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AN EXPLORATORY STUDY OF LEARNING STYLE VARIABLES RELATED TO SUCCESS OR FAILURE IN SELF-DIRECTED INDEPENDENT STUDY AMONG INTELLECTUALLY GIFTED STUDENTS

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AN EXPLORATORY STUDY OF LEARNING STYLE VARIABLES RELATED TO SUCCESS OR FAILURE IN SELF-DIRECTED INDEPENDENT STUDY AMONG INTELLECTUALLY GIFTED STUDENTS

By

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ABSTRACT

AN EXPLORATORY STUDY OF LEARNING STYLE VARIABLES RELATED TO SUCCESS OR FAILURE IN SELF-DIRECTED INDEPENDENT STUDY AMONG INTELLECTUALLY GIFTED STUDENTS

By

Fay Marie Carney

Studies of intellectually gifted students have revealed certain cognitive traits that differentiate them from their non-gifted peers -- a wide range of interests, ability to do abstract thinking, superior judgement in evaluation, a long attention span, and intense powers of concentration. Curriculum developers have designed programs for intellectually gifted students which they believe allow for the maximum utilization of these traits. One of the most common instructional approaches used in special programs for identified students is self-directed independent study. Experience with efforts to implement self-directed independent study programs has revealed that some intellectually gifted students have serious difficulty in adapting to this learning approach.

It is apparent that a greater understanding is needed of the factors that influence success or failure in self-directed independent study. This study investigated the impact of two relatively stable variables -- cognitive style (field independence/dependence) and dominant modality (visual, auditory, or kinesthetic) -- on an individual's

ability to succeed in self-directed independent study programs.

A random sample of students was drawn from the population of intellectually gifted students in grades 5-8 participating in special programs based on the self-directed independent study model in the state of Michigan (N=220). Self-directed (N=40) and non-self-directed (N=38) groups were formed on the basis of scores on the Self-Directed Learning Readiness Scale and teacher observation of learning behaviors. The Group Embedded Figures Test, the Swassing-Barbe Modality Index, and the Learning Styles Inventory were administered to both groups.

T-tests performed on the mean scores obtained by the two groups on the cognitive style and modality measures indicated significant differences at the .05 level. The self-directed students were found to be more field independent, and the non-self-directed students were more auditory.

In order to obtain insight into what instructional approaches might be the most appropriate for non-self-directed gifted students, various correlations between cognitive style, modality, and instructional preference measures were analyzed. Preferences for peer teaching and discussion correlated positively with the FD/FI continuum and preferences for peer teaching, discussion, simulation, and programmed instruction correlated negatively with the continuum of auditory scores.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

Table

1. T-Test for Difference Between Means
of Self - Ideal and Non-Self-
Descriptive Style . . . 60

CHAPTER 1

Introduction

Background of the Problem

During several periods of recent U.S. history, programs for gifted learners have been encouraged. Terman's study during the 1920's initiated one such impetus, and the dramatic accomplishments of the Russian space program in the late 1950's and 1960's triggered another. The current focus on education of the gifted was largely the result of the 1971 report to Congress by the U.S. Commissioner of Education, Sidney Marland, concerning the status of gifted education in the U.S. By highlighting the inadequacy of provisions for gifted students in U.S. schools, this report renewed interest and involvement in research and program development for gifted children, which has continued through the early 1980's.

Concern for the education of the gifted necessitated dealing with the difficult questions of definition and identification. A number of definitions of giftedness have been formulated and a considerable number of research studies have been conducted in an attempt to identify the specific characteristics which differentiate the gifted from their less talented peers.

One of the most widely used definitions is the one provided by the U.S. Office of Education (Marland, 1972, p. 2):

> Gifted and talented children are those with demonstrated achievement and/or potential ability in any of the following areas, singly or in combination:
> 1. General intellectial ability,
> 2. Specific academic aptitude,
> 3. Creative or productive thinking,
> 4. Leadership ability,
> 5. Visual and performing arts,
> 6. Psychomotor ability.

Although special programs have been developed for each of the six types of giftedness indicated in the preceding definition, the majority of programs have been designed for those students with outstanding general intellectual ability.

Research studies have revealed that children with outstanding general intellectual ability are characterized by a variety of traits including a wide range of interests, curiosity, rapid and efficient learning, unusual retention of information, ability to do abstract thinking, superior judgement in evaluation, a long attention span, and intense power of concentration (Seagoe, 1974). Although there is strong emphasis on the use of multiple criteria to identify these children, systems for identification commonly include IQ and/or achievement test measures as an integral part of the procedure.

Knowledge of the characteristics of the intellectually gifted and development of appropriate identification procedures provided the basis upon which programs for this population were designed. This knowledge provided a clearer understanding of the curricular components that need to be structured into appropriate learning programs. The underlying premise was, of course, that by virtue of their

exceptional ability, the gifted differ so markedly from other students that the usual educational procedures are not adequate.

Using the characteristics of the intellectually gifted as a basis, educators proceeded to design curriculum for identified students that would allow for the maximum utilization and development of their cognitive traits. Curricular adaptations are delivered to gifted students through a variety of program approaches including ability-grouped classes, cluster groups within the regular classroom, pull-out programs, elective courses, and after school or Saturday classes.

It was implied that intellectually gifted students need to be introduced to new topics in a stimulating environment enriched with multiple resources, provided with skill instruction that will further develop complex, higher level thinking abilities, taught to use research methods, and encouraged to develop products that challenge existing ideas or produce new ideas (Kaplan, 1979). A common application of these principles in current practice is a program in which students are given an opportunity to explore in-depth a self-directed topic of interest and are encouraged to develop an end-product that shows utilization of research methods, higher level thinking skill, and creative problem-solving ability. Most importantly, the study is to be undertaken independently in a self-directed manner. An increasing number of educators advocate this kind of self-directed independent study

exceptional ability, the gifted differ so markedly from other students that the usual educational procedures are not adequate.

Using the characteristics of the intellectually gifted as a basis, educators proceeded to design curriculum for identified students that would allow for the maximum utilization and development of their potential. Curricular adaptations are [illegible] through a variety of

as an especially appropriate method for the education of gifted students (Bennett, 1971; Martinson, et.al., 1972; Treffinger, 1975; Renzulli, 1977).

A number of research studies designed to measure differences between the gifted and the non-gifted lend further support to curriculum planning for gifted students that focuses on self-directed independent study. The research of Griggs and Price (1978) and Glenn (1977) found that the gifted have less need for task structure than the non-gifted. Studies by Crandell and Katkovsky (1965) and Lynne (1979) showed high positive correlations between internal locus of control and achievement and intelligence respectively. (Internal locus of control is a characteristic associated with ability to learn independently). Nichols and Davis (1964) found that gifted students are more concerned with freedom from supervision and the opportunity to learn independently. Similarly, Stewart (1979) discovered that the gifted actually prefer independent study as an instructional technique.

Statement of the Problem

It appears that gifted programs focusing on self-directed independent study have a defensible research base. However, a decade of experience with efforts to implement such an approach has revealed that some intellectually gifted students do not succeed in this type of program. Paul Torrance, a nationally recognized authority in the field of gifted education, states that his "experiences

in talking with teachers of gifted students have convinced him that many students identified as gifted do not have a readiness for self-directed learning and as a result become casualities in special programs emphasizing self-directed learning" (Torrance, 1978, p. 1167). The author's experiences as a teacher-coordinator of a gifted program, augumented by discussions with other professionals in similar roles, suggest that a problem does exist among identified students as to their success in adapting to self-directed independent study.

It is clearly time to refine our efforts to understand what constitutes appropriate differentiated instruction for the gifted. Research is needed that focuses not only on differences that exist between the gifted and non-gifted populations, but also on the differences that exist within the gifted population. Emily Stewart, a nationally recognized authority on learning styles of the gifted, emphasized the need for recognizing diversity within the gifted population by stating that "one type of program will not suffice for the varied characteristics and needs of gifted children. Yet many gifted students are encouraged to fit themselves into a program of few dimensions, much like the myth of the procrustean bed." (Stewart, 1982, p. 27).

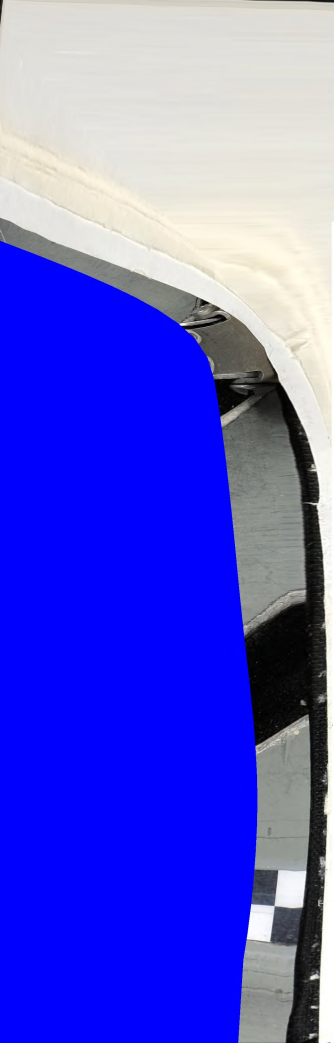
It might be suggested that those students with outstanding intellectual ability who do not exhibit ability

to self-direct their learning are not truly gifted, according to broadened definitions of the term. This contention would exclude these students from programming. However, if one asserts that outstanding intellectual ability cannot be ignored, it would follow that a different kind of program should be designed for those who have not been successful with a self-directed learning approach. In order to give direction to the development of such a program, it is essential to study the learning characteristics of those intellectually gifted students who are not self-directed.

Purpose of the Study

Certainly there are many variables, both cognitive and affective, which may impact on a student's ability to be self-directed. Some of these variables are likely to be of a nature that makes them amenable to change through instruction. In reference to these variables, the task is a relatively simple one -- provide these students with appropriate preliminary instruction concentrating on the development of these variables and once they are sufficiently developed the student can proceed to study in a self-directed manner.

Other variables may be more stable in nature and therefore less likely to be altered through instructional intervention. If such stable variables do exist that impact on a person's ability to be self-directed, then perhaps a different kind of instructional approach is needed to maximize the realization of the potential of individuals possessing these traits.



The purpose of this study was to determine whether differences do exist between intellectually gifted students who have self-directed learning ability and those who do not as measured by two relatively stable psychological variables -- cognitive style (field independence vs. field dependence) and dominant modality (visual, auditory, or kinesthetic). In addition, an attempt will be made to determine whether these two variables are correlated with students' preferences for particular instructional techniques.

Need for the Study

The need for this study becomes apparent by considering the fact that some intellectually gifted students participating in special programs based upon self-directed independent study are experiencing serious difficulty in achieving with this instructional approach. A greater understanding of the variables related to a student's ability to be self-directed is needed if appropriate curriculum planning is to take place. Specifically, it is essential to determine whether there are relatively stable psychological characteristics that are related to lack of success in self-directed independent study which would indicate that a different approach is warranted. In order to choose alternative approaches that will insure more success for gifted students showing poor achievement in self-directed independent study,

student preferences for instructional methods also need to be explored.

The results of this study may help a greater number of intellectually gifted students to realize their potential by providing educators with a better understanding of differences within this group. Knowledge of these differences could provide direction to future practice in the education of the gifted.

Major Research Questions

This study will involve three major research questions:

1. Is there a difference in cognitive style (field independence vs. field dependence) between intellectually gifted students who have self-directed learning ability and those who do not?

Witkin et.al. (1977) found that individuals differ fundamentally in a dimension that he calls field articulation. Field articulation is measured by means of three perceptual tasks -- the tilting room/tilting chair, the rod-and-frame, or the paper and pencil Embedded Figures Test. What these tasks have in common is the necessity to keep an item separated from a field or embedding context. For some individuals, the objects and the field tend to fuse so that the separation called for cannot easily be made. The experience of these individuals could be characterized as unarticulated or global in nature. In contrast, other individuals are easily able to keep the objects and the field separated.

