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A Study of Cognitive Variables Associated with Achievement Among a Gifted Population

Sharon R. Coty-Kieta

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A STUDY OF THE COGNITIVE VARIABLES ASSOCIATED WITH ACHIEVEMENT AMONG A GIFTED POPULATION

A Thesis
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Sharon R. Coty-Kieta
June, 1986
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A STUDY OF THE COGNITIVE VARIABLES
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A STUDY OF THE COGNITIVE VARIABLES ASSOCIATED WITH
ACHIEVEMENT AMONG A GIFTED POPULATION

Sharon R. Coty-Kieta  June, 1986  74 pages

Directed by:  D. L. Redfield, C. R. Martray, and L. Alexander

Department of Psychology  Western Kentucky University

The purpose of this study was to investigate the relationships between specific cognitive variables and classroom achievement among a gifted population. The participants included 389 students in grades five through eight enrolled in the Gifted and Talented Education Program in a Southcentral Kentucky School district. An experimenter-developed teacher rating scale was used to document classroom achievement, the criterion variable. The predictor variables were (a) locus of control, as measured by the Intellectual Achievement Responsibility Scale; (b) the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts, as measured by the Prose Quantification System; (c) knowledge of reading, mathematics, and language arts, as measured by the Comprehensive Tests of Basic Skills; and (d) academic aptitude, as measured by the Test of Cognitive Skills. The first hypothesis stated that these cognitive variables were related to classroom achievement among the gifted. The second hypothesis stated that these relationships would rank from strongest to weakest in the following order: (a) knowledge of reading, mathematics, and language arts; (b) locus of control; (c) the ability to
clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; and (d) academic aptitude. Stepwise Multiple Regression procedures identified knowledge of mathematics as the single best predictor model of classroom achievement ($r = .29$, $p < .001$). Zero Order Correlation coefficients were computed and indicated that the following variables were significantly related to classroom achievement:

- (a) knowledge of reading ($r = .15$, $p < .05$);
- (b) knowledge of mathematics ($r = .28$, $p < .05$); and
- (c) knowledge of language arts ($r = .23$, $p < .05$). According to the Zero Order Correlation coefficients the first hypothesis was only supported in part. The lack of significant relationships may have been due to (a) limitations of the instruments used; (b) the questionable validity of teacher-assigned grades used to measure classroom achievement; (c) nonlinear bivariate distributions of the data; (d) the restriction in range evidenced by classroom achievement, PQS scores, and TCS scores. The second hypothesis was also only supported in part. As predicted the strongest relationship was between classroom achievement and knowledge of reading ($r = .15$, $p < .05$), mathematics ($r = .28$, $p < .05$), and language arts ($r = .23$, $p < .05$). The next strongest relationship was between academic aptitude and classroom achievement ($r = .10$, $p > .05$), which was predicted to be ranked last. The weakest relationships were between locus of control and classroom achievement ($r = .07$, $p > .05$); and the ability to express
thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts and classroom achievement \( (r = .07, \ p > .05) \). The failure of the last three variables to be ranked in the predicted order was likely due to chance factors, since all of these relationships were nonsignificant. It was recommended that future research (a) utilize instruments that were standardized and commonly used with the gifted; (b) increase the variability of the scores of the cognitive measures and classroom grades by using more grade levels and identified achievers and underachievers; (c) examine the validity of teacher-assigned grades; and (d) explore in depth the relationship between academic aptitude and classroom achievement to develop more reliable and valid predictors of giftedness and classroom achievement.
CHAPTER I
Introduction

The gifted child has been commonly misunderstood: the misunderstanding becomes particularly compounded when that child underachieves in the classroom. Parents and teachers who are responsible for guiding the learning of underachieving gifted children often refer to them as "lazy," "rebellious," and "stubborn" (Whitmore, 1980). These perceptions promote misunderstanding and hinder investigations of the factors related to achievement among the intellectually gifted.

The literature includes descriptions of research on specific environmental (e.g., Gurman, 1970), personological (e.g., Dean, 1977), and cognitive (e.g., Kanoy, Johnson, & Kanoy, 1980) variables which may be related to achievement among the gifted. Presently, research focuses on environmental and personological variables, with less emphasis on cognitive variables.

The primary focus of research on environmental variables has been the home environment, more specifically parents and family, as it contributes to achievement among the gifted (e.g., Gurman, 1970; O'Shea, 1970). A recent development in the environmental literature has been the effects of school (i.e., teachers, curricula, and peers) on
achievement among the gifted. For example, Whitmore (1980) investigated the effect of teacher behaviors on the achievement of gifted students and concluded that excessive criticism was related to low levels of achievement.

Personological variables, as they have related to achievement among the gifted, have also been reported in the literature. Variables investigated have included self-concept and persistence. Shaw and Alves (1963) and Gallagher and Rogge (1966) examined the relationship between self-concept and achievement among gifted students. They concluded that a positive relationship existed between self-concept and achievement. Terman (1954) and O'Shea (1970) investigated the relationship between persistence and achievement. The results of Terman's and O'Shea's studies indicated that persistence was related to achievement among the gifted.

Compared to the number of studies investigating environmental and personological variables, there have been fewer studies investigating the influence of cognitive variables on achievement among the gifted. Cognitive variables that have been explored in the research have included locus of control and basic academic skills attainment. Kanoy et al. (1980) examined the relationship between locus of control and achievement among the gifted. The findings of Kanoy's et al. study indicated a positive relationship between internal locus of control and achievement among gifted students. Whitmore (1980)
investigated the effects of knowledge of basic academic skills (i.e., reading, mathematics, and language arts) on achievement among the gifted. Whitmore's findings indicated that deficits in reading, mathematics, and language arts were related to low levels of achievement among gifted students. Research into cognitive variables has been strongly suggested by Whitmore and other researchers in the field of gifted achievement.

Those studies focusing on environmental and personological variables have contributed to a general understanding of certain gifted populations with regard to achievement. However, without an understanding of the cognitive variables related to achievement, it can be argued that little meaningful and useful information for remediation and other types of interventions has been gained.

In addition, many of those studies which have addressed the issue of achievement among gifted children have relied upon standardized measures of achievement or aptitude (e.g., Durr & Collier, 1960). However, many gifted children who are relatively poor classroom performers actually score well on achievement and aptitude tests (Whitmore, 1980). Hence, there appears to be a need to differentiate between classroom achievement and performance on standardized achievement and aptitude tests when addressing the issue of achievement among the gifted.
The purpose of the present study was to identify cognitive factors related to classroom achievement among intellectually gifted students. Classroom achievement was measured by subjective, nonstandardized teacher-assigned grades. It was hypothesized that cognitive factors related to classroom achievement would include, but not be limited to: (a) locus of control as it was dependent upon the student's thinking with regard to the causes for various achievement outcomes; (b) the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; (c) knowledge of reading, mathematics, and language arts; and (d) academic aptitude. It was further hypothesized that the relationships between classroom achievement and the cognitive variables could be rank ordered from strongest to weakest in the following order: (a) knowledge of reading, mathematics, and language arts; (b) locus of control; (c) the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; and (d) academic aptitude.
CHAPTER II
Review of the Literature

The purpose of the present study was to investigate the relationships between classroom achievement and specific cognitive variables. Before examining these relationships, it was necessary to have an understanding of giftedness; underachievement; commonly used teacher measures of classroom achievement; and environmental, personological, and specific cognitive variables as they related to achievement among the gifted.

Definition of Giftedness

The literature has provided varied and numerous definitions of giftedness. When defining giftedness the literature has included the intellectually gifted, who obtain relatively high scores on intelligence tests; the creatively talented; and those individuals possessing any one of a wide array of talents, such as the psychomotor gifted (Tannebaum, 1983). The present study was directed toward the intellectually gifted.

