phase of training included instruction in implementation of the curriculum within the daily activities of the class.

The curriculum consisted of four units of instruction; Organization of Dots, Orientation of Space, Comparisons, and Analytic Perception. The units were designed so as to allow the students an opportunity to develop the following; to produce intrinsic motivation through the formation of habits; to increase task-intrinsic motivation; to encourage reflective

thinking and to develop insights into the reasons for success or failure; to teach the vocabulary, concepts, operations and relationships necessary for the mastery of the tasks and for problem solving.

The goals of the Thinking Skills Curriculum as utilized within this research study was to focus instruction toward those competencies which are in the process of developing within an individuals' zone of proximal development and thereby enhance cognitive development. It is stressed that following the completion of the training procedures and prior to the initiation of usage of the Thinking Skills Curriculum the teacher should have become very familiar with the theoretical framework upon which the curriculum is based. A view of cognitive development as a dynamic and process oriented activity focuses attention on those competencies which are in the process of developing.

A working understanding of the dynamic nature of development allows the teacher to incorporate the constructs of the curriculum into the daily activities. Central to the development of enhanced cognitive functioning of individual student within his/her zone of proximal development is an understanding of the role of the teacher as a mediator. The classroom teacher (mediator) is viewed as the individual who continually seeks to frame and organize the environment for the students. The willingness of the mediator to share expertise with the student enables the learner to gain a scaffolding upon which to store and eventually organize information as it relates to experience.

Throughout the period of instruction in the Thinking Skills Curriculum the focus is continually directed toward the dynamic nature of the process of cognitive development. The classroom teacher insists upon directing the attention toward the process of problem solving rather than toward

the end product. Insights are developed through class discussions regarding the nature of the process of problem solving. It is this process of developing insight which leads to what Feuerstein has labeled as "bridging". The process of bridging allows the individual to transfer the generalization of operations from one situation to another.

It is with the continued utilization of the process of bridging that the individual is capable of extending the principles of problem solving from one situation to another and another. Feuerstein has developed a logo for his Instrumental Enrichment Program it is "Just a minute...Let me think". The students were encouraged to incorporate this approach and even utilize this statement during the course of instruction in the Thinking Skills Curriculum. As the students became more and more aware of the focus on the process instead of the product they were increasingly willing to offer hypothesis for problem situations. An understanding by the classroom teacher of the dynamic and process oriented nature of development which allows for attention to be focused on each individual child as he/she demonstrated development within their zone of proximal development.

APPENDIX D

SRA LEVEL A ACHIEVEMENT TEST AND EDUCATIONAL ABILITY SERIES

SRA LEVEL A ACHIEVEMENT TEST AND EDUCATIONAL ABILITY SERIES

Contents of the SRA Level A Achievement Test are described in the SRA Achievement Series Examiner's Manual, Level A, Form 1 (1978) as follows:

Academic Achievement

Visual Discrimination contains twenty-five items that test letter features, letter forms, and word forms. The students work independently after completing two sample items, choosing from four alternatives the shape that is just like the shape in the box at the beginning of each item.

Auditory Discrimination is a twenty-five item test with two samples. It is read by the examiner. The students listen to pairs of words and determine whether the words are the same or not the same.

Letters and Sounds consists of three parts: letter matching, letter identification, and letter-sound correspondence. The students and examiner work a sample item together before each part. In the first part, items 1-6, the students independently match uppercase with lowercase letters. In the second part, items 7-12, the students find the letter that the examiner names. In the third part, items 13-25, the students find a letter or a picture that corresponds with a given sound. The last two parts are orally administered.

Listening Comprehension consists of two parts. Part 1 tests the following skill clusters: understanding directions, grasping main ideas,

identifying details, perceiving relationships, and drawing conclusions. Part 2 tests oral vocabulary by having the students identify objects or actions.

Mathematics Concepts measures the student's grasp of mathematics principles and relationships. The two samples and thirty items test numeral recognition, sets and numbers, ordinal expressions, counting, shape and pattern recognition, and spatial and geometric relationships.

Educational Ability Series (EAS)

Picture Vocabulary is a twenty item test which examines a student's knowledge of word meanings. Each item consists of a word stimulus and four picture choices, one of which illustrates the word stimulus. The student must identify the picture named to answer correctly.

Number is a seven item test designed to measure whether the student has acquired some general quantitative concepts.

Picture Grouping is a seven item test. Each of the items in the picture grouping cluster is composed of four pictures. Three of the pictures are alike in some way; one picture is different.

Spatial is a six item test. This test is designed to examine the student's ability to visualize the relation of one shape to another. Given a stimulus in the form of a partially completed square, the student is required to select the piece that correctly completes the square.