Their experience could be called articulated or analytical. Subjects who respond to the field as an unarticulated whole are said to be field dependent, and subjects who indicate a high degree of field articulation are said to be field independent. The terms field dependent and field independent specifically refer to extremes of a dimension represented by a continuous distribution of scores on the perceptual tests.

Further research efforts led Witkin and his associates (1977) to conclude that the FD/FI dimension actually extends beyond perceptual situations to intellectual functioning as well. It was discovered that individual consistency extended from body orientation tests to tests which required the overcoming of an embedded context not involving body position, to parts of conventional intelligence tests which required restructuring, to clarity of experience in unstructured situations, and to various manifestations of a sense of separate identity. Thus the FD/FI construct was determined to be a manifestation, in specific perceptual situations, of a more generalized preference or "style" of perceiving. Furthermore, this "cognitive style" was found to be relatively stable for each individual over a period of several years.

Because field dependent students seem to have a greater need for externally provided analytical structure than field independent students, it is expected that gifted students who are successful in self-directed independent studies will

be field independent and those who are not successful in this learning approach will be field dependent.

2. Is there a difference in dominant modality between intellectually gifted students who have self-directed learning ability and those who do not?

Modalities are defined as the sensory channels through which an individual receives and retains information. All individuals (excluding those with specific physical handicaps) are capable of receiving information through visual, auditory, and kinesthetic modes. However, each individual appears to have a dominant modality, i.e. a mode through which he tends to prefer to receive information and which he uses most often (Barbe and Moline, 1980).

Because self-directed independent study in the school setting depends heavily upon reading as a source of information, it is expected that gifted students who are successful in self-directed learning programs will have vision as their dominant modality, and those who are not self-directed will have dominant auditory or kinesthetic modalities.

3. Are cognitive style (field independence vs. field dependence) and dominant modality correlated with preferences for instructional techniques among intellectually gifted students?

Witkin contends that cognitive style is a dimension that extends across a broad range of perceptual and intellectual activities. Specifically, he has found that field dependent persons show a greater social orientation in that they are

more sensitive to social cues, are more interested in what others say and do, and are more likely to prefer to be with others than field independent persons (Witkin, 1977). This finding leads to the expectation that field dependent stutends will tend to prefer instructional techniques that include working with other students such as peer teaching, group projects, or simulations. In contrast, field independent students are expected to prefer instructional techniques that are primarily individual efforts such as independent study, programmed instruction, or lecture.

Similarly, a student's dominant modality may influence his preference for instructional techniques. It is expected that students with a dominant visual modality will prefer instructional approaches that depend upon vision as the information receptor, such as independent study or programmed instruction. Students with auditory dominance are expected to prefer discussion, lecture, or simulation.

Conceptual Framework

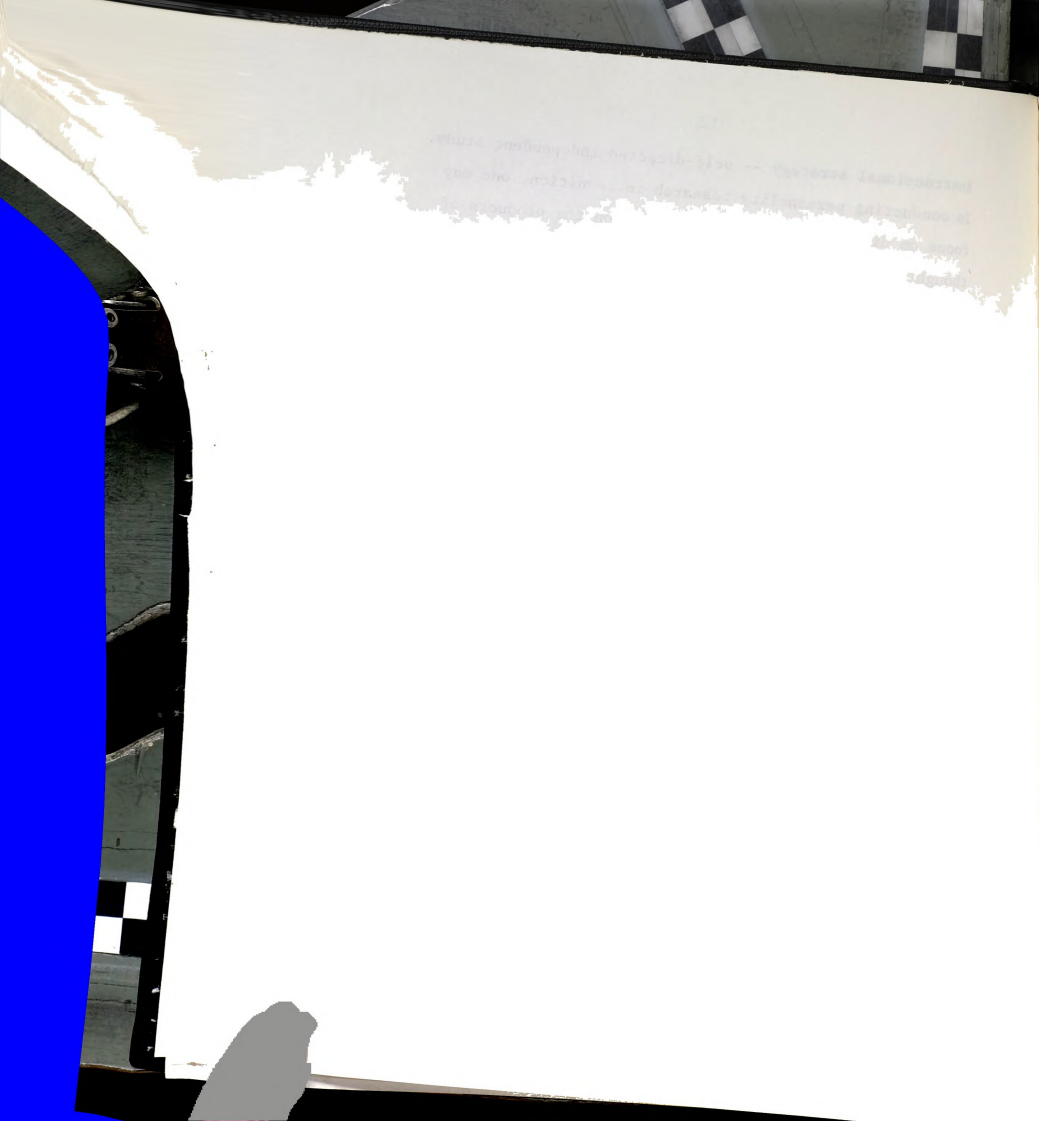
Many educational practices are based on understanding stemming from psychological research. The field of psychology has provided knowledge about cognition, affect, behavior, and environmental consequences that has influenced decision-making at both the administrative and classroom levels.

This study is essentially psychological research that will attempt to investigate the relationships between cognitive-personality structures and success with a particular

instructional strategy -- self-directed independent study. In conducting personality research in cognition, one may focus on differences in three ways -- on the products of thought, the process of thinking, or the conditions surrounding cognitive activity (Sandburg, 1981, pp. 54, 55). The latter of these three involves studying the external or internal conditions of the person. This study takes the latter approach by investigating the internal condition, specifically cognitive style, as it interacts with the external conditions characteristic of self-directed, independent learning environments.

Allport was, perhaps, the first to use the concept of cognitive style. In 1927, he made references to it as a style of living and adapting influenced by distinct personality types (Kuchinskas, 1979). Recent research in the area of cognitive style has been less global in scope, focusing rather on specific cognitive or personality variables.

Kagan (1963) identified analytic vs. global strategies in defining cognitive style differences. The analytic style dimension involves the tendency to analyze and differentiate a stimulus environment, while the global style dimension involves the tendency to categorize a relatively undifferentiated stimulus as a whole. Similarly, Satterly and Brimer (1972) noted differences in patterns of cognitive processing and labeled the style dimensions analytic and synthetic. The analytic style is associated with a part-isolation examination and a withholding of closure until a number of



possible formulations have been made. The synthetic style is an active attempt to achieve functionally valid meaning through a speedy whole-form appraisal.

Zelnicker and Jeffrey (1976) designed a series of experiments which identified the different strategies of information processing underlying the cognitive style dimensions of reflectivity and impulsivity. On a variety of tasks, detailed information processing characterized the performance of reflective children, whereas global processing characterized the performance of impulsive children.

Witkin and his associates (1977) found that people differ fundamentally in a dimension they referred to as field articulation, which is the ability to keep an object or idea separate from a field or embedding context. Individuals who are able to separate object from field easily are called field independent and those who tend to fuse object and field are called field dependent. Each of these cognitive style dimensions was found to be associated with a cluster of personality variables.

Although the terms and definitions of cognitive style varied, each of the researchers discovered that people behave in a typical way across a variety of tasks and that such personal consistencies remain comparably stable over time.

Witkin's work has led to a variety of conclusions (Witkin, et.al., 1977). These conclusions reveal

characteristics which the researcher believes may impact on an individual's success in self-directed independent study:

1. Field independent persons are more likely than field dependent persons to overcome the organization of the field or to restructure it, indicating an ability or organize experiences as required by self-directed independent study.
2. Field independent persons are more likely than field dependent persons to be aware of their own needs, feelings, and attributes which they experience as distinct from those of others. This distinction provides an internal frame of reference to which the person adheres in dealing with others. This characteristic may make the field independent student more capable in decision-making steps required in self-directed independent study.
3. Field independent persons show significantly more non-verbal behaviors interpreted as reflecting a need to gain psychological distance from others than field dependent persons. This characteristic may influence success in activities pursued independently of others.

Another component of learning style is dominant modality. A dominant modality indicates the sensory channel through which an individual processes information most efficiently.

Because self-directed independent study in the school setting relies heavily upon information processing through the visual mode, differences in dominant modality may strongly influence success with this learning strategy.

Learning style as defined by field dependence -- independence and dominant modality are the "lenses" through which the researcher will be investigating success in self-directed independent study. These relatively stable personal-cognitive dimensions may prove useful in explaining differences in student success with this approach and may influence student's affective preferences for particular instructional strategies.

Definitions of Terms (for the purpose of this study)

1. Intellectually Gifted Students. Those students who possess above average ability to think in abstracts, to generalize, to solve complex problems, and to see unusual and diverse relationships. In addition, they have proven their ability to use their intelligence by performing academically in advance of the class in one or more disciplines of knowledge. For the purpose of this study, these traits will be ascertained through IQ test scores of 120 or above and achievement test scores in the 95th percentile or above in one or more subject areas.

2. Self-Directed Independent Study. A learning approach in which the student self-selects a topic of study, locates resources, plans activities, and culminates the

study by creating a final product. Self-directed independent study must meet the following criteria:

a. Teacher guidance is permitted, but the structure of the study is primarily the responsibility of the student.

b. Activities which involve working with other students are not excluded, but the majority of activities are pursued independently.

c. Activities may be varied, but the majority involve reading written material as the primary source of information.

A student-planned study, pursued alone, primarily through the use of written material is the most commonly found application of self-directed independent study in schools today. Only students in gifted programs that are characterized by this definition, as indicated by the teachers of these programs, were chosen to participate in this study.

3. Cognitive Style. An individual's characteristic approach to perceptual and intellectual activities. This mode of perception is defined in a bipolar manner as field dependence (in which perception is strongly influenced by the prevailing field) or field independence (in which an individual perceives items as being separated from the surrounding field).

4. Dominant Modality. An individual's dominant modality is the sensory channel through which he or she processes

information most efficiently. Dominance may occur in visual, auditory, or kinesthetic modalities.