There have been a wide variety of definitions for intellectual giftedness. For example, Whitmore (1980, p. 61) defined intellectual giftedness as an "exceptional potential for learning and a superior capacity to assimilate, manipulate, and utilize abstract concepts and
factual information." For the purpose of the present study, intellectual giftedness was defined as obtaining a Cognitive Skills Index (CSI) of 125 or higher on the Test of Cognitive Skills (CTB/McGraw-Hill, pub., 1982), or a score of 125 or higher on a standardized test of intelligence. In addition to this basic criterion, the students also met at least three of the following criteria: (a) a total score at the 95th percentile or above on the Comprehensive Tests of Basic Skills (CTB/McGraw-Hill, pub., 1982); (b) a score at the eighth stanine or above on the Reading, Language Arts, and/or Mathematics subscales of the Comprehensive Tests of Basic Skills (CTBS); (c) teacher nomination or recommendation; (d) self-nomination; (e) parent nomination; and/or (f) nomination by a psychologist or other professional qualified to make a recommendation.

**Definition of Underachievement**

A review of the literature has produced a number of definitions of underachievement. The underlying theme of almost all the definitions was that a discrepancy existed between potential and actual performance (Dowdall & Colangelo, 1982). This discrepancy has been viewed as the difference between (a) two standardized measures; (b) a standardized measure and performance; or (c) two nonstandardized measures. It was not necessary to operationally define underachievement in the present study because the gifted students were not differentiated on the basis of achievement.
Teacher Measures of Classroom Achievement

Teachers have used numerous objective and subjective measures to quantify classroom achievement. Objective measures of classroom achievement include inventories; checklists; and standardized tests, such as the Woodcock-Johnson Psycho-Educational Battery—Part II (Woodcock & Johnson, 1977). For the most part, subjective measures of classroom achievement are teacher-assigned grades for academic subjects. For the purpose of the present study, classroom achievement was measured by an experimenter-designed teacher rating scale (Coty-Kieta, Redfield, Martray, & Beck, 1984). This scale required the teachers of each gifted student to list end-of-semester letter grades in reading, language arts, and mathematics. A copy of the teacher rating scale (TRS) form appears in Appendix A.

Variables Related to Achievement

After reviewing the literature it was apparent that studies investigating the variables associated with achievement focused on different populations. Some studies (e.g., Messer, 1972) examined the relationship between variables and achievement among the general or non-gifted student population. These studies were useful because of the possible implications of their findings for the gifted. Other studies (e.g., Austin & Draper, 1980) focused on the gifted and provided direct information on the factors affecting their achievement. Some studies
(e.g., Combs, 1964; Kanoy et al., 1980) identified gifted students as achievers or underachievers and compared the two groups to determine what variables differentiated between them. Other studies (e.g., Whitmore, 1980) examined only populations of gifted underachievers and explored those variables related to underachievement. The variables associated with achievement among gifted students that have been reported in the literature fall into three categories: (a) environmental, (b) personological, and (c) cognitive. Each of the populations and variables examined provided indirect or direct information concerning achievement among the gifted. However, some of the studies reviewed were considered to have methodological problems affecting the applicability of the findings. These studies were noted accordingly.

Environmental Variables

The influence of both home and school environments upon achievement among the gifted has been investigated. The home environment of gifted students has been reported in the literature more frequently than the school environment as it affects achievement. More specifically, either the parents or the family as a whole have been the focuses of studies investigating the possible relationship between home variables and achievement among the gifted.

Home. With regard to parental influence among the gifted, Gowan (1955) and Fliegler (1957), on the basis of literature reviews, concluded that underachieving gifted
children had non-supportive, indifferent, and rejecting parents. McGilluray (1964), in a study comparing gifted achievers and gifted underachievers, concluded that parents of high achievers tended to display more interest in education and in their children than did parents of underachievers. After reviewing the relevant literature, Gallagher and Rogge (1966) and Zilli (1971) concluded that parents of gifted underachievers showed little interest in education and in their child. Gurman (1970) also investigated the role of parents in underachievement among average and gifted males. The results of Gurman's study indicated that underachieving average and gifted males viewed their parents as rejecting, indifferent, and inconsistent. The generalizability of Gurman's study to the gifted population was limited because only 13 males were surveyed, and the number of gifted males in the study was not given. In addition, the data collected were statements made by the student and their parents in a counseling situation. These statements were subjectively analyzed by counselors and the project director and interrater reliability was not established between/among the counselors and project director.

The family as a unit, compared to parents only, has also been investigated with regard to achievement among the gifted. The literature often attributed low levels of achievement among the gifted to family problems (e.g., Musselman, 1942). The Philadelphia Suburban School Study
Council (1965) concluded on the basis of a literature review that broken or disturbed homes and a lack of strong family ties were related to underachievement among the gifted. In a study investigating the differences between bright, male high achievers and low achievers, O'Shea (1970) found that bright low achievers had significantly poorer family relationships than did high achievers. Laycock (1979) examined the literature on families of gifted low producers and also concluded that these students had family problems that interfered with school achievement.

In summary, the literature on achievement among the gifted has commonly portrayed the underachieving gifted child as having indifferent and neglectful parents, and/or family problems. However, the studies that have focused on the parents and/or the family as a whole have provided few solutions concerning the phenomenon of gifted underachievers.

**School.** The effects of the school environment on achievement have also been investigated (Whitmore, 1980). The specific variables that make up the school environment are teachers, curriculum, and peers.

Much of the research focusing on the school environment has looked at the effects of the teacher on achievement. Based on the motivational literature and his own case studies, Torrance (1965) concluded that external pressure and evaluation by the teacher only temporarily motivates the student to achieve. External pressures
(e.g., teacher-assigned grades) were unable to sustain motivation because they did not supply the inner stimulation or intrinsic motivation necessary for continued motivated learning. It was the unsubstantiated opinion of Rosenberg and Ehrgott (1973) that external pressures and reinforcements used to motivate gifted students led to boredom and inhibited achievement. It was also their opinion that the gifted student's personal thoughts and inner stimulation were critical motivators. Therefore, stress on external evaluation used to motivate gifted students seemed to foster underachievement rather than achievement.

Teacher behaviors may also affect achievement among the gifted. Gifted underachievers described "bad" teachers as those who were sarcastic and overly critical (Fine, 1967). Whitmore (1980) taught a class of 27 second and third grade gifted underachievers for two years in Cupertino, California. Using a case study approach, Whitmore investigated the variables associated with underachievement among these gifted students. She provided detailed case study information on four of the students and less detailed case study information on six of the other students. However, Whitmore based her conclusions on all of the 27 gifted underachievers. One of Whitmore's findings was that the gifted student's achievement may be affected by the student's perception of teacher disregard and disrespect. Dorhout (1983) surveyed gifted students to determine the
behaviors they preferred in teachers. Dorhout found that positive personal attributes, such as a sense of humor, were valued most highly by gifted students. Dorhout believed that gifted students would learn more when their teacher displayed the preferred behaviors. Conversely, it may be concluded that teachers displaying negative personal attributes, such as sarcasm and excessive criticism, would adversely affect the gifted students' academic achievement. In summary, a review of the literature has supported the idea that the classroom teacher may have a detrimental effect on the gifted student's classroom achievement when the teacher is sarcastic, overcritical, and disrespectful.

Another environmental factor that has been explored and found to be related to achievement among the gifted was the curriculum in which the student matriculates. A "dull" and "meager" curriculum that is not challenging promotes underachievement (Strang, 1951). Hildreth (1966) also concluded, after reviewing the literature, that a lack of challenge in the curriculum and instruction contributed to underachievement. Findings from Whitmore's (1980) study indicated that underachievement was fostered by a curriculum that was designed for "average ability" and was not stimulating, challenging, or relevant to the gifted child. These findings by Whitmore have been consistently supported by past (e.g., Hildreth, 1966) and present (e.g., Khatena, 1982) research. It may be concluded that gifted potential
might be lost to underachievement if proper educational experiences are not provided (Khatena, 1982).

The effect of peers on achievement has also been reported in the literature. Torrance (1970a) believed that a frequent problem of gifted students was loneliness and social isolation which frequently resulted in underachievement. Based on information gained in interviews with gifted underachievers, Whitmore (1980) concluded that gifted children's perceptions that their non-gifted peers do not respect them may lead them to believe they are resented by their non-gifted peers. In a review of literature regarding peer relationships of the academically gifted, Austin and Draper (1981) concluded that intellectually gifted adolescents, particularly girls, lose status with their non-gifted peers as they progress through school. In an attempt to gain status and social acceptance, students may underachieve in the classroom so they will not be labeled a "brain" and be ostracized by their non-gifted peers. It may be concluded that the literature provided evidence for the negative effects of non-gifted peers on achievement.