APPENDIX E

SUMMARY STATISTICS SRA

LEVEL A SERIES

GSV SUMMARY DATA FOR READINESS TESTS

Grade/ Month	National Mean	National s.d.	Large City Mean	Large City s.d.	Title I Mean	Title I s.d.	Nonpublic Mean	Nonpublic s.d.
Visual Discrimination								
.1	74	58	67	58	34	33	77	58
.8	113	60	106	63	94	60	122	58
Auditory Discrimination								
.1	162	55	132	57	104	47	169	55
.8	170	51	166	53	159	51	186	53
Letters & Sounds								
.1	86	48	72	44	43	29	91	50
.8	117	53	113	50	103	50	135	53
Listening Comprehension								
.1	142	44	113	50	100	43	149	43
.8	157	45	147	39	143	45	166	46
Reading Total								
.1	68	46	51	37	29	20	75	49
.8	101	57	90	52	77	47	111	56

GSV SUMMARY DATA FOR MATHEMATICS TESTS

Grade/ Month	National Mean	National s.d.	Large City Mean	Large City s.d.	Title I Mean	Title I s.d.	Nonpublic Mean	Nonpublic s.d.
Mathematics Concepts								
.1	143	33	133	38	114	30	152	34
.8	163	37	158	34	149	37	169	35

GSV SUMMARY DATA FOR COMPOSITE

Grade/ Month	National Mean	National s.d.	Large City Mean	Large City s.d.	Title I Mean	Title I s.d.	Nonpublic Mean	Nonpublic s.d.
.1	61	37	49	34	32	18	68	42
.8	89	49	79	43	69	41	97	49

APPENDIX F

CORRESPONDENCE REGARDING

SELF-CONTROL RATING SCALE

4666 South Norwood
Tulsa, Ok. 74135
Mary Rineer

Philip C. Kendall
Dept. of Psychology
Elliott Hall
University of Minnesota

Dear Mr. Kendall,

I am currently conducting research in the area of thinking skills curriculum as it relates to enhanced cognitive development. I would appreciate receiving a copy of your Self-Control Rating Scale. If you are pursuing research in the area of self-control at this time I would be extremely interested in a selected bibliography. Thank you, for your consideration and assistance in this matter.

Sincerely,
Mary Rineer
Mary Rineer

TEMPLE UNIVERSITY
A Commonwealth University
Department of Psychology
Philadelphia, Pennsylvania 19122

Thank you for your interest in the Self-Control Rating Scale (SCRS). Please find enclosed the Kendall and Wilcox article and/or the SCRS itself. The rating scale is a new research instrument with many areas open for additional inquiry. The scale may be reproduced at this time for research purposes.

I would very much appreciate being informed of your SCRS project and any other SCRS projects that are ongoing, as well as the results of the research. I will attempt to keep researchers abreast of the area. Please keep in touch.

Philip C. Kendall, Ph.D.

Best regards,

Philip C. Kendall, Ph.D.
Professor
Head, Division of Clinical Psychology

PCK/ep

TEMPLE UNIVERSITY
A Commonwealth University

Department of Psychology

Philadelphia, Pennsylvania 19122

Thank you for your interest in the Manual of Cognitive Behavioral Strategies for Teaching Children Self-control. I would be happy to provide you with a copy of the manual following your completion and return of the attached form and a check for $10.00 to cover expenses.

The manual is presently under revision and will be updated as input is received from the many users. Please send comments and suggestions to me as you have them. In the end, it is hoped that the manual will be rich with clinical input and research support.

Best regards,

Philip C. Kendall, Ph.D.
Professor
Head, Division of Clinical Psychology

PCK/eg

4666 South Norwood
Tulsa, Ok. 741335
February 9, 1985
Mary Rineer

Phillip C. Kendall
Professor of Psychology
Temple University
Department of Psychology
Philadelphia, Pa. 19122

Dear Dr. Kendall:

I wish to thank you for your timely reply to my request for information on your Self-Control Rating Scale (SCRS). I have completed the enclosed form and would be interested in the opportunity to utilize the manual for the SCRS.

I will continue to inform you of the progress of my research. Thank you for any consideration you can give this request. I will look forward to your future publications in this area.

Sincerely,

Mary Rineer

VITA

Mary Elizabeth McCarthy Rineer

Candidate for the Degree of

Doctor of Philosophy

Thesis: ANALYSIS OF THE EFFECTS OF UTILIZATION OF A THINKING SKILLS CURRICULUM ON ACADEMIC ACHIEVEMENT LEARNING ABILITY AND SELF-CONTROL

Major Field: Applied Behavioral Studies

Biographical:

Personal Data: Born in Scranton, Pennsylvania, December 9, 1948, the daughter of Jack and Molly McCarthy, married to Hugh V. Rineer, mother of Justin Matthew and Brendon Hugh Rineer.

Education: Graduated from Saint Rose High School, Carbondale, Pennsylvania, 1966; received Bachelor of Science Degree in Elementary Education from East Stroudsburg University in May, 1971; received Master of Arts degree in Education, Learning Disabilities from University of Tulsa in May, 1975; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in July, 1987.

Professional Experience: Elementary Teacher, Newark, New Jersey Public Schools, 1971-1972; Elementary Teacher, Tulsa, Oklahoma, Holy Family School, 1973-1974; Resource Teacher, Tulsa, Oklahoma, Tulsa Public Schools, 1976-1980; Psychometrist, Tulsa Public Schools, 1980-1983; Psychologist, Tulsa Public School, 1983-present.