5. Instructional Preference. A learning approach most preferred by individual students as they interact with particular bodies of curricular material. The specific instructional preferences to be examined in this study include:

a. projects
b. drill and recitation
c. peer teaching
d. discussion
e. teaching games
f. independent study
g. programmed instruction
h. lecture
i. simulation

Limitations of the Study

A limitation of this study lies in the fact that there was no control in relation to external motivational factors acting upon the gifted students participating in the self-directed independent study program. In some cases, the gifted class may have been competing with a variety of alternative experiences that were desirable or undesirable in nature. What each student "traded off" or "gave up" and for what reasons are variables which might have influenced an individual's motivation and ultimately his performance in self-directed independent studies.

Another limitation stems from the differences in program prototypes utilized by the participating school districts. Each district provided a pull-out program, an ability-grouped classroom, or a special elective as a means of offering opportunities for self-directed independent study to gifted students. As a result, the students participating in the study were engaged in self-directed learning activities for differing amounts of time. The time variable may have influenced the degree of student interest and involvement in a project, but was unable to be controlled in this study.

Summary

This chapter reviewed the rationale for the widespread use of the self-directed independent study approach in programs for intellectually gifted students. The problem of lack of success in self-directed independent study experienced by some gifted students was identified. The purpose of the study was described as an attempt to determine whether differences exist between intellectually gifted students who have self-directed learning ability and those who do not in relation to two relatively stable psychological variables -- cognitive style and dominant modality. Relationships between the two learning style variables and instructional preferences will also be explored. The need for knowledge of differences that exist among gifted students that could provide direction to curriculum planners was cited.

The three major research questions which are the focus of this study were stated and justified. The conceptual framework based in psychological research of learning style variables was explained.

Terms used in the study were defined, and limitations in relation to variables the researcher was unable to control were described.

CHAPTER 2

Review of the Literature

Characteristics of Gifted Learners

Throughout the history of education in the U.S. various attempts have been made to provide differentiated educational programs for gifted and talented young people. Although the degree of emphasis has varied with the social climate, the underlying purpose has been to provide children with exceptional abilities the opportunity to develop their full potential. Philosophically speaking, proponents of such programs point out that when highly talented young people remain undiscovered and untrained, their potential is wasted and society suffers an irreparable loss.

The noted French psychologist, Dr. Alfred Binet, promulgated the idea that the various capacities and talents of individual children should be the starting point of all educational endeavor, i.e. the determiner of educational goals and programs (Binet, 1916). This viewpoint was also expressed by Dr. John Dewey and Dr. Edward Thorndike. Following this line of thinking, identifying the characteristics of gifted learners essentially becomes the key to developing appropriate curriculum for them.

There is, naturally, an intimate connection between characteristics and definition, i.e. it is important to consider what definition is being used when characteristics are

referred to. The earliest objective definition of giftedness was stated in terms of rank on an intelligence test. The gifted child was defined as one whose level of cognitive development was advanced beyond children of comparable age as measured by standardized tests. It is important to note that virtually all the experimental work on the gifted until very recently has been based on this simple formula. The advantage of this definition to the researcher has been that it is based on a clearly defined, measurable criterion.

There are, however, some limitations to this narrowly conceived definition. The score obtained from an intelligence test pertains only to certain mental functions. Psychologists tell us that only a few of the fifty or more dimensions of the mind are measured by standard intelligence tests. Thus the capabilities of remarkable children can scarcely be encompassed by the high IQ definition (Renzulli, 1977). Furthermore, a child can show talent in any of several areas not directly related to IQ such as art, music, or drama. The trend today is toward broader definitions of giftedness, based on multi-dimensional traits and more comprehensive, elastic concepts of unusual ability and superior capacities. Nevertheless, the IQ score still stubbornly remains as a primary identification variable and our knowledge of gifted children is still largely based on research utilizing IQ scores as the sole determinant of giftedness.

The traits of children identified as gifted on the basis

of high test ratings have been described by Terman (1925), Hollingsworth (1926), Witty (1930), Barbe (1955), Strang (1960), Hildreth (1966) and others. The largest source of objective information about traits of the mentally gifted is Terman's study (1925) of 1,440 California children who were in the middle childhood years when first identified. The children scored 140 or above on the Stanford-Binet Intelligence Test and were studied over a span of almost 40 years. The goals of the study were to investigate the development of intellectually superior children from childhood to adulthood, to draw a composite picture of the characteristics of these individuals, and to chart the later achievements in life that could be related to childhood performance. The findings were reported in a five-volume series entitled Genetic Studies of Genius. The first volume was devoted mainly to a description of the mental and physical traits of these children.

According to Terman, in his first volume (1925), the ability to assimilate ideas and to generalize are indicative of high intelligence. Similarly, Hildreth (1966) states that mentally gifted children have a strong disposition toward intellectual activities and a liking for abstract thinking and ideas. She also emphasizes their prodigious memory. She points out that they learn easily without prolonged drill and are able to remember what they learn. These patterns of intellectual strength are also supported by the research of Gallagher and Lucito (1961) who compared the mental abilities

of samples of gifted, average, and retarded learners. They found that the outstanding strength of the gifted lies in a large fund of past information and the ability to associate concepts.

The gifted children studied by Terman (1925) also proved to be more intellectually curious and imaginative than the children in the control group. Furthermore, their interests differed from those of the non-gifted in that they were both varied and more numerous than those of their agemates. Newland (1976) claims that although the interests of the gifted often changed over time, each interest tends to involve relatively intensive commitment.

Hildreth (1966) contends that "lively" and "energetic" are two words that describe well the behavior of the gifted. She states that they show enthusiasm for new experiences and are self-motivated in pursuing their interests. Closely related to liveliness and energy are the traits of drive and perserverance. Klausmeier and Loughlin (1961) found persistence to be particularly characteristic of the gifted. In a series of studies comparing the learning characteristics of a group of gifted fifth grade boys and girls with groups of average and slow students, they found that the gifted group performed significantly better than the average in persistence.

Some studies suggest that high intelligence is associated with independence. Smith (1964) compared a group of 42 superior and 42 average adolescents matched on social class status,

chronological age, religion, sex and national background. On a Thematic Apperception Test which provides data on self and self-ideal concepts the average group indicated more themes of a dependency-weakness-conformity basis than did the superior group. Similarly, Lucito (1964) compared 55 bright students (CTMM 120+) and 51 dull students (CTMM 82-) on a task which attempted to measure their behavior along an independence-conformity continuum. Results showed that high intelligence may be a contributor to the degree of independence shown by the student.

A keen memory, abstract thinking ability, curiosity, broad, intense interests, perserverance, and independence are traits commonly referred to as characteristics of gifted learners. However, several authors offer a word of caution. They point out that gifted children differ as much among themselves as children of ordinary abilities. It appears that not all gifted children possess all of these characteristics nor to the same degree. Hildreth (1966) states that there is no such thing as a typical gifted child since no one child possesses all of the traits associated with giftedness. Torrance (1965) refers to the different kinds of cognitive styles found within the gifted population that are reflected in a variety of behaviors. He claims that if we were to identify five or ten gifted ten year olds who had exactly the same Binet IQ, their cognitive styles, i.e. the ways in which they would function intellectually, would be discernibly different. Certainly care must be taken to avoid overgeneralizing or making unwarranted assumptions when decisions are made about

the education of gifted children.

The Relationship of Gifted Learners and Self-Directed Independent Study

Despite the fact that differences among gifted children exist, the characteristic behavioral patterns indicated in the lists of traits have been used to determine curricular directions for the gifted. Curriculum developers have inferred that an appropriate educational program for gifted students must allow these distinguishing characteristics to benefit the learners.

Many researchers and practioners in the field of gifted education have concluded that a curriculum that emphasizes self-directed independent study, i.e., a curriculum that capitalizes upon curiosity, broad, intense interests, perserverance, and independence, accomplishes this purpose.

E. Paul Torrance (1965, p. 41) has stated that "One of the most promising curricular frontiers for educating gifted children is self-initiated learning." Donald Treffinger (1975) contends that a goal of primary importance in the education of the gifted is to cultivate self-directed learning. He believes that this goal is especially desirable for the gifted because research on the personal characteristics of the gifted indicates that they are independent of thought and judgement, self-starting, and perseverant.

In his book, The Enrichment Triad Model, Joseph Renzulli (1977) refers to the importance of providing gifted students with an opportunity to emulate professionals in a

field of study by engaging in self-initiated original research. He claims that it is this type of activity that is particularly appropriate for the gifted.

Martinson, Hermonsen, and Banks (1972) describe an Independent Study Seminar (ISS) program which they designed for high ability secondary school students. They advocate this program model as being especially suitable for gifted students since "the very characteristics of the gifted are consonant with the autonomy and self-determination in learning implicit in the ISS approach." They point out that because the gifted operate at higher levels of abstraction, are keenly interested in exploring topics of extra-ordinary depths, and have interests that are highly individualized, the opportunity to study topics of concern thoroughly becomes highly satisfying and productive.

Markwalder (1976) and Wolf and Stevens (1979) suggest the use of independent study contracts as a method of individualizing educational planning for the gifted. They explain that use of the contract approach allows students to pursue a topic or field of study in-depth, to use primary resources outside the school setting, to make decisions about the mode and media to be used, and to assume the major responsibility for their own learning. Each of these authors views the self-directed independent study approach as a particularly appropriate way to match the learning characteristics of the gifted with instructional method.

Briscoe (1977), Carlson and Ackerman (1981), and Jeter and Chauvin (1982) propose that independent study is one of the most effective methods for providing individualized instruction to the gifted child in the regular classroom. Independent study is viewed by these educators as a way of meeting the needs of students of widely varying abilities, particularly the gifted who may be unchallenged, bored, or rebellious in the regular classroom. Reference is made by each of these authors to the concept that independent study is a method that is particularly well-suited to the learning characteristics of gifted students.

Data collected by Alexander and Hynes (1966) revealed that independent study opportunities are, in fact, overwhelmingly directed toward the more able student. The assumption is that the abler or brighter student may be able to profit more from methods of learning that give him/her greater responsibility for his/her own education, while the less able student requires closer supervision and guidance. There is some evidence to support this contention.

The hypothesis of a study by Despain (1973) was centered on the idea that there are certain academic abilities which are predictors of the ability of students to work independently of teacher supervision amd control. Using a sample of 575 sixth, seventh, and eighth graders, he found that the single best predictor of student self-direction was the variable "general reading ability." Intelligence was also found to be a significant predictor variable. A similar study by Gutenson

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(1978), investigating characteristics of college students that are predictive of performance in self-directed independent study, showed that the variables of mental ability and intellectual efficiency were predictive of achievement in the self-directed group.

An in-depth look at the literature reveals, however, that not all identified gifted students achieve outstanding success in programs utilizing the self-directed independent study approach. A study conducted by Gruber and Weitman (1962) provided little support for the notion of a direct relationship between intellectual ability and capacity to profit from self-directed study. The correlation between intelligence and final exam performance was almost identical for the experimental group (self-directed instructional method) and the control group (conventional instructional method). Similarly, a study by Heber (1982) found that intellectually gifted students did not achieve significantly greater gain scores than regular students when using self-directed instructional methods.

A study of the attitudes of gifted students toward independent study conducted by Renzulli and Gable in 1976 revealed that 60%-70% of a sample of 196 gifted high school students enrolled in independent study programs had favorable attitudes toward various characteristics of this learning approach, including influence on motivation, effect on study habits and thought processes, degree of challenge, and opportunity for self-expression. Although the researchers

concluded that the independent study approach is viewed favorably by a majority of gifted students, the fact remains that a sizeable minority, 30%-40%, had unfavorable attitudes toward this approach.

Research on Self-Directed Independent Study

An analysis of the nature and use of the self-directed independent study approach reveals some clues about variables which may be key factors in determining student success or failure with this method.

A nation-wide survey of students in grades 7-12 who were engaged in self-directed independent study was conducted by William Alexander and Vynce Hynes through the United States Office of Education in 1965-1966. The authors defined self-directed independent study as a plan of instruction that builds on an individual student's unique interests and needs. It is considered to be a learning activity largely motivated by the learner's own aims to learn and largely rewarded in terms of intrinsic values. Students formulate their own learning goals, pursue them by self-selected means, and evaluate their own activities. This approach utilizes the services of teachers and other professionals primarily as resources for the learner and involves studies carried on both in and out of school facilities.