In summary, the review of the environmental variables affecting achievement indicated that environment has a strong impact on the achievement of gifted students. For example, unfavorable environmental factors often contributed to underachievement among gifted students. However, studies focusing on environmental variables do not provide
information concerning the individual characteristics and individual differences that result in achievement or underachievement.

**Personological Variables**

Research investigating the variables associated with achievement among the gifted have focused more on personological variables than on environmental and cognitive variables. The researchers in the area of personological variables looked at how these variables appeared to differentiate achievers from underachievers. The personological variables investigated have included self-concept and persistence.

**Self-concept.** In his comprehensive review of the literature pertaining to underachievement among the gifted, Taylor (1964) concluded that underachievers, compared to achievers, exhibit a higher anxiety level, and lower self-esteem and self-value. Several studies (e.g., Bledsoe & Garrison, 1962; Combs, 1964; Durr & Collier, 1960) showed that gifted underachievers compared to gifted achievers, felt less adequate and had lower senses of personal worth. Recent studies comparing underachieving to achieving gifted students on various self-concept measures, have demonstrated significantly lower scores for the underachievers. (e.g., Kanoy et al., 1980; Saurenman & Michael, 1980). According to Whitmore (1980), research findings have indicated that gifted underachievers have lower self-concepts and lower self-esteem than do gifted achievers. Findings from the
Whitmore study indicated that gifted underachievers were perfectionists, making them feel discontented with any performance short of meeting their personal goals. Whitmore described this perfectionism as a source of "crippling fear" of failure and chronic dissatisfaction that ultimately resulted in underachievement.

**Persistence.** Persistence, another personological variable, has been found to positively correlate with achievement among gifted students (Burks, 1980). Persistence may be defined as determination, effort, and willingness to engage in hard work (Franks & Dolan, 1982). Terman, in a follow-up study reported in 1954, compared the 150 most successful and 150 least successful men among his gifted subjects in an attempt to identify nonintellectual factors that were related to life success. Success was defined as the extent to which a subject made use of his superior intellectual ability. His comparison of the two groups indicated that the most successful group was more persistent in the accomplishment of ends than the least successful group. Renzulli (1978) examined the literature on factors that characterized highly productive people and also concluded that task commitment or persistence characterized highly productive people. Creel (1983) surveyed the literature on persistence and concluded that persistence was necessary for the successful realization of achievement among gifted students.
"The descriptive portrait of the gifted underachiever is clear but how he/she got that way or what can be done about it is not" (Gallagher & Rogge, 1966, p. 53). The gifted underachiever may be described as having (a) low self-concept and self-esteem; (b) a perfectionistic attitude; and (c) limited persistence and task commitment. The personality research comparing gifted underachievers and gifted achievers has provided a description of characteristics associated with underachievement. A comparison to the previous review of environmental variables suggested that some of the underachiever's personality characteristics may be associated with his or her environment. However, restructuring a student's entire environment, or changing his or her personality would appear to be a difficult, if not an impossible task. A less daunting task appeared to be the exploration of cognitive variables associated with achievement among the gifted. 

**Cognitive Variables**

Investigations of cognitive variables that may be related to achievement have proven to be few. However, some recent studies (e.g., Goetz & Dweck, 1980; Kanoy et al., 1980) are indicative of a shift from the investigation of personality to an investigation of cognitive variables. This shift may be related to (a) the continuing popularity of Piaget's developmental theory; (b) the recognition that previous research has provided few solutions to underachievement among the gifted; and/or (c) the hypothesis
that cognitive development is the prerequisite determinant of other aspects of human development, including personality development. The cognitive variables of interest in the present study were: (a) locus of control; (b) the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; (c) knowledge of reading, mathematics, and language arts; and (d) academic aptitude.

**Locus of Control.** Locus of control was commonly considered to be a personality variable in the literature (e.g., Kanoy et al., 1980). However, the present study defined locus of control as a cognitive variable because it was dependent upon the student's thinking with regard to the causes for various outcomes, including achievement. Locus of control may be characterized as internal or external. Internal locus of control indicated that the student believed he or she was in control or responsible for events in his or her life. External locus of control indicated that the student believed that outside forces were responsible for the events occurring in his or her life. Messer (1972) explored the relationship between locus of control (internal versus external), as measured by the Intellectual Achievement Responsibility (IAR) Scale, and academic achievement among a general population of students. The findings indicated a positive significant relationship between internal locus of control and academic achievement. Kanoy et al. (1980) examined the relationship...
between academic achievement and locus of control, as measured by the IAR scale, among a group of academically bright elementary students. The sample was divided into groups of achievers and underachievers. The results indicated that achievers had higher internal locus of control scores than did underachievers.

Hiroto (1974) investigated learned helplessness in internal-external subjects. Three groups equally divided between internals and externals, received different treatments of an aversive tone, the independent variable. The aversive tone was operationally defined as 3000 Hz. The first group could neither escape nor avoid the aversive tone; the second group could escape the aversive tone; and the third group was not exposed to the treatment. Learned helplessness, the dependent variable, was measured by the number of avoidance responses and the number of failures to escape the aversive tone. The results indicated that externals, regardless of the treatment, were significantly slower to escape or avoid the aversive tone than were the internals. Therefore, it was concluded that externals were more helpless than the internals.

Diener and Dweck (1980) used the IAR scale to identify and compare non-gifted helpless children and non-gifted mastery oriented children. Helpless children were defined as those who attributed their failure to a lack of ability and viewed failure as insurmountable. Mastery-oriented children were defined as those who attributed failure to a
lack of effort and viewed failure as surmountable. Diener and Dweck compared the two groups' perceptions of failure and success on two-choice discrimination problems. Eight of the problems were solvable, four of the problems were unsolvable. The results indicated that helpless children underestimated the number of successes, overestimated the number of failures, did not view successes as indicative of ability, and did not expect success to continue. The behavior of these "helpless" children appeared to be similar to the "learned helplessness" behavior produced in laboratory animals by Seligman and Maier (1967). Learned helplessness in humans refers to the perception that some problems cannot be solved because of the intolerable stress associated with the effort to solve the problem. Some studies (e.g., Dweck, 1975; Dweck & Repucci, 1973; Goetz & Dweck, 1980) have provided evidence of a possible relationship between learned helplessness and (a) poor performance in achievement-related situations, and (b) lack of persistence.

Locus of control has been determined to be a cognitive variable associated with achievement among the gifted (Kanoy et al., 1980). More specifically, internal locus of control was characteristic of gifted achievers while external locus of control was characteristic of gifted underachievers. Locus of control is an important variable for consideration because studies have demonstrated that locus of control can be modified to improve achievement. For example,
Dweck (1975) examined whether retraining attributions for failure would enable non-gifted learned helpless children to deal more effectively with failure. The two retraining methods were (a) success only experiences and (b) teaching students to take responsibility for failure and attribute failure to a lack of effort. The success only treatment group continued to evidence a severe deterioration in performance after failure. However, students taught to attribute failure to a lack of effort maintained or improved their performance and increased the degree to which they accepted responsibility for their failures.

A cognitive variable that has been relatively neglected in the literature that may be related to classroom achievement among the gifted was the ability to clearly express thoughts through creative written expression. The cognitive processes behind creative written expression may be evaluated on the basis of fluency (i.e., associational and ideational), flexibility, originality, elaboration, and organization). These five creativity factors were found within Guilford's (1968) structure of intellect model. See Appendix B for the definition of these creativity factors.

Creative written expression may also be considered a verbal measure of elaboration (Steagall-Tamme, 1982). Elaboration, according to Guilford (1968) and Torrance (1970b), was only one factor which contributed to the total quality of a person's output. They defined elaboration as the ability to take what is already a fairly well-rounded
product and expand it with details. Elaboration was more broadly defined as the quality of expressive language by Steagall-Tamme. Therefore, verbal elaborations are products reflective of cognitive elaboration.

The relationship between verbal elaboration and achievement has been explored by Torrance (1974). Torrance found that high scores in verbal elaboration tasks seemed indicative of school achievement. Low verbal elaboration scores on the same tasks appeared characteristic of underachievers in school. Torrance's findings seemed to be logical because school performance is judged more heavily on verbal ability than on nonverbal ability (Ebel, 1979). Therefore, it would appear that creative written expression—a measure of elaboration, organization, fluency, flexibility, and originality—may be related to classroom achievement among the gifted.

The relationship between knowledge of basic academic skills (i.e., reading, mathematics, and language arts) and classroom achievement among the gifted has been examined. Basic skills deficiencies, to a large extent, define gifted students as underachievers (Fearn, 1982). Krouse and Krouse (1981), after reviewing the literature, concluded that academic underachievement among the intellectually gifted was a result of deficiencies in scholastic performance areas such as reading and mathematics. In Whitmore's study she found that the underachieving gifted students in her class had academic deficiencies in reading, mathematics, and
language arts. Based on existing literature, direct clinical involvement, and research with several gifted underachievers, Fine and Pitts (1980) concluded that children may develop academic skills deficiencies because they sometimes play a game called "I can do it if I want to—but I don't, so I won't." Fine and Pitts concluded that a continuing decrease in basic skills attainment was the cumulative effect of the gifted students not applying themselves. Basic skills deficiencies, then, seem to impair the ability of gifted students to perform at expected levels.

Deficiencies in basic skills—such as reading, mathematics, and language arts—have been measured and identified using various instruments in an attempt to remediate weaknesses. Fearn (1982) used the CTBS to measure basic skills achievement. Remediation of skills deficits was attempted after the skills deficits were identified. Fearn found that the gifted underachievers improved in the areas of reading, mathematics, and language arts, as measured by the CTBS, when basic skills were reviewed and retaught. Whitmore's (1980) report on her study of gifted underachievers also indicated that increased knowledge and understanding of reading, mathematics, and language arts decreased underachievement in the classroom.

The final cognitive variable of interest to the present study was academic aptitude. Academic aptitude, as measured by an intelligence or aptitude test, has commonly been used
to predict a student's achievement in the classroom. For example, college entrance exams such as the American College Test (1973) are used to select students on the basis that the tests predict academic achievement. Renzulli (1982) concluded on the basis of a review of the literature that the abilities students displayed on IQ and aptitude tests were the kinds of abilities most valued in the traditional school learning situations. Renzulli reported that research indicated that students who scored high on IQ tests were also likely to get high grades in school. However, based on the research, Renzulli concluded that IQ scores correlate only from .40 to .60 with school grades, accounting for only 16 to 36 percent of the variance in classroom achievement for all students. If IQ scores are used to predict academic achievement, it is necessary to keep in mind those other variables, such as interest and motivation, that can affect simplistic IQ-achievement relationships (Fine & Pitts, 1980).

The pitfalls of using only academic aptitude to predict classroom achievement among the intellectually gifted were reviewed by Whitmore (1980). Based on this review, Whitmore concluded that "highly gifted" students with IQs of 145 or above were more likely to underachieve than those below this IQ cutoff. Therefore, it would seem that the higher the academic potential, the more likely the gifted student will underachieve in the classroom.
In summary, cognitive variables including locus of control; the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; knowledge in reading, mathematics, and language arts; and academic aptitude have been shown to be related to classroom achievement. These cognitive variables were investigated in the present study to determine their relationship with classroom achievement among an intellectually gifted population.
CHAPTER III

Method

Participants

Participants included 389 students in grades five through eight meeting the criteria for placement in the Gifted and Talented (GAT) Education program in a Southcentral Kentucky school district. All 389 students were not administered all measures due to absences during the administration of the measures. The analyses were based on only complete data sets. Therefore, the number of cases for each analysis were not necessarily equal to 389.

At the time of the present study, consideration for placement in the GAT program required a Cognitive Skills Index (CSI) of 125 or higher on the Test of Cognitive Skills (CTB/McGraw-Hill, pub., 1982) or a score of 125 or higher on a standardized test of intelligence. Placement also required meeting at least three of the following criteria: (a) a total score at the 95th percentile or above on the Comprehensive Tests of Basic Skills (CTB/McGraw-Hill, pub., 1982); (b) a score at the eighth stanine or above on the Reading, Language Arts, and/or Mathematics subscales of the Comprehensive Tests of Basic Skills (CTBS); (c) teacher nomination or recommendation; (d) self-nomination; (e) parent nomination; and/or (f) nomination by a psychologist.
or other professional qualified to make recommendations for placement in the GAT program.

**Instrumentation**

The instruments used in this study included (a) the CTBS, (b) the Test of Cognitive Skills (TCS), (c) the Intellectual Achievement Responsibility (IAR) Scale (Crandall, Katkovsky, & Crandall, 1965), (d) the Prose Quantification System (Redfield & Martray, 1984), and (e) an experimenter-designed teacher rating scale (Coty-Kienda et al., 1984). The CTBS measures knowledge of content in reading, mathematics, and language arts. The CTBS provides standardized scale scores. The psychometric properties of the CTBS reported in the CTBS Technical Report (1984) included criterion validity and internal consistency. As a measure of criterion validity, CTBS total battery scores were correlated with TCS total scaled scores. These intercorrelations were produced from the scores of a sample representative of the United States school population who took both the TCS and the CTBS. A summary of the intercorrelations appears in Table 1.
Table 1

Intercorrelation Coefficients for the Normed Sections of the CTBS and TCS.

<table>
<thead>
<tr>
<th>CTBS &amp; TCS Levels</th>
<th>Grade</th>
<th>r</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level G-Level 2</td>
<td>5</td>
<td>.76</td>
<td>1914</td>
</tr>
<tr>
<td>Level G-Level 3</td>
<td>5</td>
<td>.74</td>
<td>1767</td>
</tr>
<tr>
<td>Level G-Level 3</td>
<td>6</td>
<td>.80</td>
<td>4127</td>
</tr>
<tr>
<td>Level H-Level 3</td>
<td>7</td>
<td>.75</td>
<td>2813</td>
</tr>
<tr>
<td>Level H-Level 4</td>
<td>7</td>
<td>.77</td>
<td>2815</td>
</tr>
<tr>
<td>Level H-Level 4</td>
<td>8</td>
<td>.82</td>
<td>5921</td>
</tr>
</tbody>
</table>

NOTE: Two levels of the TCS exist for grades 5 and 7 to allow for flexible use of the TCS with the CTBS (CTB/McGraw-Hill, personal communication, June 12, 1986).

Kuder-Richardson 20 (KR-20) reliability coefficients were computed to determine the degree of internal consistency of Total Reading, Total Language Arts, Total Mathematics, and Total Battery scores for grades five, six, seven, and eight. A summary of the KR-20 reliability coefficients appears in Table 2.
Table 2
Kuder-Richardson Reliability Coefficients for Reading, Language Arts, Mathematics, and Total CTBS Battery for Grades 5-8

<table>
<thead>
<tr>
<th>Level</th>
<th>Grade</th>
<th>Total Reading</th>
<th>Total Language Arts</th>
<th>Total Mathematics</th>
<th>Total Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level G</td>
<td>5.1</td>
<td>.97</td>
<td>.94</td>
<td>.94</td>
<td>.98</td>
</tr>
<tr>
<td>Level G</td>
<td>5.7</td>
<td>.97</td>
<td>.95</td>
<td>.95</td>
<td>.98</td>
</tr>
<tr>
<td>Level G</td>
<td>6.1</td>
<td>.97</td>
<td>.95</td>
<td>.95</td>
<td>.98</td>
</tr>
<tr>
<td>Level G</td>
<td>6.7</td>
<td>.97</td>
<td>.95</td>
<td>.95</td>
<td>.98</td>
</tr>
<tr>
<td>Level H</td>
<td>7.1</td>
<td>.96</td>
<td>.95</td>
<td>.94</td>
<td>.98</td>
</tr>
<tr>
<td>Level H</td>
<td>7.7</td>
<td>.96</td>
<td>.95</td>
<td>.95</td>
<td>.98</td>
</tr>
<tr>
<td>Level H</td>
<td>8.1</td>
<td>.97</td>
<td>.95</td>
<td>.96</td>
<td>.98</td>
</tr>
<tr>
<td>Level H</td>
<td>8.7</td>
<td>.97</td>
<td>.95</td>
<td>.96</td>
<td>.98</td>
</tr>
</tbody>
</table>

The TCS purports to measure academic aptitude. The TCS yields a Cognitive Skills Index (CSI) which is a standardized scale score with a mean of 100 and a standard deviation of 15. The psychometric properties reported in the TCS Technical Report (1983) included concurrent validity and internal consistency. As a measure of concurrent validity, CSI scores on the TCS were correlated with the IQ scores yielded by the Short Form Test of Academic Aptitude (SFTAA). To correlate scores of the TCS and SFTAA, both
tests were administered to students in grades two through twelve. A sample of approximately 10,500 students was drawn from 35 districts geographically dispersed across the United States. Generally two classes per grade were secured from each district. A summary of the intercorrelations appears in Table 3.