This study revealed that learning how to learn independently requires deliberate teaching of certain necessary techniques. Important skills to be taught or developed include

techniques of research, use of the library, use of the interview, organization and critical analysis of materials, applications of theory, and ability to reserve judgement until after investigations are made. Furthermore, the authors found that certain attitudes were needed including the desire to initiate learning tasks, a reflective testing out of possible answers, a seeking to apply generalizations to new situations, absence of discouragement at the difficulty of learning tasks, and an enjoyment of learning.

Other practioners have also emphasized the need for skill and attitude development in order to insure success in self-directed learning programs. Treffinger (1978) proposed several guidelines to parents and teachers for the purpose of "encouraging independence and self-direction among gifted students." Doherty and Evans (1981) offered nine steps for improving independent study skills. And, Patricia Haensley (1980) discussed at length the assessment of "task commitment," an attitudinal trait which is considered to be crucial to the successful completion of self-directed independent study.

Lucy Guglielmino (1977) sought to discover the skills and attitudes necessary for self-directed learning. She used the Delphi technique in which fourteen authorities on self-direction in learning participated. The characteristics that emerged from the Delphi survey included an openness to learning opportunities, self-concept as an effective learner, initiative in learning, informed acceptance of

responsibility for one's own learning, love of learning, creativity, future orientation, and ability to use basic study skills and problem-solving skills. She incorporated these eight factors into an instrument called the Self-Directed Learning Readiness Scale. Mourad and Torrance (1979) explored the construct validity of this instrument by administering it to 684 gifted students in grades five through twelve. Teachers rated the students on a scale indicating student abilities, skills, and motivations for self-directed learning. The researchers concluded that readiness for self-directed learning is associated with skills in original thinking, ability to produce analogies, the motivations of creative personalities, and creative achievement.

Lucy and Paul Guglielmino have found that outstanding performers in jobs requiring a very high level of creativity, a high level of problem-solving, or a high degree of change score significantly higher in self-directed learning readiness (Zemke, 1982). Additional research using the Self-Directed Learning Readiness Scale developed by Lucy Guglielmino shows that highly self-directed learners exhibit initiative, accept responsibility for their own learning, and view problems as a challenge.

The research indicated thus far indicates that certain skills and attitudes are prerequisites for success in self-directed learning activities. However, Alexander and Hynes (1966) assert that schools do not deliberately work at the goal of developing self-directed learners. They describe

learning in school as being largely other-directed, without a natural progression from teacher-direction to self-direction. Therefore they feel that it is unrealistic to expect that after five to fifteen years of submissive, structured, teacher-directed behavior, children will be able to function effectively in an individualized program that requires ability to solve problems, make decisions, and remain independently task-focussed. It is no wonder that large numbers of students flounder if and when they have the opportunity to create their own learning goals and activities. But the fact remains that some children do succeed. What characteristics predispose certain children to experience this kind of success in an instructional method so different from what they are accustomed to?

Some researchers have attempted to analyze the relationship between personality factors and educational methods in order to discover clues. Gruber and Weitman (1962) tested the hypotheses that more self-reliant students would adapt better to self-directed study, while less self-reliant students would adapt better to conventional methods. The hypothesis was not confirmed. Similarly, a study by Worley (1975), which was designed to determine criteria for helping students decide if they would profit more from traditional methods of instruction or from independent individualized methods, found no correlation between autonomy and success in independent study.

In contrast, Jenkins (1981) found that students who possess traits of submissiveness, liking group action, and

group dependency had higher achievement in conventional classes as opposed to independent individualized classes. Maloney (1978) found a statistically significant finding in the interaction effect of internal locus of control and the self-directed method. And Sabbaghian (1979) discovered a close, positive relationship (0.558) between adults' self-directedness and their self concept. Highly self-directed adults were found to have more self esteem and self-acceptance than low self-directed adults.

Even though there is conflicting evidence, there appears to be sufficient reason to believe that a particular personality structure or style may be related to success or lack of success in self-directed independent study. Further support for this notion can be found in a study by Gutenson (1978). Significantly different means were obtained in the lecture-discussion and the self-directed groups for the variables "socialization" and "achievement via conformance" demonstrating a personality difference between the two groups. In a similar study by Root and Gall (1981) significant interactions were found between the variable of "achievement via conformance" and each of the two methods of instruction being studied -- self-directed and conventional.

Cognitive Style Research

The concept of "style" was first suggested by Allport in the early 1940's. He defined style as "the consistency and pattern of expressive behaviors that individuals manifest in

performing various types of activities." (Kuchinskas, 1979). In regard to cognitive behaviors, the concept of "style" has been investigated in the context of cognition as a facet of personality. During the past forty years, psychologists have amassed an extensive professional literature in "cognitive styles" that represent a bridge between cognitive processing and personality theory. In essence, cognitive styles reflect preferences for and attitudes toward a manner of performing both intellectually and perceptually oriented tasks in a relatively consistent way (Swyter and Michael, 1982).

Several cognitive style constructs have been proposed by researchers. Bruner introduced partist vs. wholist strategies (1956). Kagan identified analytic vs. global cognitive styles (1963, 1964, 1965). Witkin et.al. (1977) analyzed field independent vs. field dependent learners. Satterly and Brimer focused on analytic vs. synthetic styles (1971), and Zelnicker and Jeffrey studied reflective vs. impulsive information processing strategies (1976). Decesso and Crawford (1974) also identified two types of style: conceptual tempo and selection strategies.

Although the definitions of cognitive style vary, all of the approaches suggest that people behave in a typical way across a variety of tasks and that such personal consistencies remain comparably stable over time.

Of all the cognitive styles, by far the one most frequently and extensively investigated has been Witkin's field

dependence vs. field independence(FD-FI). Since its conceptualization in 1954, 2,500 investigations of this dimension have taken place. Rosenberg, et.al., (1977) suggests that one reason for the survival of the FD-FI construct is the care with which the situations employed for its measurement were developed and studied.

Initial work regarding this construct was concerned with how individuals in a laboratory setting located the upright position of a rod within a rectangular frame or the tilt of one's chair to a true vertical position while looking into a small tilted room. These tasks were respectively called the Rod and Frame and the Body Adjustment Tests (Witkin et.al., 1977).

It was later discovered that performance on a printed test correlated highly enough with the lab-oriented measures to suggest its use as a measure of FD-FI. This test, called the Embedded Figures Test (EFT), was first developed as an individually administered test, but was later adapted for use in groups and renamed the Group Embedded Figures Test (GEFT). The EFT and GEFT present a series of relatively complex figures and forms within which the examinee must find a given simple figure that is incorporated or embedded as part of the complex stimulus pattern. In other words, the subject is required to achieve a correct perception by ignoring the interfering or irrelevant visual stimuli in which the part is embedded or buried. An individual with a field independent (FI) orientation typically can disassemble and identify quickly

and accurately the hidden part or figure, whereas the field dependent (FD) attitude has difficulty in locating the designated part within the broader global context.

What these three perceptual tests - the tilting room/tilting chair, the rod and frame, and the EFT or GEFT - have in common is the necessity to keep an idea separate from a field or embedding context. In these situations, for the relatively field dependent subjects, object and field tend to "fuse" so that the separation called for by the task cannot easily be made. In this sense, the experience of the more field dependent subject can be characterized as global. In contrast, the performance of a relatively field independent person, who is able to keep object and field separate, can be termed analytical. It should, however, be noted that the terms global or FD and analytical or FI refer to extremes of a dimension represented by a continuous distribution of scores on the perceptual test(s).

The next question which arose was whether the distinction between global and anlytical styles of functioning on perceptual tests is specific to perceptual situations or whether it extends to intellectual functioning as well. Further research showed that individual consistency extended from body orientation tests, to printed tests which require overcoming of an embedding context, to clarity of experience in unstructured situations, and to various manifestations of a sense of separate identity (Faterson, 1962). Thus the FD-FI dimensions came to be regarded as a manifestation, in specific perceptual

situations, of a more general style of experience.

Witkin and his associates described the FD-FI construct as "an expression of a generalized style of perceiving that is associated with an extensive and varied assortment of activities involving numerous domains of psychological functions" (Witkin, et.al., 1977). In essence, important differences exist between field independent and field dependent persons in perceptual, emotional, social, and cognitive functioning. These differences become particularly relevant to educators as they impact the learning process.

The existing research shows that the field dependent person tends to possess a social orientation in that he/she takes greater account of external social referrents in defining feelings and attitudes, is more sensitive to social cues, is more interested in what others say and do, and in general, is drawn to people and enjoys being with them. In contrast, the field independent person shows an impersonal orientation, is more likely to be aware of needs, feelings, and attributes which they experience as their own and as distinct from those of others, and, in general, provides internal frames of references (Witkin, et.al., 1977).

These differences in cognitive style affect the learning process in several important ways. Field dependent learners have been found to exhibit the following characteristics.

1. are better able to learn socially relevant material.

2. more frequently assume a passive or spectator learning role.

3. are more affected by negative reinforcement.

4. are more influenced by authority and the opinions of others.

Field independent persons are characterized by the following learning behaviors:

1. more frequently assume an active or participant learning role.

2. learn more effectively in the presence of intrinsic motivation conditions.

3. learn better in the absence of performance feedback. (Rosenberg, et.al., 1977, p. 43).

These findings support the notion that cognitive style is indeed a pervasive individual characteristic. In fact, the major researchers of cognitive style specifically refer to pervasiveness of this dimension of personality. Kagan (1965), who studied reflection and impulsivity, conducted several research studies involving many different kinds of tasks. He found that impulsive children consistently performed all tasks faster and less accurately than the reflective children who scored higher on sustained attention measures and employed more systematic and efficient scanning strategies. He concluded that an individual's preferred conceptual strategy is commonly utilized in a wide variety of activities.

Furthermore, cognitive style appears to remain relatively stable. Kagan (1965) stated that reflection and impulsivity were moderately stable over time, and Witkin (1977) discovered

that individuals were likely to be quite stable in their preferred mode of perception over many years. Franks and Dolan (1982) specificially describe cognitive style characteristics as underlying traits that are not dependent on environmental changes.

A third important characteristic of cognitive style is that it does not appear to be associated with level of intelligence. Witkin (1977) pointed out that field independent and field dependent individuals are not appreciably different in sheer learning ability or memory. He also found little correlation between cognitive style and grade point average, an overall achievement measure. Fischer and Fischer (1979), in summarizing learning styles research, emphasized that the association of intelligence with a particular style of learning is a common misconception.

In summary, the pervasiveness of cognitive style implies that it directly affects the learning process; its relative stability suggests that it is unlikely to change with educational intervention; and, its lack of correlation with intelligence indicates that there is no guarantee that a gifted child possesses one particular style. As a result, cognitive style appears to this researcher to be a promising variable to study in relation to effectiveness of instructional method with gifted students.

The Relationship of Cognitive Style and Instructional Method

Cognitive style has been the focus of study of many researchers interested in discovering how this variable interacts with particular instructional methods. The body of research which attempts to match instructional treatments with particular characteristics in order to maximize learning is called aptitude-treatment-interaction (ATI). Although there is a lack of consistent findings in ATI research in general (Bracht, 1970), many researchers have found the model of aptitude-treatment-interaction to be an effective approach for enhancing learning outcomes.

McLeod and Adams (1979) prepared a final technical report summarizing a number of studies undertaken to investigate the relationship of learner characteristics among mathematics students to various instructional methods. They stated that significant ATI's were obtained with three aptitude variables -- cognitive style as defined by field dependence-independent, general reasoning, and locus of control. Similarly, Annesley and Scott (1976), in discussing the implications of a learner's cognitive style for the development of reading competence, identified two dimensions -- field dependence-independence and reflectivity/impulsivity as being significantly related to reading achievement. They concluded that cognitive styles of students should be taken into account in designing instructional methods.