Table 3

Intercorrelations for TCS CSI scores and SFTAA Total IQ

<table>
<thead>
<tr>
<th>SFTAA-TCS Levels</th>
<th>Grade</th>
<th>r</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 3-Level 2</td>
<td>5</td>
<td>.72</td>
<td>539</td>
</tr>
<tr>
<td>Level 3-Level 3</td>
<td>5</td>
<td>.82</td>
<td>577</td>
</tr>
<tr>
<td>Level 3-Level 3</td>
<td>6</td>
<td>.81</td>
<td>660</td>
</tr>
<tr>
<td>Level 4-Level 3</td>
<td>7</td>
<td>.82</td>
<td>609</td>
</tr>
<tr>
<td>Level 4-Level 4</td>
<td>7</td>
<td>.83</td>
<td>763</td>
</tr>
<tr>
<td>Level 4-Level 4</td>
<td>8</td>
<td>.83</td>
<td>627</td>
</tr>
</tbody>
</table>

Concurrent validity between total scale scores on the TCS and the total battery scores on the California Achievement Tests, Form C (CAT/C) was computed. The intercorrelations were produced from scores of 11,878 students who took both the TCS and CAT/C. The sample was drawn from 77 schools in 22 districts geographically dispersed across the United States. A summary of the intercorrelations appears in Table 4.
Table 4

Intercorrelations for TCS Total Scale Score and CAT/C Total Battery

<table>
<thead>
<tr>
<th>CAT/C-TCS Levels</th>
<th>Grade</th>
<th>r</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 15-Level 2</td>
<td>5</td>
<td>.71</td>
<td>715</td>
</tr>
<tr>
<td>Level 15-Level 3</td>
<td>5</td>
<td>.67</td>
<td>673</td>
</tr>
<tr>
<td>Level 16-Level 3</td>
<td>6</td>
<td>.82</td>
<td>813</td>
</tr>
<tr>
<td>Level 17-Level 3</td>
<td>7</td>
<td>.82</td>
<td>524</td>
</tr>
<tr>
<td>Level 17-Level 4</td>
<td>7</td>
<td>.86</td>
<td>570</td>
</tr>
<tr>
<td>Level 18-Level 4</td>
<td>8</td>
<td>.82</td>
<td>752</td>
</tr>
</tbody>
</table>

The KR-20 was applied to the TCS subscales as a measure of internal consistency for grades five through eight. A summary of the KR-20 reliability coefficients appears in Table 5.
Table 5

Kuder-Richardson 20 Reliability Coefficients for the Subscales of the TCS for Grades 5-8

<table>
<thead>
<tr>
<th>Level</th>
<th>Grade</th>
<th>Verbal Sequences</th>
<th>Verbal Analogies</th>
<th>Verbal Memory</th>
<th>Verbal Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
<td>.90</td>
<td>.86</td>
<td>.84</td>
<td>.82</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>.86</td>
<td>.74</td>
<td>.84</td>
<td>.79</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>.86</td>
<td>.75</td>
<td>.84</td>
<td>.81</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>.87</td>
<td>.77</td>
<td>.85</td>
<td>.84</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>.81</td>
<td>.80</td>
<td>.84</td>
<td>.80</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>.81</td>
<td>.80</td>
<td>.86</td>
<td>.81</td>
</tr>
</tbody>
</table>

The Intellectual Achievement Responsibility (IAR) scale measures beliefs in internal versus external reinforcement responsibility in academic achievement situations. The IAR scale consists of an equal number of items that describe positive and negative achievement events. The IAR yields an I+ score, which reflects acceptance of responsibility for positive achievement experiences; a I- score, which reflects acceptance of responsibility for negative achievement experiences; and a total score, which is an overall rating of the student's internal locus of control. The psychometric properties of the IAR scale as reported by Crandall et al. (1965) included: (a) test-retest
reliability, and (b) internal consistency. Test-retest reliability over a two-month interval for students in grades 4, 4, and 5 combined was .69 (p<.001, n=47), .66 (p<.001, n=47), and .74 (p<.001, n=47) for the total, I+, and I- scales, respectively.

The internal consistency for "older" children was .60 and .60 for the I+ and I- scales, respectively, and .54 and .57 for "younger" children for the I+ and I- scales, respectively. The terms older and younger were not defined by Crandall et al. (1965) and the internal consistency of the total IAR scale was not reported.

The IAR was modified to better accommodate the participants in the present study. Some instructions were modified to improve readability. Dated words and phrases were also changed to facilitate ease of understanding. A copy of the modified and original IAR scales appear in Appendix C.

The Prose Quantification System (PQS) is an instrument designed to reflect the characteristics of thought processes which determine the quality of expressive language. The PQS provides scores for the following subscales: (a) Ideational Fluency, (b) Associational Fluency, (c) Elaboration, (d) Originality, (e) Flexibility, and (f) Organization. These six subscales are combined to produce a total score. See Appendix B for operational definitions of the subscales.

The psychometric properties of the PQS include (a) rater reliability, and (b) convergent and discriminant
validity. Holt, Callicott, Redfield, Martray, and Roenker (1983) and Redfield, Steagall-Tamme, Martray, and Roenker (1984) investigated rater reliability. These two studies have yielded average interrater agreements across five and nine raters of .80 and .81, respectively; intrarater stability coefficients ranged from .93 to .89 in the Holt et al. study, and .94 to .84 in the Redfield et al. study across eight weeks.

A Stepwise Multiple Regression analysis evaluated convergent and discriminant validity (Holt et al. 1983). The analysis suggested that the PQS and teacher ratings provided measures of a similar construct. $F(1, 278) = 120.81, p < .001$. The Carlson Analytical Scale (Carlson, 1968) for measuring the originality of children's stories and the Torrance Tests of Creative Thinking, Verbal Form A (Torrance, 1974) provided weaker predictors of teacher ratings than did the PQS, $F(1, 278) = 8.13, p < .01$ and $F(1, 278) = 2.04, n.s.,$ respectively.

The experimenter-developed teacher rating scale (TRS) was used to document classroom achievement. See Appendix A for a copy of the TRS. The TRS required the teachers of each student to list the end-of-semester grades assigned in reading, mathematics, and language arts which are areas measured by the CTBS. End-of-semester grades reported by the teachers were intermediate letter grades (e.g., A+, A, A-, etc.). A numerical value was assigned to each intermediate letter grade to quantify the grades (e.g.,
A+ = 14, A=13, A-=12, etc.). The number values assigned to the letter grades for reading, mathematics, and language arts were combined to equal classroom achievement.

The validity of teacher-assigned grades was indirectly investigated in a study conducted by Coty-Kieta et al. (1984). Examined in this study were the relationships among teacher-assigned grades, classroom conduct, and standardized achievement for a sample of gifted students. The best predictor of grades was conduct (r=.50, p < .01, n=216). The relationship between standardized achievement and classroom grades was weaker (r=.27, p > .01, n=166) than the above mentioned relationship. It was concluded from these findings that factors other than knowledge of content, as measured by an achievement test, greatly affected grade assignments for the gifted.

**Procedures**

The CTBS and TCS were administered to all students in the participating school district in March 1984. The administration date for the CTBS and TCS was determined by the schools. The actual results of the CTBS and TCS were not received by the schools until the summer of 1984.

The PQS was administered in May 1984 to students being promoted to grades six, seven, and eight; and February 1985 to current fifth graders. The PQS was administered in this fashion because the GAT program is only in operation for grades five through twelve. Those students administered the PQS in May 1984 were fifth, sixth, and seventh graders. In February 1985 the new fifth graders were administered the
PQS. The months May and February were chosen so that the students would have had the opportunity to practice written language skills.

The IAR scale was administered to all fifth, sixth, seventh, and eighth grade students in the GAT program in February 1985 so that all eligible students were administered the IAR scale at the same time. It was believed that a more stable locus of control would be established after students had been in their classrooms for a semester. Therefore, February was chosen as the month to administer the IAR scale.

The TRS was also administered in February 1985 to all teachers responsible for assigning reading, mathematics, and/or language arts grade(s) to GAT students. The TRS was administered at this time to obtain first semester grades.

The scoring procedures for the measures varied as was merited for each case. The CTBS and TCS were computer scored. The IAR and the TRS were scored by the experimenter. The PQS was scored by two trained judges and one untrained judge. A trained judge was defined as one who had read the manual, worked through ten stories with an experienced rater, and received feedback. An untrained judge was defined as one who read the manual, scored stories and then had interrater reliability computed to establish the adequacy and accuracy of his/her scoring.

Interrater reliability between the two trained judges and the untrained and trained judges was established for each subscale and the total scale by calculating Pearson
Product-Moment Correlation coefficients for the judges' ratings of ten stories. The reliability coefficients for the subscales ranged from .53 to .93, and .51 to 1.00 for the two trained judges and the untrained and trained judges, respectively. The reliability coefficient for the total scale was .81 and .88 for the two trained judges and the untrained and trained judges, respectively.

Analyses

A Stepwise Multiple Regression analysis was conducted using the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Brent, 1975) to identify the best predictor model for classroom achievement.

Zero Order Correlation coefficients were computed using the Statistical Package for the Social Sciences (Nie et al., 1975). Fourteen Pearson Product-Moment Correlation coefficients were computed, using the Statistical Package for the Social Sciences, to investigate the relationships between classroom achievement, the criterion variable, and 14 predictor variables. The predictor variables were IAR I+, IAR I-, IAR Total, CTBS Reading, CTBS Language Arts, CTBS Mathematics, TCS CSI, PQS Ideational Fluency, PQS Associational Fluency, PQS Elaboration, PQS Total Flexibility, PQS Originality, PQS Organization, and PQS Total scores. Separate scatter plots were examined for each Zero Order Correlation to determine if each bivariate distribution was linear.
Hypotheses

It was hypothesized that locus of control; the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; knowledge of reading, mathematics, and language arts; and academic aptitude were related to classroom achievement. It was further hypothesized that these relationships could be ranked from the strongest to the weakest.

The strongest relationship was hypothesized to be between classroom achievement, as measured by teacher-assigned grades, and knowledge of reading, mathematics, and language arts, as measured by the CTBS. Research indicated that knowledge and degree of mastery of basic academic skills was significantly related to classroom achievement among the gifted (e.g., Fearn, 1982; Whitmore, 1980).

The relationship between classroom achievement and locus of control, as measured by the IAR scale, was hypothesized to be the next strongest relationship. Studies indicated locus of control was related to achievement among the gifted (e.g., Kanoy et al., 1980). Specifically, internal locus of control has been associated with high levels of achievement while external locus of control was related to underachievement.

The relationship between classroom achievement and the ability to clearly express thoughts and the elaboration,
fluency, flexibility, originality, and organization of those thoughts, as measured by the PQS, was hypothesized to be the next strongest relationship. Limited research investigated this particular relationship among the intellectually gifted population. However, research conducted by Torrance (1974) indicated that verbal elaboration, that may be measured by creative written expression, was related to achievement.

The weakest relationship hypothesized was between classroom achievement and academic aptitude, as measured by the TCS. Fine and Pitts (1980) contended that the predictive ability of academic aptitude was substantially affected by other factors, such as interests and motivation.
CHAPTER IV

Results

Regression Analyses

Stepwise Multiple Regression procedures (Nie et al., 1975) were used to identify the best predictor model for classroom achievement. The Mathematics score of the CTBS was the single best predictor, accounting for the most variance in classroom achievement ($r = .29$, $p < .001$). A summary of the results appears in Table 6.

Table 6

**Stepwise Multiple Regression Procedure with Classroom Grades as the Criterion Variable.**

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>$F$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>227</td>
<td>4935.627</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>1</td>
<td>413.770</td>
<td>413.770</td>
<td>20.680</td>
<td>.001</td>
</tr>
<tr>
<td>CTBS Mathematics</td>
<td>1</td>
<td>413.770</td>
<td>413.770</td>
<td>20.680</td>
<td>.001</td>
</tr>
<tr>
<td>Residual</td>
<td>226</td>
<td>4521.857</td>
<td>20.008</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation Analyses

Using the Statistical Package for the Social Sciences (Nie et al., 1975), Pearson Product-Moment Correlation coefficients were computed to determine the relationship
between classroom achievement and each of the 14 predictor variables. Significant relationships at the $p < .05$ level were shown between classroom achievement and Reading ($r = .15$), Mathematics ($r = .28$), and Language Arts ($r = .23$) as measured by the CTBS.

Nonsignificant relationships were shown between classroom achievement and IAR I- ($r = .02$), IAR I+ ($r = .10$), total IAR ($r = .07$), CSI ($r = .10$), Ideational Fluency ($r = -.03$), Associational Fluency ($r = .03$), Elaboration ($r = .07$), Flexibility ($r = .04$), Originality ($r = .06$), Organization ($r = -.08$), and Total PQS ($r = .07$). A summary of the results appears in Table 7.

Scatter plots were examined to determine if the relationships between the 14 predictor variables and classroom achievement were linear. Scatter plots indicated that all relationships were linear with the exception of the curvilinear relationship between classroom achievement and I+ scores and the curvilinear relationship between classroom achievement and total IAR scores.
Table 7

**Pearson Product-Moment Correlation Coefficients for Classroom Achievement and Every Other Variable**

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Classroom Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAR I-</td>
<td>$r = .02, \ n = 246$</td>
</tr>
<tr>
<td>IAR I+</td>
<td>$r = .10, \ n = 246$</td>
</tr>
<tr>
<td>IAR total</td>
<td>$r = .07, \ n = 246$</td>
</tr>
<tr>
<td>CTBS Reading</td>
<td>$r = .15*, \ n = 246$</td>
</tr>
<tr>
<td>CTBS Language Arts</td>
<td>$r = .23*, \ n = 246$</td>
</tr>
<tr>
<td>CTBS Mathematics</td>
<td>$r = .28*, \ n = 246$</td>
</tr>
<tr>
<td>Cognitive Skills Index</td>
<td>$r = .10, \ n = 250$</td>
</tr>
<tr>
<td>PQS Ideational Fluency</td>
<td>$r = -.03, \ n = 253$</td>
</tr>
<tr>
<td>PQS Associational Fluency</td>
<td>$r = .03, \ n = 253$</td>
</tr>
<tr>
<td>PQS Elaboration</td>
<td>$r = .07, \ n = 253$</td>
</tr>
<tr>
<td>PQS Total Flexibility</td>
<td>$r = .04, \ n = 253$</td>
</tr>
<tr>
<td>PQS Originality</td>
<td>$r = .06, \ n = 253$</td>
</tr>
<tr>
<td>PQS Organization</td>
<td>$r = -.08, \ n = 253$</td>
</tr>
<tr>
<td>PQS Total</td>
<td>$r = .07, \ n = 253$</td>
</tr>
</tbody>
</table>

* $p < .05$
CHAPTER V
Discussion and Summary

The purpose of this study was to identify cognitive variables related to classroom achievement among intellectually gifted students. Classroom achievement was measured by the TRS, a subjective and nonstandardized instrument that combined classroom grades in reading, mathematics, and language arts to measure the students' level of achievement. It was hypothesized that the cognitive factors which were related to classroom achievement were (a) locus of control, as measured by the IAR scale; (b) the ability to clearly express thoughts and elaboration, fluency, flexibility, originality, and organization of those thoughts, as measured by the PQS; (c) knowledge of reading, mathematics, and language arts, as measured by the CTBS; and (d) academic aptitude, as measured by the TCS. It was further hypothesized that relationships between the criterion variable, classroom achievement, and the predictor variables could be rank ordered from strongest to weakest in the following order: (a) knowledge of reading, mathematics, and language arts; (b) locus of control; (c) the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; and (d) academic aptitude.
Hypothesis 1

The hypothesis that classroom achievement was related to locus of control; the ability to express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; knowledge of reading, mathematics and language arts; and academic aptitude was supported in part. Not all of the hypothesized relationships were significant according to the Zero Order Correlation procedures. The cognitive variables that exhibited a significant Zero Order relationship with classroom achievement were reading, mathematics, and language arts, as measured by the CTBS. However, Stepwise Multiple Regression procedures indicated that mathematics achievement on the CTBS was the best and only significant predictor model. These seemingly contradictory findings may have occurred because reading and language arts shared variance with mathematics. Reading and language arts did not add significantly to the prediction model computed using Stepwise Multiple Regression procedures because they shared variance with mathematics.