The most recent work relating cognitive style to instructional method has utilized cognitive style mapping. Numerous

symbols, cultural determinants, and modalities of inference are analyzed for each student to produce a map that describes the individual's cognitive traits. Nunney (1978) investigated the effectiveness of various instructional methods including group work, individual study, TV viewing, audio tapes, and programmed instruction with students having various cognitive style maps. He found that matching trainee style and instructional method insured 90% success. Whitley (1982), in analyzing and summarizing cognitive style mapping research, concludes by recommending mapping as a means of determining each student's ideal mode of learning so that optimal instructional strategies can be chosen and utilized.

Of particular interest to this study is the research relating cognitive style specifically to achievement or attitude when the method of self-directed independent study is utilized. The interaction effect of cognitive style (field dependence/independence) and method of instruction (independent vs. teacher-directed) on the acquisition of science concepts among third and fourth grade students was evaluated in a study by Wuhl (1977). The rationale underlying this research was the premise that field independent persons may learn better in an independent instructional atmosphere where they can utilize their analytical abilities and conversely, that field dependent persons may learn better in teacher-directed situations conducive to the utilization of their social interaction approach to learning. However, the interaction hypothesis was not supported. A similar study conducted by Pearl in 1978 investigated the degree of interaction between an individual's

symbols, cultural determinants, and modalities of inference are analyzed for each student to produce a map that describes the individual's cognitive traits. Nunney (1978) investigated the effectiveness of various instructional methods including group work, individual study, TV viewing, audio tapes, and programmed in

cognitive style (field dependence/independence) and his/her attitude toward the method of science instruction (independent vs. teacher-directed). No significant interaction between cognitive style and student attitude was found.

Several studies relating cognitive style and either achievement in or attitude toward independent study have been done with college-age students. Provost (1981) investigated possible interactions of aptitude and treatment between the cognitive styles of field dependence/independence and two different teaching strategies. No interactions were found. Wallace (1980) attempted to determine the effects of cognitive style and mode of study upon achievement in self-paced, autotutorial instruction among medical students. No interactions were found. In another study of adult learners, Moore (1976) hypothesized that the attitudes of field independent learners toward independent study would be more positive than the attitudes of FD learners. However, no personality-treatment interaction was found.

In contrast to the research above, some studies indicate that cognitive styles do indeed influence the degree of success with self-directed independent instructional methods. McLeod's research findings (1978) confirmed his hypothesis that field independent students would do better with a teaching method offering minimum guidance and that field dependent students would excel more with maximum guidance. Jonassen (1980) found that field independence was a strong predictor

of learning performance in project production in an introductory instructional media course. Brennan (1977) constructed collective cognitive maps for fast completers and slow completers in a self-paced auto-tutorial electronics course. He found that these maps contained distinct elements that differed significantly from each other.

A study completed by Fulbright in 1980 examined the relationship of self-reported cognitive mode (as an indicator of brain hemisphericity) and task performance on seven instruments including the Self-Directed Learning Readiness Scale. She found that left cognitive mode correlated negatively and significantly with self-directed learning ability, and that right cognitive mode correlated positively and significantly with self-directed learning ability. One conclusion of her study was that a left cognitive mode is an indicator of preference for and high performance in other-directed learning as opposed to self-directed learning. She believes that this finding is important in relation to the failure of many able students in programs requiring independence in learning.

Considering the contradictory evidence, this researcher has concluded that the reason why many aptitude-treatment interaction studies do not show significant interactions may be because the achievement measures utilized are too narrow. Achievement is commonly measured in these studies on the basis of what a student knows or understands as shown on a paper and pencil test. Little attention is given to how fast or

or efficiently the student learned, how much he enjoyed the learning experience, or how motivated he is toward future learning experiences of a similar kind. Furthermore, achievement is usually measured in written form, a form which is adaptable to particular learning styles and which may put some students at a disadvantage.

The Relationship of Cognitive Style and Gifted Learners

A question of importance to this study is whether gifted students tend to reflect clustered rather than individual style characteristics which may impact upon their success with particular instructional methods. Several major investigations of the learning style characteristics of gifted students suggest that gifted students do have certain learning style characteristics that are highly visible as group traits.

Dunn and Price (1980) in a study of students in grades 4-8 found that gifted students favored a more formal design in their instructional environment, required less task structure, were more persistent, and indicated less preference for the auditory sense in learning than average ability students. Griggs and Price (1982) found gifted students in grades 7-9 to be less teacher motivated, more persistent, and to have a greater preference for learning alone than average ability students.

Glenn (1977) conducted a study to compare the structure needs of gifted and average students. Structure needs were defined as the assistance, advice, and approval required by

a student for him to complete a task to his own satisfaction. Results indicated that task structure need was negatively correlated with intelligence.

Nichols and Davis (1964) studied 3,397 high school students in an attempt to discover traits that differentiated students with high academic aptitude (National Merit Scholarship winners) from average students. They found that the high aptitude students indicated more frequently than the average students that freedom from supervision in instruction was important to them. In addition, the average students valued the opportunity to work with others more frequently than the high aptitude students.

The consistently emerging traits of independence, i.e. freedom from supervision, minimal task structure, persistence, and desire to work alone among gifted students implied to Stewart (1979) that instructional methods where students work more on their own would be especially appropriate for gifted students. She constructed a study that showed that these methods are in fact preferred by gifted students.

Caution in equating certain learning styles with giftedness has been voiced by Alvino (1981). He points out that experimental attempts have been made to predict giftedness on the basis of learning style preferences. For example, the Learning Styles Inventory has been found to discriminate between gifted and non-gifted elementary students as identified by IQ and achievement, making it possible to predict with

53% accuracy whether or not gifted students would actually be classified in the gifted group. He points out that this is just above chance, or a 47% error. In other words, while many gifted children display learning style preferences that distinguish them from non-gifted children, nearly as many do not.

Indeed the most recent literature pertaining to learning styles and gifted children contends that gifted children are by no means a uniform group in their characteristics and preferences for instructional strategies. Because of their diversity, emphasis is placed on the idea that no one program can meet the needs of all gifted students (Stewart, 1982).

It appears that the majority of gifted students possess learning style characteristics that imply the appropriateness of self-directed independent study as an instructional technique. However, research evidence does exist that reminds us that not all gifted students possess the learning style traits characteristic of the majority. Perhaps too much generalization has taken place in grouping gifted children and in designing programs for them. This researcher intends to discover whether the gifted students with the cognitive style that is in the minority have become the "casualities" of gifted programs.

The Modality Concept

Another promising variable which may influence a student's success with particular instructional methods is modality. All the academic information that a student learns is acquired through one of the perceptual channels or modalities -- vision, audition, or kinesthesia. The perceptual channel that is most efficient is called a modality strength. Modality strength is, in effect, one of the most fundamental categories of learning style.

Some people have a single modality strength and rely most heavily on one perceptual channel. Others have a mixed modality strength, and two or more of the perceptual channels are of comparable efficiency. Different children rely on different sensory modes and the mode they use influences their classroom behavior and achievement (Barbe and Milone, 1982). Research has shown that approximately 30% of elementary school-age children have a visual modality strength, 25% have an auditory strength, and 15% are kinesthetically oriented. The remaining 30% have mixed modality strength (Barbe and Milone, 1982).

Neither "nature" nor "nurture" fully accounts for the development of a modality strength. Most likely, a person's heredity, maturation, learning, and cultural upbringing are all contributing factors. And unlike cognitive style, modality strength is not a fixed characteristic. Infants are more kinesthetic than older children; pre-school and early primary grade children have comparatively strong auditory

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abilities; and older children and adults rely more on vision (Barbe and Milone, 1982). Furthermore, the modalities become more integrated with age. Whereas younger children focus on a single perceptual aspect of an event, older children and adults are more likely to consider an event in terms of several perceptual characteristics. As a person grows older, there is an increase in the ability to transfer information from one modality to another (Barbe and Milone, 1982).

Modality Characteristics of Gifted Children

With gifted children, the shift toward the visual in the elementary grades and the overall tendency toward modality integration as a child grows older seems to occur earlier (Kirchoff, 1980). While other preschool and primary grade children are relying on audition most heavily, the gifted child is learning best through the visual modality. Moreover, the gifted child in the middle school is already showing a degree of modality integration that is normally associated with a much older student. You might say that the "modality age" of gifted children parallels their mental age and that both greatly exceed chronological age (Barbe and Milone, 1982).

A study conducted by Griggs and Price (1982) clearly showed that gifted children as a group do not prefer to learn auditorally. This finding also holds true for a sample of musically talented adolescents, a group that would be expected to demonstrate auditory strengths or preferences (Barbe and Milone, 1982). It appears that, for gifted children, the auditory mode is not the most efficient means

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nor the one they prefer.

It is apparent that the research investigating the modality strengths and preferences of gifted children, like the previously cited learning styles research, treats gifted children as a group. Program designers who use this research as a basis for developing appropriate curricula and teaching strategies for gifted students may overlook the fact that some gifted children may not possess these "group" characteristics. Perhaps some gifted children do not make the early shifts from audition to vision to modality integration. These may be the children who experience difficulty in programs designed for the majority of gifted children.

Research on Modality Based Instruction

It is important to recognize for the purpose of this research that the idea that teachers should try to teach children according to their dominant modalities in order to increase achievement is not supported by firm research evidence. Kampwirth and Bates (1980) severely criticize this widely accepted premise. They discovered 22 studies that investigated the modality methods problem. Of these, only two showed positive results. The remaining 20 either resulted in no clear evidence either way or demonstrated that teaching to the nonpreferred modality produced better results than did teaching to the preferred modality.

Foster, et.al. (1976) also recognized that studies of this type generally failed to establish significant interactions. However, they point out that this research is

characterized by serious methodological errors including failure to establish discrete groups and failure to delineate specific controlled treatments. The researchers designed a study which avoided these methodological problems often found in ATI-modality studies. The results demonstrated that a relationship does exist between modality strength and the ability to remember sight words taught through procedures designed to emphasize either the visual or auditory modality.

A study conducted by Farr in 1971 found that learning and testing in one's preferred modality increases achievement. This study emphasized another methodological problem that may have contributed to the conflicting results found in ATI-modality research -- that the modality of the testing used to determine the level of achievement in these studies may be confounding the results.

Instructional Preference

The underlying purpose of this study is to determine whether certain variables, specifically cognitive style and dominant modality are related to lack of success in self-directed independent study, an instructional method that is commonly used in programs for gifted students. If it is found that field independence, field dependence, visual, auditory, kinesthetic, or mixed modality is related to poor achievement in self-directed independent study, then knowledge of the variable(s) could be used as a key to designing alternative programs for these students.

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controlled interviews. [illegible] ...
avoid ... These methodological problems often found in such
... studies. The results ... indicated that a relationship
... exist between ... ability to remem-
ber objects ... observed
either ...

In order to choose instructional methods which will insure more success for gifted students who do not fit the broad patterns generally characteristic of gifted students as a whole, it seems wise to explore student preferences for instructional methods. Research has shown that students who are allowed to learn using methods they prefer have higher achievement, indicate more interest in the subject, and show a more positive attitude toward the subject (Stewart, 1982). Several studies (Domino, 1971; James, 1962; Pascal, 1971; Smith, 1976) suggest that students make more progress in both cognitive and affective areas when they are able to learn according to their individually preferred methods. A more recent study by Frazier in 1981 investigated the hypotheses that students show greater performance and more satisfaction when taught in a manner congruent with their preference for working either socially (in a group) or independently (alone). The interaction effect of learning preference on both performance and satisfaction was significant.

Perhaps one or more of the variables related to lack of success in self-directed independent study will be strongly associated with particular preferences for instructional method. If so, the preferred instructional method(s) could be utilized in programs for non-self-directed gifted students to help them realize more of their potential.

Thus far, research relating cognitive style or modality

to instructional preference has been sparse. Two studies were found. In 1976, Powell discovered that the cognitive styles (field independence/dependence and reflection/impulsivity) do not predispose students to select a self-directed study option. Similarly, Smith (1980) found no significant relationship between cognitive style (field independence/field dependence) and choice of instructional methods. However, neither of these studies focused on gifted students.

Summary

This chapter began by reviewing research relative to characteristics of gifted learners. Despite the fact that considerable variation exists within the gifted population, the general behavioral patterns revealed in the literature have been used to determine curricular directions for the gifted, particularly the utilization of the self-directed independent study approach. Many authorities in gifted education advocate the self-directed approach, but some studies indicate that not all gifted students are successful self-directed learners.

A review of the literature pertaining to self-directed independent study showed that certain skills and attitudes are prerequisites for success in self-directed learning activities. A search for personality characteristics which may be associated with the development of the necessary skills and attitudes resulted in conflicting evidence, but gave sufficient reason to suggest that a particular personality style

may be related to success or failure in self-directed independent study.

A review of learning styles research revealed certain promising variables worthy of investigation, specifically cognitive style and dominant modality, The construct of cognitive style has been investigated extensively by psychologists during the last forty years. The pervasiveness of cognitive style, its relative stability, and its lack of correlation with intelligence indicate that it could be a significant factor contributing to consistent success or failure with a particular instructional method among gifted students. However, research attempting to establish significant aptitude-treatment interactions with regard to cognitive style and instructional method has resulted in conflicting evidence.

Another relatively stable learning style variable which appears to influence a student's success with particular instructional methods is modality. The research shows that the majority of gifted students share similar modality characteristics, a finding which has influenced the planners of curriculum for gifted students and obscures the needs of the remaining minority group.

Research involving student preference for instructional method was also reviewed in this chapter because this variable has been found to be strongly related to successful learning. Investigation of instructional preferences of non-self-directed gifted students appears to be warranted to provide direction for the planning of alternative curricular approaches.

CHAPTER 3

Methodology

Design

The first part of this study was experimental in nature and involved deriving two groups from a random sample of intellectually gifted students. Composition of the two groups was based on the independent variable of self-directed learning ability as determined by attitudes and behavior. The self-directed and non-self-directed groups were analyzed to determine whether significant differences existed in relation to two dependent variables -- cognitive style, as defined by field dependence/independence, and modality dominance. Three null hypotheses were tested:

H_1: There is no significant difference between the mean cognitive style scores for intellectually gifted students who have self-directed learning ability and those who do not.

H_2: There are no significant differences between the mean percentage scores of each category of modality dominance for intellectually gifted students who have self-directed learning ability and those who do not.

H_3: There are no significant differences in the percentages of subjects having either vision, audition, kinethesia, or a mixed modality as their dominant or

secondary modality between self-directed and non-self-directed samples of intellectually gifted students.

The data for the null hypotheses H_1 and H_2 was analyzed using t-tests to determine whether significant differences in the mean scores of cognitive style, visual modality, auditory modality, kinesthetic modality, and mixed modality existed between the self-directed and non-self-directed groups of intellectually gifted students. The level of significance was established at $\alpha = .05$.

The data for the null hypothesis H_3 was analyzed by calculating chi squares from cross-tabulation data to determine whether significant differences existed in the percentages of students having a dominance in each of the modalities between the self-directed and non-self-directed samples. Chi squares were computed to determine whether differences existed relative to primary and to secondary modality dominance. If the number of persons having a particular modality dominance was less than five, then that modality category was eliminated from the chi square analysis due to the instability of that analysis for small cell sizes.

The second part of the study was correlational in nature and involved determining whether the cognitive style continuum of field dependence/independence scores was linearly correlated with each of nine instructional preferences, and, if so, to what extent. Similarly, the nature and extent of linear correlation, if any, between percentage scores for each of the three categories of modality dominance and each of the nine

instructional preferences was determined. Pearson's product moment correlation (r) was computed for each set of bivariate data. The level of significance was established at $\alpha = .05$ for the correlations involving cognitive style. In order to control for the effect of multiple testing on a large number of correlations, the set of correlations involving modality dominance was tested at the stricter $\alpha = .01$ level.

Description of the Sample

The population from which the sample of students was drawn for this study consists of intellectually gifted students in grades 5-8 participating in special programs based on the self-directed independent study model. The students were chosen from randomly selected school districts representing a variety of demographic areas in the state of Michigan.

A list of schools providing self-directed independent study for intellectually gifted students in grades 5-8 was procured from the State Department of Education in Michigan. A random sample of school districts were invited to participate in the study through the chief school administrator and the teacher-coordinator for gifted programs. Identification procedures and characteristics of the self-directed independent study models were requested of each school district to be included in the study, and participating schools were required to meet minimum criteria to insure that similarity in definitions of "intellectually gifted students" and "self-directed independent study" was maintained:

1. IQ test scores of 120 or above and achievement test scores at the 95th percentile or above in one or more subject areas are used by the school district for identification of the intellectually gifted.

2. Self-directed independent study is defined by the school district as student-selection of the topic of study, student-planning of the majority of activities in the study, work primarily done individually, and visual material utilized as the primary source of information.

Teachers of the gifted in the eleven participating school districts were each requested to categorize ten students from their district as being self-directed and ten students as being non-self-directed as measured by a checklist of observable behaviors (See Appendix). After categorizing the students, each teacher was asked to administer the Self-Directed Learning Readiness Scale to the 20 students they had selected. Only students in grades 5-8 who had participated in the gifted program for a minimum period of one year were considered by the teachers to insure that familiarity with the self-directed independent study approach had been established. In addition, the researcher noted that all of the teachers participating in the study were certified instructors, with a minimum of ten years of classroom teaching experience, and at least two years of experience teaching in a gifted program.

Those students who (1.) scored at or above the 73rd percentile on the Self-Directed Learning Readiness Scale and who

(2.) had been categorized by their teachers as being characteristically very self-directed in pursuing independent studies constituted the self-directed sample group. Likewise, those students who (1.) scored at or below the 27th percentile in the Self-Directed Learning Readiness Scale and who (2.) had been categorized by their teachers as characteristically experiencing difficulty in being self-directed in pursuing independent studies constituted the non-self-directed sample group.

Instrumentation

In the first phase of student testing, intellectually gifted students in the random sample of school districts that agreed to participate and that met the necessary criteria were administered the Self-Directed Learning Readiness Scale by the teacher of the gifted program. This instrument is a self-report questionnaire consisting of 58 Likert-type items designed to determine whether a student possesses certain attitudes and personal characteristics which are considered important for success in self-directed learning. The content of the instrument was determined through a three-round Delphi survey of fourteen leading authorities in self-directed learning. A reliability coefficient of .87 was reported by the author, Dr. Lucy Guglielmino, after field testing utilizing 307 subjects. A factor analysis indicated the presence of the following eight factors in self-directed learning ability: openness to learning opportunities, self-concept as an

effective learner, initiative and independence in learning, love of learning, creativity, future orientation, and ability to use basic study skills and problem-solving skills.

In the second phase of student testing, the researcher administered two instruments to students in both the self-directed and non-self-directed groups within each participating school district:

1. Group Embedded Figures Test - The purpose of this test is to determine the degree of field articulation an individual possesses. The subject is required to find and trace a specified simple figure in each of 25 complex figures. The number of simple figures correctly traced constitutes the raw score of the GEFT. The greater the number of figures correctly traced, the more field independent the subject is.

2. Swassing-Barbe Modality Index - This individually administered instrument is designed to determine relative strengths in the visual, auditory, and kinesthetic modalities. It consists of matching-to-sample tasks in each of three sub-tests corresponding to the respective modalities. Relative modality strengths for each student can be determined by converting raw sub-test scores into percentages which, in turn, are indicative of an individual's dominant modality.

In the third phase of student testing, the teacher of the gifted program within each district administered an instrument to students in both the self-directed and non-self-directed groups:

1. Learning Styles Inventory: A Measure of Student Preference for Instructional Techniques (LSI) - the LSI, created by Dr. Joseph Renzulli and Dr. Linda Smith, is composed of 65 items which are designed to measure student attitudes toward nine general modes of instruction. The specific categories of instruction which the inventory includes are projects, drill and recitation, peer teaching, discussion, teaching games, independent study, programmed instruction, lecture, and simulation. Various classroom learning experiences associated with these learning approaches are described and students are asked to indicate their reaction to each activity along a 5-point scale ranging from unpleasant to very pleasant. This instrument is appropriate for use in grades 4-12 and requires approximately thirty minutes to complete.

Estimates of internal consistency reliability for the sub-scales of the LSI range from .66 to .77 by the Spearman-Brown formula. Content validity for the LSI was established through the use of 23 "expert" judges who reviewed all items. This group of judges was composed of professors of education, teachers, administrators, and advanced graduate students with

a background in the areas of learning and instruction. These individuals were asked to review all items and to indicate the category of instruction to which each item best applied. To establish construct validity, a principal component analysis was employed to discover common components underlying the items on the LSI. This procedure was followed by an oblique rotation in order to identify meaningful dimensions among the test items. The nine factors, i.e. modes of instruction, were identified through this technique.

Data Collection Procedures

A list of schools providing self-directed independent study programs for the intellectually gifted in grades 5-8 was obtained from the Michigan Department of Education. This information is available through computer listing printouts and can be accessed with permission. The Superintendents and gifted program coordinators of the school districts selected by a random sampling procedure from the listing were contacted and given descriptive information concerning the study. If permission for school district participation was granted, specifics about identification procedures and program characteristics was requested.

The gifted program teachers in participating districts meeting the minimum criteria for identification and program definition were given complete instructions and forms for

categorizing students and administering the Self-Directed Learning Readiness Scale. Upon completion of the scoring of this instrument, the researcher determined the composition of the two sample groups according to the procedures specified in the "Description of the Sample."

Once the two groups had been determined, the researcher visited each participating school district and administered the Group Embedded Figures Test and the Swassing-Barbe Modality Index to the students in both sample groups. At that time, the researcher also gave a packet to the teacher of the gifted program containing Learning Style Inventories, a list of students in that district to be tested, and specific guidelines for the testing procedure.

Following the administration of the Learning Style Inventories by the teachers in the participating school districts, the instruments were returned by mail to the researcher for scoring and tabulation.

All testing took place during the months of April and May in three separate sessions:

First session - Self-Directed Learning Readiness Scale

Second session - Group Embedded Figures Test and Swassing-Barbe Modality Index

Third session - Learning Style Inventory

Clearance for the testing was granted to the researcher by each participating school district although administrative

procedures for securing permission varied among the districts.

The Self-Directed Learning Readiness Scales and the Learning Style Inventories were computer-scored, and the Group Embedded Figures Tests and the Swassing-Barbe Modality Indexes were hand-scored by the researcher.

Summary

This chapter described the two-part design of the study and the statistical analyses employed in each. In the first part of the study, the primary techniques used for testing the three null hypotheses involving the self-directed and non-self-directed groups of intellectually gifted students were t-tests and a chi-square analysis. In the second part of the study, Pearson's product moment correlation coefficients were computed for several sets of bivariate data pertaining to cognitive style, modality, and instructional preference score continuums. A description of the sample, explanatory information about the four instruments used in the study, and a detailing of the data collection procedures were included in subsequent subsections.

CHAPTER 4

Results of the Study

The Self-Directed Learning Readiness Scale was administered to 220 students participating in programs for the intellectually gifted in eleven public school districts in the state of Michigan. Each of these students was categorized by their teachers as being either self-directed or non-self-directed according to checklists of behavioral characteristics.

Forty students scored at or above the 73rd percentile on the Self-Directed Learning Readiness Scale and were categorized by their teachers as being characteristically very self-directed in pursuing independent studies. Thirty-eight students scored at or below the 27th percentile and were categorized by their teachers as characteristically experiencing difficulty in being self-directed in pursuing independent studies.

The Group Embedded Figures Test, the Swassing-Barbe Modality Index, and the Learning Styles Inventory were administered to the self-directed group (N=40) and the non-self-directed group (N=38).

Comparison of Cognitive Style Scores Between the Self-Directed and Non-Self-Directed Groups

This study first addressed the research question:

Is there a significant difference in cognitive style (field dependence vs. field independence) between intellectually gifted students who have self-directed learning ability and those who do not?

The data were analyzed using a t-test to determine if there was a significant difference in the mean scores of the self-directed and the non-self-directed groups on the cognitive style measure, i.e. the Group Embedded Figures Test.

The mean score for the self-directed group was 11.85 and the mean score for the non-self-directed group was 8.71. The probability value (p=.01) for the difference between the mean scores was significant beyond the .05 level of confidence established as the criterion for this test. Therefore, the null hypothesis stating that there is no significant difference between the mean cognitive style scores for intellectually gifted students who have self-directed learning ability and those who do not is rejected. Table 1 contains the mean scores, standard deviations, t value, and p value for the t-test on the cognitive style variable for the two groups.

Table 1

T-Test for Difference Between Means of Self-Directed and Non-Self-Directed Groups on Cognitive Style

Group	No. of Cases	Mean	Standard Deviation	t Value	p Value
Self-Directed	40	11.85	4.53	2.79	.01
Non-Self-Directed	38	8.71	5.40		

Comparison of Modality Dominance Between the Self-Directed and Non-Self-Directed Groups

The second research question investigated through this study was:

> Is there a difference in dominant modality between intellectually gifted students who have self-directed learning ability and those who do not?

The data were analyzed by using t-tests to determine if there was significant differences in the mean percentage scores of the self-directed and non-self-directed groups for each category of modality dominance.

No significant differences between the two groups were found for the visual or the kinesthetic scores. Only the t-test for the auditory scores indicated a significant difference beyond the .05 level ($p=.03$). Therefore the null hypothesis stating that there are no significant differences between the mean percentage scores of each category of modality dominance for intellectually gifted students who have self-directed learning ability and those who do not is rejected in

the case of auditory dominance only. Table 2 reports the mean scores, standard deviations, t values, and p values on the three modality variables for the two groups.

Table 2

T-Tests for Differences Between Mean Percentage Scores of Self-Directed and Non-Self-Directed Groups on Modality Variables

Variable	Group	No. of Cases	Mean	Standard Deviation	t Value	p Value
Visual	SD	40	.430	.084	1.12	.27
	NSD	38	.409	.084		
Audi-tory	SD	40	.301	.076	-2.19	.03
	NSD	38	.341	.086		
Kines-thetic	SD	40	.269	.078	1.02	.31
	NSD	38	.251	.077		

Further analysis of the data relative to the second research question was accomplished by calculating chi squares from cross tabulation data. This procedure was used to determine whether significant differences existed in the percentages of students having a dominance in each of the modalities between the self-directed and non-self-directed groups. Both primary and secondary dominance in each of the modality categories was analyzed.

There were only two students who had a primary kinesthetic modality dominance in the self-directed group and only one student who had a primary kinesthetic modality dominance in the non-self-directed group. Therefore the cells for primary kinesthetic modality dominance were dropped from the analysis because of the instability of the chi square test with small cell sizes of less than five.

In testing the null hypothesis, no significant differences were found between the two groups for either primary or secondary modality dominance. The probability values of .32 for primary modality dominance and .91 for secondary modality dominance both fell considerably short of the established level of significance (α =.05). These results indicate that there does not appear to be an association between self-direction or non-self-direction and category of modality dominance. Table 3 shows the chi squares and p values for both primary and secondary modality dominance.

Table 3

Chi Square Values for the Self-Directed and Non-Self-Directed Groups Having Each Modality Dominance

Variable	x^2	p value
Primary Modality Dominance	2.26	.32
Secondary Modality Dominance	.56	.91

Because the chi square analyses did not reveal significant p values for either primary or secondary modality dominance, the null hypothesis stating that there are no significant differences in the number of subjects having either vision, audition, or mixed modality as their dominant or secondary modality between self-directed and non-self-directed samples of gifted students cannot be rejected. However, the raw frequency data for each category of primary modality dominance shown in Table 4 revealed an interesting pattern. Cell sizes for visual and mixed dominance were similar for both the self-directed and non-self-directed groups, but the cell for auditory dominance in the non-self-directed group had twice the number of students as the cell for auditory dominance in the self-directed group. This supplementary analysis lends additional support to the finding relative to H_2 that there was a significant difference between the mean percentage scores for the auditory modality between the self-directed and non-self-directed groups, with the non-self-directed group having the higher mean percentage score. However, no corresponding pattern in regard to cell sizes exists for secondary modality dominance, as shown in Table 5.

Table 4

Frequency Table of Primary Modality Dominance Categories for Self-Directed and Non-Self-Directed Groups

Group	Visual	Auditory	Mixed
Self-Directed	23	5	10
Non-Self-Directed	19	10	8

Table 5

Frequency Table of Secondary Modality Dominance Categories for Self-Directed and Non-Self-Directed Groups

Group	Visual	Auditory	Kinesthetic	No Secondary Dominance
Self-Directed	4	9	6	21
Non-Self-Directed	5	9	7	17

The Relationship of Cognitive Style and Dominance Modality with Instructional Preferences

The third research question addressed in this study was:

Are cognitive style (field dependence vs. independence) and dominant modality correlated with preferences for instructional technique?

The data were analyzed by computing Pearson's product

moment correlation coefficient (r) between the continuum of field dependence→independence scores and the continuum of scores for each of nine instructional preferences. Similarly, r was computed between the continuum of percentage scores for each modality category and the continuum of scores for each of the nine instructional preferences.

The results of the correlation analysis between cognitive style and instructional preferences yielded only two correlations significant beyond the .05 level. Preference for the instructional techniques of "peer teaching" correlated positively with the field dependence→independence continuum with an r value of .235 and a p value of .05, and preference for the instructional technique of "discussion" correlated positively with the field dependence independence continuum with an r value of .236 and a p value of .05. Although both of these correlations were statistically significant, the values of the correlation coefficients were weak. Table 6 shows the r values and p values for each of the nine instructional preference variables that were correlated with the cognitive style variable.

Table 6

Correlations Between Cognitive Style Scores and Scores for Each of Nine Instructional Preferences

Instructional Preference	r value	p value
Project	.122	.31
Simulation	.145	.22
Drill and Recitation	.167	.16
Peer Teaching	.235	.05
Discussion	.236	.05
Teaching Games	-.020	.87
Independent Study	.116	.33
Programmed Instruction	.189	.11
Lecture	.204	.08

The results of the correlation analysis between modality categories and instructional preferences revealed four correlations that were statistically significant at the .01 level. The level of significance was tested at the stricter .01 level in order to control for the effect of multiple testing on a large number of correlations. The continuum of percentage scores for the auditory modality correlated negatively with the following instructional preferences -- simulation (r=.315, p=.01), peer teaching (r=.361, p=.002), discussion (r=.334, p=.004) and programmed instruction (r=.340, p=.003). Table 7 indicates

the correlation coefficients and the probability values for each of the correlations that were analyzed between instructional preferences and the modality categories.

Table 7

Correlations Between the Percentage Scores for each Modality Category and the Scores for each of Nine Instructional Preferences

Instructional Preference	Visual		Auditory		Kinesthetic	
	r value	p value	r value	p value	r value	p value
Project	.010	.93	-.202	.09	.210	.08
Simulation	.178	.13	-.315	.01	.148	.21
Drill and Recitation	.062	.60	-.215	.07	.160	.18
Peer Teaching	.133	.26	-.361	.002	.241	.04
Discussion	.157	.18	-.334	.004	.193	.10
Teaching Games	-.026	.83	-.180	.13	.219	.06
Independent Study	.089	.45	-.151	.20	.071	.55
Programmed Instruction	.219	.06	-.340	.003	.131	.27
Lecture	.169	.15	-.131	.27	-.040	.74

the correlation coefficients and the probability values for ...
each of the correlations between ... and ...
tional preference and ... modality ... [illegible]

Table 7

... Correlations Between the ... Scores
for each Modality ... [illegible]
... Scores for each of the ... [illegible]

Summary

The study was designed, in part, to determine whether differences exist in cognitive style (field dependence vs. field independence) between intellectually gifted students who have self-directed learning ability and those who do not. A t-test performed on the mean scores obtained by the two groups on the cognitive style measure indicated a significant difference at the .05 level. The self-directed students were found to be more field independent than the non-self-directed students.

Another research question addressed by the study was whether differences exist in dominant modality between intellectually gifted students who have self-directed learning ability and those who do not. T-tests performed on the mean percentage scores obtained by the two groups on the modality measure revealed a significant difference at the .05 level for the auditory modality scores only. No significant differences between the two groups were found for the visual or kinesthetic modality scores.

Further analysis of the data relative to the second research question was accomplished by calculating chi squares to determine whether significant differences existed in the percentages of students having a dominance in each of the modalities between the self-directed and non-self-directed groups. The chi square analysis did not reveal significant p values for either primary or secondary modality dominance.

The third research question investigated the relationship of cognitive style and modality with instructional preferences. Pearson's product moment correlation coefficient was computed between the continuum of field dependence→independence scores and the continuum of scores for each of nine instructional preferences. Preferences for peer teaching and discussion correlated positively with the FD→FI continuum at the .05 level of significance.

Correlation coefficients were also computed between the continuum of percentage scores for each modality category and the continuum of scores for each of nine instructional preferences. Preferences for peer teaching, discussion, simulation and programmed instruction correlated negatively with the continuum of auditory scores at the .01 level of significance.

Although several of the correlations analyzed relative to the third research question were statistically significant, the r values were weak ($<$ .4).

CHAPTER 5

Summary, Conclusions, and Recommendations

Summary

Intellectually gifted students are often described as independent in thought and judgement. Consequently, some parents and teachers assume that these students will be able to organize their own efforts skillfully, conduct their own learning activities, and behave consistently in a well-organized, self-directed manner. Experience with efforts to implement self-directed independent study programs has revealed that some intellectually gifted students have serious difficulty in adapting to this learning approach.

This study was designed to determine whether differences exist between intellectually gifted students who have self-directed learning ability and those who do not as measured by two relatively stable psychological variables -- cognitive style (field independence vs. field dependence) and dominant modality (visual, auditory, or kinesthetic). In addition, an effort was made to determine whether these variables correlate with student preferences for particular instructional techniques.

A random sample of intellectually gifted students in the 5th-8th grades participating in programs utilizing

the self-directed independent study approach (N=220) were administered the Self-Directed Learning Readiness Scale and were assessed by their teachers to determine whether they were self-directed or non-self-directed. Students in the self-directed group (N=40) and students in the non-self-directed group (N=38) were given the Group Embedded Figures Test and the Swassing-Barbe Modality Index, tests which are designed to indicate cognitive style and modality characteristics respectively.

A t-test performed on the mean scores obtained by the two groups on the cognitive style measure indicated that a significant difference existed. Students who were highly successful in self-directed learning activities were more field independent than students who had difficulty being self-directed. The characteristics associated with the field independent cognitive style apparently facilitate the development of the skills and attitudes necessary to learn successfully in a self-directed manner, while the characteristics associated with the field dependent cognitive style appear to stifle this development.

Similarly, the t-tests used to analyze differences in the mean percentage scores for each category of modality dominance revealed a significant difference between the two groups in the auditory scores, although no significant differences existed for the visual or kinesthetic scores. Students in the non-self-directed group had a higher mean percentage score for the auditory modality than the students

in the self-directed group. This finding indicates that auditory modality dependence may hinder success in self-directed learning.

Although the results of a chi square analysis revealed that there is no clear association between self-directedness or non-self-directedness and category of modality dominance, supplementary analysis showed that the cell for auditory dominance in the non-self-directed group had twice the number of students as the cell for auditory dominance in the self-directed group. These data lend further support to the contention that auditory modality dominance may contribute to difficulty with a self-directed learning approach.

The second part of the study involved the administration of the Learning Styles Inventory to both the self-directed and non-self-directed groups and was designed to provide insight into the most appropriate instructional methods to use with non-self-directed intellectually gifted students. The correlations that were computed in this part of the study yielded unexpected results. First, preferences for the instructional techniques of peer teaching and discussion correlated positively with the FD FI continuum at the .05 level of significance. In other words the more field independent a student was the more likely he/she was to prefer to learn by peer teaching or discussion methods. This finding is inconsistent with research

conducted by Witkin and his associates (1977) that showed that field independent persons tend to prefer to learn alone, while field dependent persons tend to prefer more socially-oriented group learning situations.

Secondly, the continuum of percentage scores for the auditory modality (which is associated with the non-self-directed student) correlated negatively with four instructional preferences -- peer teaching, discussion, simulation, and programmed instruction at the .01 level of significance. Surprisingly, all but the latter of these teaching strategies predominantly utilize the auditory mode.

In summary, the results of this study appear to indicate that significant differences in cognitive style and modality characteristics do exist between students who are self-directed and those who are not. Furthermore, these two relatively stable learning style variables are correlated with certain preferences for instructional techniques.

Conclusions

This study lends support to the contention that gifted learners may differ as much from one another as they do from learners with average intellectual abilities. Findings from this investigation show differences in self-directed learning ability, cognitive style, modality characteristics, and instructional preferences among students who share similar intelligence and achievement levels. These varied

characteristics lead naturally to a diversity of program options serving the gifted population. The use of only one type of program for all gifted learners may leave the potential of many unchallenged.

In order to avoid creating unnecessary frustration and anxiety for gifted students and to promote maximum talent development, it would seem feasible to screen students not only for identification as gifted or talented, but to determine readiness or appropriateness of placement in a particular learning program as well. The reader is reminded that conflicting evidence exists in aptitude-treatment interaction research involving learning style variables. However, findings from this study suggest that cognitive style and modality testing may help determine which gifted students are likely to adapt successfully to self-directed independent study programs and which are not. Specifically, field independence is a positive indicator while auditory modality is a negative indicator.

Alternative programs for non-self-directed gifted learners could be designed. The characteristics found in this study to be associated with non-self-direction, specifically the field dependent cognitive style and the auditory modality, could be developed as strengths. Social skills characteristic of the field dependent learner could be emphasized through group problem-solving, role playing, and various cooperative learning activities. The auditory modality could be utilized in developing valuable proficiency

in public speaking, drama, and debate. Focussing on strengths instead of on remediating weaknesses could play a powerful role in helping this subgroup of gifted learners realize more of their potential.

If, however, self-direction is a central goal of the educational program, then educators need to realize that students will experience differing degrees of success with this method of learning. This research study shows that it cannot be assumed that all students have self-directed learning ability. Moreover, some gifted students may possess relatively stable learning style characteristics that tend to hinder the development of skills and aptitudes associated with self-directed learning.

Efforts could be made to aid the field dependent student in coping more successfully in self-directed activities. Studies by Bodine (1977) and Frank and Davis (1982) suggest that field dependent students achieve more when grouped with field independent students than when they are homogeneously grouped. Jacobs (1980) studied differences in behavior and achievement between field independent and field dependent students in a self-directed independent study course and discovered that field dependent individuals achieved as well as field independent students, but they engaged in more frequent interaction with proctors and other students. The researcher concluded that social behavior is one way in which field dependent students may possibly adapt successfully to a self-directed instructional setting.

These accomodations could be made in self-directed independent study situations to assure a greater degree of success for field dependent learners.

At the very least, educators could help make students aware of their particular learning styles and how these characteristics may impact on their self-directed learning ability. This knowledge would aid students in choosing activities for their independent study plans that utilize their most efficient or preferred modes of learning.

Parents of gifted children can utilize understanding of the relationships among self-directed learning ability, cognitive style, dominant modality and instructional preferences to formulate appropriate performance expectations for their children. Parental expectations often cause pressures to be brought to bear upon a child. Therefore it is important that expectations are determined with accurate and adequate information. Furthermore, parents will be able to make more knowledgeable choices when faced with the multitude of options currently available for gifted children in after-school, Saturday, and summer enrichment programs.

Recommendations for Further Research

Findings from the current investigation suggest a number of possibilities for further research. Certainly

the study could be replicated using different samples to determine whether the findings of this study have broader application. Alternative sample groups might include another age group of gifted students, gifted students from another region in the country, students with average or below average intellectual abilities, or students who are bilingual.

An attempt could be made in a similar study to control for the number of class hours students are engaged in self-directed independent study activities. Similar program prototypes could be required in selection of the schools to be included in the sample.

Since locus of control is widely recognized as a strong intervening variable between a child's potential and actual performance, this variable could be investigated in relation to self-directed independent study with a design similar to the current study.

Exploratory studies suggesting variables related to success or failure in self-directed independent study, such as cognitive style, modality, and locus of control should be followed up with aptitude-treatment-interaction research. This research would allow investigators to determine specifically whether students possessing a particular characteristic actually achieve different levels of success with self-directed and teacher-directed methods.

Longitudinal research on changes in instructional preferences and the factors affecting such change could help

educators determine the developmental stages at which children prefer certain instructional techniques. Such research could reveal at what stage it would be most appropriate to introduce the self-directed independent study approach. It is possible that students experiencing difficulty with self-directed independent study are simply not ready developmentally to accomplish self-directed tasks successfully.

Since the correlations of cognitive style and modality with instructional preferences revealed unexpected results, it is recommended that this study be replicated utilizing a more comprehensive alternative measure of preferred modes of instruction such as the Learning Style Inventory by Dunn and Dunn. Replication of the study using a different instrument for assessing modality characteristics is also recommended considering limitations of the Swassing-Barbe Modality Index.

Specifically, the authors of the SBMI assumed that if material is presented in a certain mode, it will be learned through the use of that modality. A number of studies suggest that mode of presentation does not necessarily determine the modality by which material is learned. Rather the mental image is determined by the ideational type of the individual. For example, a learner with vision as his/her dominant modality may still visualize material to be learned despite the fact that it is presented auditorily. The researcher's observation of students to whom she administered the Swassing-Barbe Modality Index supports this contention.

Several students appeared to devise strategies for remembering the stimulus sequences that were unrelated to the modality in which the sequences were presented.

In addition, the memory capabilities of gifted students appeared to enable them to remember long sequences repeated on subsequent subtests of the SBMI. Although the authors of the instrument contend that no learning effect takes place as a result of using identical sequences of shapes for each subtest, several students told me they were able to remember a sequence because it had appeared on a previous subtest.

Additional studies of intellectually gifted students who possess characteristics that are not commonly associated with giftedness such as field dependence and auditory modality dominance should be conducted. Attempts should be made within these studies to determine whether certain characteristics tend to cluster or occur together. This knowledge would be valuable in planning differentiated programs for subgroups within the gifted population.

APPENDICES

APPENDIX A

CORRESPONDENCE

April 21, 1983

Dear_____:

Thank you for agreeing to participate in my research study. Hopefully the study will yield significant findings about the relationship of cognitive style to self-directed learning ability which will be of value to education of the gifted in planning appropriate educational programs for their students. Once the data collection is complete, I will provide you with information about the self-directed learning ability, cognitive style, dominant modality, and instructional preferences of each of your participating students. After the results are analyzed, I will share the conclusions of the study with you. Please review the enclosed materials and follow the instructions carefully.

Sincerely,

GENERAL PROCEDURES AND INSTRUCTIONS

1. Enclosed in this packet you will find the following materials:
   - Teacher Categorization Forms - Directions (pg. 1) and List of Student Names (pg. 2)
   - Directions for Administration of the Self-Directed Learning Readiness Scale

- Twenty copies of the Self-Directed Learning Readiness Scale booklets and answer sheets

2. Please read the Directions for the Teacher Categorization Form (pg. 1) and complete the List of Student Names (pg. 2).
3. Read the Directions for Administration of the Self-Directed Learning Readiness Scale and administer the instrument to the 20 students whose names you listed.
4. Send the completed List of Student Names and the completed Self-Directed Learning Readiness Scale answer sheets and test booklets back to me by May 6. My address is: Fay Carney, 750 Sherwood Road, Williamston, Michigan 48895. (I will reimburse you for the postage when I see you in May).
5. I am planning to visit your school on _____ for the purpose of administering two tests to approximately ten of the students you selected.
   a. One of these tests can be administered to the group and takes approximately 15 minutes.
   b. The other test must be administered individually and takes approximately 10-15 minutes.
6. On _____ I will give you copies of a Learning Style Inventory which you should administer to the participating students sometime before the end of the school year. It takes approximately 30 minutes to complete.

7. I would greatly appreciate it if you would send me a map directing me to your school which includes a major route that I could take from the Lansing area. Please enclose it in the envelope when you send back the Student List and SDLRS booklets and answer sheets.
8. Thank you very much for your cooperation. Call me collect at (517) 655-3849 if you need any questions answered. This is my home phone number and it is best to call in the evening.

APPENDIX B

TEACHER CATEGORIZATION FORM - DIRECTIONS

SELF-DIRECTED STUDENTS

Please identify ten students whom you have observed as being characteristically very self-directed in pursuing independent studies. These students should exhibit a majority of the following behaviors:

1. ability to self-select a topic of interest
2. skill in locating a variety of resources pertinent to the topic
3. ability to determine activities appropriate to the study with a minimum of teacher guidance
4. sufficient task commitment which usually results in a completed product
5. satisfaction in working alone

*List the names of these students on the attached sheet (pg. 2).

NON-SELF-DIRECTED STUDENTS

Please identify ten students whom you have observed as characteristically experiencing difficulty in being self-directed in pursuing independent studies. These students should exhibit a majority of the following behaviors:

1. difficulty in choosing a topic of interest, e.g. frequently changes the topic of study

2. consistent need for assistance in locating resources appropriate to the topic of study
3. consistent need for teacher guidance in determining activities appropriate to the study
4. insufficient task commitment, leading to dropping of study before product completion
5. preference for working with others

*List the names of these students on the attached sheet (pg. 2).

APPENDIX C

TEACHER CATEGORIZATION FORM -

LIST OF STUDENT NAMES

NAMES OF SELF-DIRECTED STUDENTS

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

NAMES OF NON-SELF-DIRECTED STUDENTS

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Name of School District _____

APPENDIX D

DIRECTIONS FOR ADMINISTERING THE
SELF-DIRECTED LEARNING READINESS SCALE

1. This test may be administered at your convenience any time before May 6. It takes approximately 30 minutes to complete, but students should be given as much time as they need to finish.
2. Distribute a copy of the test booklet and an answer sheet to each of the 20 students you identified on the Categorization Form.
3. Instruct the students to fill in the following information in the boxes and circles on the left side of the answer sheet. (They should not fill in any information on the test booklet itself.)
   a. Name - first and last
   b. Sex
   c. Grade
   d. No birth date is necessary
   e. Identification No. - 000000000 - This is the code I'm using for your school district.
   f. Special Code - 00000_ - the last digit should be the number of years the student has been in the gifted program, e.g. 1, 2, 3, etc.
4. The students should use a No. 2 pencil and mark their answers only on the answer sheet. (No answers should be

marked in the booklet.) The ABCDE circles on the answer sheet correspond to the five ordered responses in the test booklet.

5. Do not inform the students of the name or exact purpose of the scale. This is necessary to avoid possible response bias. Use the description of the instrument that is printed in the instructions on the test booklet.
6. Briefly review the same item to insure that they understand how the answers are to be marked.
7. Answering vocabulary questions or helping them read the items will not affect the validity of the scale.
8. Be sure that they understand the importance of being truthful in responding to a research study. Remind them they are not being graded in any way.

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