While significant Zero Order relationships between classroom achievement and knowledge of reading, mathematics and language arts were evidenced, knowledge of reading, mathematics, and language arts actually accounted for little of the variance in classroom achievement (i.e., two, eight, and five percent respectively). This limited amount of variance accounted for in classroom achievement may be due
to limitations of the CTBS (e.g., a possible ceiling effect with gifted students). Therefore, the practical significance of the relationships between classroom achievement and knowledge of reading, mathematics, and language arts as assessed by the CTBS may be limited. The questionable validity of teachers' grading practices may also account for the lack of a stronger relationship between classroom achievement and knowledge of basic skills, as measured by the CTBS. Variables other than knowledge of reading, mathematics, and language arts may influence teacher grading practices for gifted students. For example, classroom conduct has been found to be significantly correlated with classroom grades (Coty-Kieta et al., 1984) and may affect gifted students' grades more than their actual understanding of the content areas.

The remaining Zero Order relationships were nonsignificant. Some of these nonsignificant relationships may have been a result of nonlinear bivariate distributions of the data. The Zero Order Correlation procedure (i.e., Pearson Product-Moment Correlation) used in the present study to indicate the degree of relationship, assumed that the relationships investigated were linear. Scatter plots were examined and indicated that the bivariate distributions for locus of control (i.e., I+ and IAR total) and classroom achievement were not linear. Gifted students who scored low on the IAR I+ and IAR total had high classroom achievement, while those scoring high on the IAR I+ and IAR total also
had high classroom achievement. The distribution of the data clustered around a curve rather than around a line and, as a result, the relationships were nonsignificant.

Another possible explanation for the lack of a significant relationship between locus of control and classroom achievement may be that the IAR scale was not an appropriate instrument to measure locus of control for the intellectually gifted student. The IAR may not reliably discriminate individual differences in a homogeneous population like the gifted population, since the IAR was not standardized on a gifted population, but on a more heterogeneous population.

Another important factor influencing the size of a correlation coefficient is the nature of the group. The correlation coefficient is affected by the range of individual differences in the group. The wider the range of scores, the higher will be the correlation. The scatter plots of the distributions for expressive language skills and classroom achievement, and academic aptitude and classroom achievement illustrated restricted ranges. Due to the lack of variability of the PQS scores and classroom grades, the relationship between expressive written language skills and classroom achievement was nonsignificant.

Furthermore, expressive language skills measured by the PQS may not be emphasized or needed to succeed in the classroom at the studied grade levels. Aspects of
expressive language measured by the PQS such as elaboration, originality, organization, flexibility, associational fluency, and ideational fluency may not be emphasized or evaluated by classroom teachers at the studied grade levels. Mechanics of language--such as spelling, grammar, and punctuation--may be stressed at these grade levels, even with gifted students.

The nonsignificant relationship between academic aptitude and classroom achievement, as indicated by the Zero Order Correlation, may have been a result of a restricted range of CSI scores and classroom grades. More specifically, the CSI scores on the TCS lack variability (i.e., most CSI scores fell in the 125 to 140 range) as did the assigned classroom grades (i.e., most numerical values fell in the 31 to 42 range). The lack of significance may also be indicative of the importance of other variables (e.g., interests and motivation) affecting classroom achievement. Fine and Pitts (1980) noted that other variables can substantially affect IQ-to-achievement predictability. In addition, the TCS may not have been an adequate measure of academic aptitude for the gifted because it was not specifically standardized on a gifted population. Thus, a possible ceiling effect may restrict the range of CSI scores for the gifted.
Hypothesis 2

It was also hypothesized that the relationships, indicated by the Zero Order Correlations, between the cognitive variables and classroom achievement would rank from strongest to weakest in the following order: (a) knowledge of reading, mathematics, and language arts; (b) locus of control; (c) the ability to express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; and (d) academic aptitude. As predicted, the strongest relationship was between classroom achievement and knowledge of reading \( r = 0.15 \), mathematics \( r = 0.28 \), and language arts \( r = 0.23 \), as measured by the CTBS.

The next strongest relationship was between academic aptitude, as measured by the TCS, and classroom achievement \( r = 0.10 \), which had been predicted to be ranked last. The weakest relationships were between locus of control, as measured by the IAR scale, and classroom achievement \( r = 0.07 \) and between the ability to express thoughts, as measured by the PQS, and classroom achievement \( r = 0.07 \). The failure of the last three variables to be ranked in the predicted order is likely to be due to chance factors, since all of the relationships were found to be nonsignificant.
Implications

Future research investigating locus of control; the ability to clearly express thoughts and the elaboration, fluency, flexibility, originality, and organization of those thoughts; knowledge of reading, mathematics, and language arts; and academic aptitude as they may be related to classroom achievement should take into account the problem of the restricted ranges of these cognitive variables among a gifted population. Researchers should consider obtaining instruments that are not hindered by ceiling effects and that provide greater variability. This goal may be accomplished by selecting instruments standardized and commonly used with gifted students, such as Torrance's Test of Creative Thinking (Torrance, 1974) and the Structure of Intellect Test (Meeker & Meeker, 1975). Another method that may be used to increase the variability of the predictor variables is increasing the number of grades studied (e.g., primary and secondary grades). The emphasis on knowledge of basic skills, locus of control, expressive written language skills, and academic aptitude on classroom achievement may vary as students advance through school.

It may also be necessary to identify and include achievers and underachievers in future research to increase the heterogeneity of the group. The majority of gifted students in the present study were achieving at a "B" or higher level. There was an apparent lack of heterogeneity in grades (i.e., achievers vs. underachievers) among the
gifted students in the present study. Therefore, the inclusion of identified achievers and underachievers may be necessary when investigating variables related to classroom achievement among the gifted.

The lack of predicted significant results may also have been a result of using teacher-assigned grades as a measure of classroom achievement. Future studies may further examine the validity of teacher-assigned grades as a measure of classroom achievement for the gifted because studies (e.g., Coty-Kieta et al., 1984) have shown factors such as conduct greatly affect teacher grading practices. More objective measures of classroom achievement may be obtained by using only objective measures (e.g., standardized measures) of knowledge attainment.

Future research should also consider exploring the relationship between tests of academic aptitude and classroom achievement. Based on the findings of this study, tests of academic aptitude did not predict classroom achievement. Therefore, aptitude tests should not be used in isolation or as the primary criteria for determining giftedness. Objective measures (e.g., achievement and creativity tests) in combination with subjective measures (e.g., teacher nomination and checklists) appear to be warranted when determining giftedness.
REFERENCES


Renzulli, J. S. (1982). Dear Mr. and Mrs. Copernicus, we regret to inform you... *Gifted Child Quarterly*, 26(1), 11-14.


Appendix A
Appendix A

TEACHER RATING SCALE

GENERAL DIRECTIONS

Using the form at the bottom of the page, fill out the sections that apply to the student whose name is listed.

Grades—List the final letter grades you assigned the student in applicable conduct and subject matter areas (i.e., Math, conduct during Math, Reading, conduct during Reading, Language Arts, conduct during Language Arts).

Rank—Use the seven point scale listed below to compare your perception of this student's ability (not other students' performances) to his/her actual level of classroom achievement:

1 = Nonproductive
2 = Very low level of achievement
3 = Low level of achievement
4 = Moderate level of achievement
5 = High level of achievement
6 = Very high level of achievement
7 = Superior level of achievement

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*Note: For the purpose of this study, the only data used were subject grades. Numerical values were assigned to grades in the following manner: A+ = 14, A = 13, A- = 12, B+ = 11, B = 10, B- = 9, C+ = 8, C = 7, C- = 6, D+ = 5, D = 4, D- = 3, F+ = 2, F = 1, F = 0.
Appendix B
Appendix B

Operational Definitions for Prose Quantification System Factors

1. **Ideational Fluency** refers to the number of different uses served by the "content" or object (i.e., box, money, string, paper) of any given story starter.

2. **Associational Fluency** is defined as the number of different things done WITH, TO, or BY the object of any given story starter and/or the CONSEQUENCE of each use described under Ideational Fluency.

3. **Elaboration** refers to adjectives, adverbs, prepositional phrases, and other descriptive words/phrases and qualifiers (e.g., maybe, instead, then, at last, finally, although, later, not, n't, somewhat) not necessary for completing a thought, sentence, or basic idea.

4. **Total Flexibility** is equal to Relevant Flexibility plus Irrelevant Flexibility. Relevant Flexibility is defined as the number of basic ideas or subthemes contained within the story which are consistent with the overall theme of the story. Subthemes are indicated by changes in action, perception, or thinking on the part of the author or a character in the story. Irrelevant Flexibility is defined as the number of basic ideas or subthemes contained within the story which are inconsistent with the overall theme of the story. Subtheme changes are indicated by changes in action, perception, or thinking on the part of the author or a story character.
5. **Originality** scores consist of three components: Base Originality, Transformation, and Ending Twist. Base Originality is defined as the uniqueness of the use(s) to which the object of any given story starter is/are put. Uniqueness is determined by separating all of the stories obtained from a given large sample or population into categories according to content (box vs. money vs. string vs. paper) by context (usual setting vs. unusual setting). Then, the uses of the story starter objects are determined for each story within each of the categories. Base Originality scores are then determined on the basis of the statistical infrequency of the responses. Transformation points are added to the Base Originality score if a story describes a transformation (i.e., if an object was transformed to create another, different object). A point is added to the Base Originality score for each transformation described within a story. A Creative Twist point is added to the Base Originality score if a story has a "surprise" (i.e., unusual or unexpected) ending.

6. **Organization** is defined as the number of sentences related to the prior sentence, adjacent sentence. If a sentence is related to the prior sentence, it receives a point; if a sentence is not related to the prior sentence, it does not receive a point. The relationship between sentences is judged by asking, "Is the idea of the sentence related to the prior, adjacent sentence?" The story starter is not counted as a sentence; however, the first phrase or
sentence written by the author is evaluated for its relationship to the story starter.

7. **Total PQS Score** is equal to the sum of the scores for all subfactors.

Taken from:

Appendix C

Modified Intellectual Achievement Responsibility Scale

Directions: The following items are used to find out how certain school-related events affect different people. Each item has a question and two possible answers, lettered A and B. For each question, please choose the one answer which you more strongly believe to be true. Mark an X through the letter you choose on your answer sheet. Since these questions "get at" personal beliefs or opinions, there are no "right" or "wrong" answers.

Please answer these items carefully but do not spend too much time on any one item. Be sure to answer every item. In some cases you may find that you believe either one. When this happens, be sure to pick the answer you believe most strongly even though you may not believe it 100 percent.

Please do not mark on this questionnaire; mark only on the answer sheet provided.

1. If a teacher passes you to the next grade, would it probably be
   A. because he/she liked you, or
   B. because of the work you did?

2. When you do well on a test at school, is it more likely to be
   A. because you studied for it, or
   B. because the test was especially easy?

3. When you have trouble understanding something in school, it is usually
   A. because the teacher didn't explain it clearly, or
   B. because you didn't listen carefully?

4. When you read a story and can't remember much of it, is it usually
   A. because it wasn't well written, or
   B. because you weren't interested in it

5. Suppose your parents say you are doing well in school. Is this likely to happen
   A. because your school work is good, or
   B. because they are in a good mood?

6. Suppose you did better than usual in a subject at school. Is this likely to happen
   A. because you tried harder, or
   B. because someone helped you?
7. When you lose at a game, such as cards or checkers, does it usually happen
   A. because the other player is good at the game, or
   B. because you don't play well?

8. Suppose a person doesn't think you are very bright or clever.
   A. can you make him/her change his/her mind if you try to, or
   B. are there some people who will think you're not very bright no matter what you do?

9. If you solve a puzzle quickly, is it
   A. because it wasn't a very hard puzzle, or
   B. because you worked on it carefully?

10. If other students tell you that you are dumb, is it more likely that they say that
    A. because they are mad at you, or
    B. because what you did really wasn't very bright?

11. Suppose you study to become a teacher, scientist, or doctor and you fail. Do you think this would happen
    A. because you didn't work hard enough, or
    B. because you needed some help, and other people didn't give it to you?

12. When you learn something quickly in school, is it usually
    A. because you paid close attention, or
    B. because the teacher explained it clearly?

13. If a teacher says to you, "Your work is fine," is it
    A. something teachers usually say to encourage pupils, or
    B. because you did a good job?

14. When you find it hard to work arithmetic or math problems at school, is it
    A. because you didn't study well enough before you tried them, or
    B. because the teacher gave problems that were too hard?

15. When you forget something you heard in class, is it
    A. because the teacher didn't explain it very well, or
    B. because you didn't try very hard to remember?

16. Suppose you weren't sure about the answer to a question your teacher asked you, but your answer turned out to be right. Is it likely to happen
    A. because the teacher wasn't as particular as usual, or
    B. because you gave the best answer you could think of?

17. When you read a story and remember most of it, is it usually
    A. because you were interested in the material, or
    B. because the material was well written?
18. If your parents tell you you're acting silly or not thinking clearly, is it more likely to be
A. because of something you did, or
B. because they happen to be feeling cranky?

19. When you don't do well on a test at school, is it
A. because the test was especially hard, or
B. because you didn't study for it?

20. When you win at a game, such as cards or checkers, does it happen
A. because you play real well, or
B. because the other person doesn't play well?

21. If people think you're bright or clever, is it
A. because they happen to like you, or
B. because you usually act that way?

22. If a teacher didn't pass you, would it probably be
A. because that teacher "had it in for you," or
B. because your school work wasn't good enough?

23. Suppose you don't do as well as usual in a subject at school. Would this probably happen
A. because you weren't as careful as usual, or
B. because somebody bothered you and kept you from working?

24. If another student tells you that you are bright, is it usually
A. because you thought up a good idea, or
B. because they like you?

25. Suppose you became a famous teacher, scientist, or doctor. Do you think this would happen
A. because other people helped you when you needed it, or
B. because you worked very hard?

26. Suppose your parents say you aren't doing well in your school work. Is this likely to happen more
A. because your work isn't very good, or
B. because they are feeling cranky?

27. Suppose you are showing a friend how to play a game and he/she has trouble with it. Would that happen
A. because he/she wasn't able to understand how to play, or
B. because you couldn't explain it well?

28. When you find it easy to work arithmetic or math problems at school, is it usually
A. because the teacher gave you especially easy problems, or
B. because you studied your book well before you tried them?
29. When you remember something you heard in class, is it usually
   A. because you tried hard to remember, or
   B. because the teacher explained it well?

30. If you can't work a puzzle, is it more likely to happen
   A. because you are not especially good at working puzzles, or
   B. because the instructions weren't written clearly enough?

31. If your parents tell you that you are bright or clever, is it more likely
   A. because they are feeling good, or
   B. because of something you did?

32. Suppose you are explaining how to play a game to a friend and he/she learns quickly. Would that happen more often
   A. because you explained it well, or
   B. because he/she was able to understand it?

33. Suppose you're not sure about the answer to a question your teacher asks you and the answer you give turns out to be wrong. Is it likely to happen
   A. because the teacher was more particular than usual, or
   B. because you answered too quickly?

34. If a teacher says to you, "Try to do better," would it be
   A. because this is something teachers say to get pupils to try harder, or
   B. because your work wasn't as good as usual?

Modified from:
For Use With the Modified Version of the Intellectual Achievement Responsibility Scale

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**Answer Sheet:**

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The Original Intellectual Achievement Responsibility Scale

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6. Suppose you did better than usual in a subject at school. Is this likely to happen
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Taken from: