GIFTED TRAINING: ITS EFFECT ON ELEMENTARY CLASSROOM CURRICULUM

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DEDICATION

To Blake, Sara, and Blake, Jr. . . .

I shall always hold very dear the memories of those soft little knocks at the study door; the whispered, "Just wanted you to know we love you, Mom;" the unexpected but welcomed cookies and milk; the drawing slipped lovingly and quietly under the study door; and the two small children lying on the study floor reading . . . ever so silently. The memories of a loving husband who often had to be father, mother, cook, and chief bottle washer but still found time and energy to believe in me. I remember that it was he who wanted this for me. These memories are much more vivid and expressive to me than a Hallmark card. Their love, selfless sacrifices and support are painted across my heart forever in beautiful warm colors. How marvelously blessed I am to be loved by three such extraordinary people!

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Preface

MIZAR is a double star seen as two tiny pinpoints of light lying extremely close to each other in the handle of the Big Dipper. This double star represents the dual purpose of the gifted program in Denton, Texas: to enhance the learning of all children while expanding the learning environment of the academically able. As the distinguishing of the binary light of MIZAR requires keen vision, so the individual differences and needs of all children require keen insight (DeHart & Vaughan, 1979).

CHAPTER I

INTRODUCTION

Background of the Study

In American schools the interest in education of the gifted has waxed and waned since public schools first began. In the late 1950s and early 60s, for example, the attention given to the gifted, or at least to the academically gifted, was short lived (Gold, 1965). For the rest of the decade, during the Johnson administration, national concern with education of the disadvantaged, with civil rights, and with equality of educational opportunity resulted in a shift in school priorities (Tannenbaum, 1972). The emphasis in education swung toward developing competencies of all students, through mainstreaming coupled with individualized instruction (Lindsey, 1980).

In 1971, when the U.S. Commissioner of Education, Sidney P. Marland, Jr., conducted a national survey of gifted programs in the United States, the results revealed not only how few gifted programs there were but also how few gifted children had even been identified (Marland, 1972). Commissioner Marland found that from an estimated two million gifted children in public schools, only about four

percent were receiving appropriate education (Marland, 1972). Most of the administrators surveyed seemed unconcerned and stated that gifted education was not one of their top priorities (Marland). More than half of the principals surveyed reported there were no gifted children in their schools (Marland). Only twelve institutions of higher learning were found to be providing graduate level training programs for teachers specializing in education of the gifted (Marland, 1972).

Since 1972, with the establishment of the Office of Gifted and Talented Education within the U.S. Office of Education and the flow of federal funds into projects concerning the gifted, more courses and graduate programs for teachers have emerged (Lindsey, 1980). More in-service programs and workshops have been established to help the classroom teacher identify the gifted. New ways of grouping gifted students have been tried, often in combination with mainstreaming, such as regular class participation along with special classes (Feldhusen, 1980). New ways of accommodating gifted children without special grouping have also been explored (Lindsey, 1980). Various models of acceleration have been developed (Lindsey).

Not only has a large body of knowledge been accumulated about the characteristics and learning styles of gifted children but also about the teachers who taught them. Since the

success of any program ultimately rested with the teacher, it was encouraging to see that increased funding was going toward teacher education with more graduate programs and college courses being offered (Burch, 1977). Yet, it was discouraging that few courses seemed to be specifically designed to help the regular classroom teachers identify or meet the needs of gifted students within their classes (Lindsey, 1980). Instead, the college courses available in the area of gifted education were designed to serve teachers in special teaching arrangements for the gifted, although gifted students would spend most of their academic day or week in the regular classroom.

Many agencies besides colleges and universities offered workshops and seminars designed to "educate one another" in gifted education (Curry & Sato, 1977). The National/State Leadership Training Institute for the Gifted and Talented was but one of many agencies across the country, with nationally recognized experts in the field, who traveled from city to city to offer short-term instruction in teaching the gifted (Tannenbaum, 1979).

Renzulli (1977) indicated that, on the basis of common sense and research, gains from short-term inservice training were transitory. The short-term workshop was only a compromise.

> The one shot "dog-and-pony show" type workshop conducted by a charismatic visiting "expert" might provide us with the inspiration needed to get started, but a more organized approach is required if there is going to be any follow-through and long-term benefits. (Renzulli, 1977, pp. 186-187)

During the past decade, the federal government, public and private schools, gifted education specialists, parents, and gifted adults themselves have dealt with the special virtues and problems of the identified minority of 1.5 to 2 million elementary and secondary gifted students who urgently needed qualified teachers (Stone, 1978). Often the classroom teacher's significance has been overlooked or belittled in developing the potential of the gifted and talented student (Stone).

In the late 1960s, when the federal government mandated that children with learning disabilities were to be mainstreamed into the regular classroom setting, teachers were overwhelmed with the responsibility of teaching children with special problems. The real problem was not the added responsibilities but the feeling of inadequacy in teaching children with special learning needs (Stone, 1978).

Prior to mainstreaming of special education students, regular classroom teachers had come to believe they were "incapable" of teaching young children with special learning problems. Only those teachers with special training, special classrooms, and special materials could teach

children with learning difficulties. Even in the colleges of education, a student majored in either special education or elementary education.

Has educational history repeated itself by again not adequately preparing classroom teachers to help their gifted students develop creative potentialities within the regular classroom setting? Often classroom teachers felt inadequate in planning and orchestrating a learning environment where creative thinking was integrated into the total academic curricula.

Research and writings in the area of gifted education were replete with examples of how the gifted fare in the traditional classroom setting (Marland, 1972; Mead, 1954; Newland, 1976; Torrance, 1977; Whitemore, 1980). For the most part, the results gleaned from research were discouraging, to say the least. Yet, instead of taking the research results to the classroom teacher along with ideas, methods, and techniques for improving the situation, young gifted students were assigned to special classes, accelerated or left unaided in traditional classrooms.

On the other hand, Marjory Ward (1982) recently stated,

> Classroom teachers want to do a good job with bright students. One exposure to a consultant in gifted education can lead to what one teacher said in amazement, "I'm appalled at what I have been doing to gifted students!" Classroom teachers are teachers of the gifted

> 100% of the class time. Raising their consciousness level and raising the performance level of the gifted in the classroom means that the gifted start on a high plateau from which they can soar. (p. 35)

A search of current literature revealed that three major approaches, acceleration, ability grouping, and enrichment, were traditionally utilized in designing programs for the gifted. This research study focuses on yet another approach in program design for the gifted. A special training program was developed to train elementary classroom teachers in methods and techniques for teaching the gifted within the regular classroom (see Appendix A). Attributes of the particular training program under investigation included:

- long-term teacher training of 45 clock hours divided into three-hour sessions once a week for 15 weeks.
- adaptation of models and techniques utilized in gifted education to the elementary classroom setting.
- district-wide training at the elementary level.
- differentiated curriculum development within the training program by the teacher trainees.
- continuous on-site teacher support from two full-time coordinators.
- establishment of a district-wide resource center with material available to trained teachers, gifted students and their parents.

The program came to be known as the MIZAR program. The identified gifted students, MIZAR students, were assigned to classroom teachers with MIZAR training. The name MIZAR was chosen because Mizar is a double star in the handle of the Big Dipper. This double star represents the dual purpose of this gifted program; to enhance the learning of all children while expanding the learning environment for the academically able (DeHart & Vaughan, 1979). This research study investigates the effectiveness of training and supporting regular elementary classroom teachers in teaching gifted children within the regular classroom.

Purpose of the Study

The purpose of this research was to investigate the implementation by regular classroom teachers of creative thinking behaviors, presented in the basic MIZAR training course, into regular classroom curricula. Specifically, this research project sought to determine the extent to which elementary teachers in a North Central Texas suburban school district, who received forty-five clock hours of training for meeting the needs of young gifted students within the regular classroom setting, were able to integrate these principles into their existing curricula.

Significance of the Study

Although concern for gifted education has risen and fallen many times in American education, the current emphasis has lasted for almost a decade (Treffinger, 1982). If gifted education is to survive effectively in the 80s, what are the main issues that must be addressed?

The first issue deals with the difficult question of defining giftedness (Guilford, 1967; Renzulli, 1981; Torrance, 1963). According to Treffinger (1982), "We may be doing some of the right things for the wrong reasons, and some of the wrong things for the right reasons" (p. 4).

The second major issue that must be addressed and analyzed in gifted education deals with identification of the gifted (Renzulli, 1982). If we know that gifted and talented students exist, have unique needs and characteristics, how will they be recognized? What kind of programming should be developed for them in order to build on the students' strengths and individual talents?

The third issue to be confronted involves the problem of delivering appropriate services for gifted students (Feldhusen, 1980; Renzulli, 1981; Treffinger, 1980). This issue includes not only programs and programming, but also, who should be responsible for teaching the gifted.

It is within this third issue that this present research study finds significance. This study analyzes the effectiveness of elementary teachers, with gifted training, in providing creative thinking opportunities for gifted and talented students within the regular classroom setting.

Research Questions

The following is a list of research questions which were specifically addressed to this study.

1. Is there a significant difference in the population mean vectors for implementing the 11 creative thinking behaviors between MIZAR trained teachers and non-MIZAR trained teachers?

2. To what extent do MIZAR trained teachers incorporate the 11 creative thinking behaviors into their daily curriculum content?

3. To what extent do non-MIZAR trained teachers incorporate the 11 creative thinking behaviors into their daily curriculum content?

Hypothesis

According to Huck (1974), in a comparison study where the multivariate Hotelling's T test is applied to the data, the null hypothesis is expressed as having identical population means (p. 179). Therefore, for the purpose of this

research the null hypothesis to be tested at the .05 level of significance was:

> The MIZAR trained teachers (Group I) and the teachers without MIZAR training (Group II) have identical population mean vectors for implementing the 11 creative thinking behaviors.

Procedures for Analysis of Data

Data collected for this research study were gathered from 75 audio cassette tape recordings of thirty-minute teaching sessions by 75 teachers who volunteered to participate in the study. Group I was comprised of 44 teachers who participated in the MIZAR gifted and talented training course (see Appendix A). Group II included 31 teachers who had not received the basic MIZAR training course. The 75 tapes were randomly assigned to two blind raters who evaluated the tapes according to 11 predetermined creative thinking behavior (CTB) variables (see Appendix B).

Differences between trained and untrained teachers on the 11 creative thinking behaviors were assessed by performing a multivariate *t*-test (Hotelling's T-square) between groups on the set of 11 behaviors. Significant T-square value results indicated that the 11 behaviors would be submitted to a two-group linear discriminant function analysis to allow detection of variables contributing to significant

multivariate group differences. Lastly, each of the 11 behaviors were analyzed by independent *t*-test between the two groups, using a minimum significance level of .039 to control for an inflated experiment-wise error rate of .43.

Assumptions of the Study

The assumptions basic to this study were:

1. Since extra caution was taken to insure that participating teachers were unaware the audiotapes were to be used for a MIZAR research project, their classroom behavior was not influenced as such.

2. The thirty-minute audiotaped lesson was representative of the teacher's overall instructional mode.

3. Implementation of creative thinking strategies in instruction is a skill that can be increased with training (Torrance, 1977).

Limitation of the Study

The scope of this study was limited to the performance of North Central Texas suburban elementary teachers who chose to participate in the study and did not constitute a random sampling. Generalizations resulting from this study were limited to this population.

CHAPTER II

RATIONALE

Review of the Literature

In reviewing the literature on programming for the gifted, three prototypes of special programs and learning experiences for gifted and talented individuals emerged. Traditionally, these special programs were classified according to their administrative pattern or organization. The terms "ability grouping," "acceleration," and "enrichment" were popular ways of describing a particular method of providing for gifted youngsters within the school setting (Clark, 1979). Many variations existed within each of these categories and, indeed, many programs involved all three paradigms (Clark). These programs were similar in that each type assumed that some form of differentiated instruction was necessary for gifted students (Clark). The most successful learning experiences were built upon characteristics unique to those gifted students served within their respective programs (Clark).

Ability Grouping

When students were grouped homogeneously, a specific criterion for the program was determined and then students were selected for the program on the basis of this predetermined criterion (Tuttle, 1977). The basic assumption behind this type of programming was that gifted students benefited from interaction with gifted peers and from special instruction designed to meet their particular areas of strengths (Barbe, 1956; Ward, 1962).

Although research in support of homogeneous grouping has been inconclusive, some studies have indicated that it is successful for the gifted. Ruth Martinson (1972) concluded that those who oppose grouping have relied on opinion rather than evidence. Research and experience have shown that administrative arrangements without curricular modification for the gifted as such produced no change (Martinson). According to Martinson, any plan of gifted education management must include active and appropriate intervention in order to be successful (1972).

In 1962, Virgil Ward spoke for other advocates of homogeneous grouping when he emphatically stated:

> Practices which can be shown by reason or research to be specifically appropriate for the gifted must replace those which have developed to meet the needs of average students . . . . Ability grouping makes possible many teaching and learning experiences which cannot be

accomplished in the typical classroom. (p. 83)

The gifted student needed materials, curricula, and instruction that differed from that found in traditional classrooms (Simpson, 1961). According to Simpson, when these provisions were made, research indicated that the gifted in homogeneously grouped situations fared better than the gifted in heterogeneous classes (1961).

Acceleration

One of the more controversial approaches to education of the gifted and talented was the accelerated programming. This type of administrative organization took many forms, including early admission to formal schooling, rapid movement through grade levels, and the bypassing of grade levels in specific subject areas. In whatever way it was implemented, acceleration resulted in student completion of formal schooling in less time than was usually required.

As early as 1938, Noel Keys reported studies of the positive effect of acceleration on students who entered the University of California at the age of 16.5 or less. Keys (1942) found that those with the greatest number of school-related behavior problems were either non-accelerated bright students or accelerated students with average intelligence. He concluded that given an IQ of 140 or above, a boy should enter college at about 16 and a girl at 15½ (p. 253).

Some educators and researchers have indicated that acceleration not only helped the gifted individual, but failure to accelerate was harmful (Bish, 1960; Stanley, 1977). The work of Julian Stanley of Johns Hopkins University (Nevin, 1977) validated its importance. Since 1971, Stanley has given students who were highly gifted in mathematics an opportunity to develop their math abilities at an accelerated pace. His program not only met with success among the students, but the results, their contributions to our society, have already been evidenced (Stanley, 1974).

After reviewing the research in acceleration, Gold (1965) concluded that when standards for acceleration were maintained, the accelerated individual would most likely excel academically and not suffer any more emotional problems than non-accelerated students. He did caution, however, against acceleration without modification of the curriculum to meet the needs of gifted students' unique abilities (1965). Renzulli (1977), too, warned that without modification the instruction would probably not be geared to the gifted child but rather to the older average students within the traditional classroom.

Havighurst (1961) suggested that those who were considering an accelerated program design for their district should be aware that acceleration is valuable only for the truly gifted and would not be appropriate for average or

bright-average students. Several researchers have suggested that the best time to accelerate is during the elementary grades (Clark, 1979). This suggestion has been borne out by others who contended that timing helped avoid problems that might hinder the accelerated student (Gold, 1965).

Those who advocated acceleration believed it did benefit the gifted individual, especially if care was taken in the selection of students and program management (Stanley, 1977). Acceptable programs involved more than just rapidly moving through the grade levels (Stanley). Wheatley (1980) agreed with Stanley (1977) that the curriculum must be modified to build upon particular learning needs and styles of the gifted student for whom the accelerated program was designed.

In a recent research study analyzing early entrance to college, Frances Karnes (1982) found that there was a sizeable number of institutions, both public and private, who had established admission policies for the younger than average student, but few students seemed to be availing themselves of these opportunities. Karnes felt that one of the possible reasons for this was the fact that approximately 50% of both public and private institutions had no one directly responsible for administering such a program. She attributed the lack of special counseling services for

early admittance in approximately 64% of the responding institutions as another compounding factor (Karnes, 1982).

Karnes further stated that with increasing cost of education, coupled with the fact that many intellectually superior students would be going on to graduate or professional schools, early admission was an avenue that qualified students might pursue. This would shorten the total length of time spent in school. Their most productive years would then be spent as practitioners rather than students (Karnes, 1982).

Enrichment

Enrichment programs, on the other hand, usually involved supplementing the regular curricula with activities that provided more insight into a specific topic or area of study (Clark, 1979). Successful enrichment programs of the gifted usually required the student to move beyond the routine acquisition of knowledge to examine relationships among different areas or to delve deeply into in-depth study (Tuttle, 1978). The less effective programs failed to differentiate among students and simply required the gifted to do more of the same. Often, as Gowan (1979) argued, "An enrichment program of the gifted is just a nice phrase for a nonexistent program" (p. 88). Tuttle (1978) warned that another serious problem with some enrichment

programs was that they tended to stop below the level of the student. These programs often provided a variety of exciting activities, but often they did not follow a sequence, direction, or ultimate goal (Tuttle, 1978). Tuttle further stated, "Enrichment programs should provide a sequence of experiences which are designed to promote systematic fulfillment of the gifted student's potential" (p. 19).

Renzulli (1977) developed a sequence of enrichment activities that began with involvement on the part of all students and finally allowed the gifted students to pursue areas of individual interest in depth. His "triad" begins with exploration of many potential areas of interest (Type I activities), leads a gifted student through a series of exercises in which the student may refine skills necessary for the development of thinking and feeling processes (Type II activities), and finally challenges the gifted student to conduct an in-depth investigation in specific areas of individual interest (Type III activities). The last stage of Renzulli's Triad differentiates the work expected of the gifted from the other students as it presumes the ability of the gifted student to pursue areas of interest, draw generalizations from many different areas, and produce quality work as an expert in a specific field (1977).

Looking toward the future of education of the gifted, both common sense and the best research available indicated that one type of programming will not suffice for the varied needs of gifted and talented children. As Emily Stewart (1982) so aptly stated:

> The very nature of programming for the gifted and talented is the art of making exceptions--exceptions in the pace of work, exceptions in the manner of learning, and the amount of time for completing tasks, and even exceptions in where learning takes place. (p. 27)

Research of the last twenty years has changed the view of giftedness to a multi-dimensional set of traits that exist in varying degrees in each individual. A careful look at the work of such researchers as Thurstone (1938), Guilford (1967), Meeker and Meeker (1979) and Sternberg (1981) indicated that there were many components of human intelligence.

The gifted and talented have been recognized as a group of individuals who shared some common characteristics. Because of multiple components of intelligence (Guilford, 1967) as well as differences in each person's environment (Kaufman, 1979; McClelland, 1973), the expression of these common characteristics is quite varied. Therefore, it should be recognized that "ability grouping," "acceleration," and "enrichment," alone or in combination, do not constitute an adequate program for the gifted. They are merely administrative procedures which allow and facilitate the

development of known characteristics of gifted students (Clark, 1979).

Gifted educators can no longer cling to the myth that the program must have one or more of the following attributes: a "gifted teacher," a resource room, a specific time when the program is offered, and a specific group of children known as "the gifted" (Callahan, 1982). Callahan argued that:

> This interpretation is in reality short-changing the gifted child . . . . Having a gifted teacher who works in a resource room using special materials for some specified period of time limits the potential for total curriculum planning for the gifted child; it allows the regular classroom teacher to assume that the "giftedness" of the child is "taken care of" in the resource room, and allows us to let children with special learning needs who have not yet been identified for the special program to vegetate while they wait. (p.17)

Rather than having a "PROGRAM," Treffinger (1982) said program designers should be moving toward a view of gifted education as the design and orchestration of many options and alternatives, varying in kind and degree and duration, for many different students. Gifted students need a richer, more flexible blending of services and activities, represented by Renzulli's (1981) "revolving door" concept, Feldhusen's (1982) "shopping center" metaphor, Stanley's (1980) rich variety of alternatives or "smorgasbord" of opportunities, or Treffinger's (1981) Individualized Programming Planning Model (p. 5). Educators of the gifted

must also accept the fact and meet the challenge that the regular educational program has, and will continue to have, considerable impact upon the life and learning of the gifted student (Ward, 1982). Therefore, gifted programming must be woven into the fabric of the total school program, not stitched on as if patching an old pair of jeans (Treffinger, 1980).

If efforts in education of the gifted stemmed from trying to compensate for inadequate classrooms, Marjory Ward (1982) warned that this would be setting up insupportable contrasts and deepening underlying hostilities toward the gifted. If, however, educators broaden their sights to apply the principles of gifted education to the total environment, it would relieve the pressure on the gifted to make the difficult transition from unrelieved boredom into all-too-brief challenge (Ward, 1982, p. 35).

Is it possible to tackle the total learning climate and thus improve the quality of the gifted program? A North Central Texas suburban school district handed this very challenge to its gifted program. Through what the Board of Trustees called the "ripple effect," the MIZAR gifted program has had a positive affect on the total learning climate. The major ingredients of the "total impact" or "blending" approach consisted of: (a) extensive and ongoing teacher training, involving classroom teachers in the program in

every possible way, (b) providing consistent support and leadership through two full time gifted specialists, and (c) supportive flexibility in the gifted programming. Most of all, the significant factor has been to develop a sense of total faculty "ownership" of the gifted program. In 1978, the MIZAR program advocated that if classroom teachers were encouraged to actively participate in the program, they would eventually come to regard efforts in gifted education as part of their responsibility as members of a complex instructional team. There was no choice as to whether or not to allow gifted and talented students into the mainstream classrooms of American education. They were already there, and the real concern was that their needs be met where they were and on a daily basis (Treffinger, 1982).

In the MIZAR program, as Treffinger (1982) and others have suggested, there has been an all out effort to provide programming which leads to a wide range of services that were considered valuable by the staff of the schools and the local community. Those services, while viewed as desirable and important, were also services that could not be provided effectively by the classroom teachers in the regular program without extensive and on-going training in meeting the needs of gifted students within the classroom setting.

In addition, the gifted education staff provided resources, demonstrations, and consultations to nurture and enhance the performance of all staff members in the regular program. The efforts of the gifted program were integrated with, not isolated from, the other components of the school program. All services were provided in ways that were responsive to the diversity of student strengths and talents, rich in options, and geared toward opportunities of productivity. There has been cooperative ownership of MIZAR programming processes among staff members, resource specialists, and parents as recommended by Reiss (1982), Renzulli (1977), Treffinger (1981), and Ward (1982).

> Absence of participation tends to produce lack of interest and concern on the part of those shut out. (John Dewey, 1959)

Have those working in the field of gifted education unintentionally perpetuated a lack of concern and accountability in the classroom teacher for the gifted student by "shutting them out?" Has the responsibility of creating learning conditions that offer the best possibility for supporting and developing programs for the qualitatively different learners been withheld from the classroom teacher? Instead of expending excess energy in discussing why classroom teachers cannot teach the gifted, an earnest effort should be made to prepare them to do so within their own, more comfortable environment--their classrooms. More

college and university courses that address the particular needs of teaching the gifted learner within the classroom setting should be developed.

Overview of the MIZAR Program

In 1977, the Denton Independent School District Board of Trustees directed the District to develop an opportunity program for its gifted and talented students. After a thorough self-evaluation for both the Southern Association of Colleges and Schools and the Texas Education Agency accreditation and following a community survey, further need of educational opportunities for the gifted were established.

During the 1977-78 school year, a district-wide task force comprised of classroom teachers and parents was established to identify (1) what the District was providing for the gifted, and (2) what model for implementation was needed which would assure implementation and continuation of a gifted and talented program.

The model developed by the task force contained the following criteria:

1. Gifted students should be consistently served every hour they are in school by qualified teachers.

2. Gifted students should be served a majority of the time in the mainstream of education programs.

3. Program evolution would include provision for individually prescribed programs.

4. Through the development of a "brain pool" of highly qualified classroom teachers, principals, counselors, coordinators, and parents, the District would maintain a program to serve many areas of giftedness.

5. In cooperation with Texas Woman's University and North Texas State University, program development would include a high level of classroom teacher training which would allow for professional development each succeeding year.

6. Program development would include parental involvement needed to expand and support the program in the child's home, school and community.

The model, though simplistic in approach, has been extremely effective both in securing quality teaching for and providing services to identified gifted and talented students.

Student strengths were identified and a MIZAR Individual Educational Plan (IEP) was established in order to plan differentiated curriculum for each gifted student's identified strengths. The MIZAR IEP was an adaptation of the Special Education IEP and was based on theory taken from Renzulli (1977), Bloom (1956), Taylor (1967), Williams (1971), and Torrance (1977). Each IEP was

developed from the academic content by the MIZAR trained teacher within the regular classroom setting. Recognizing that the needs of the MIZAR student could not be met by the MIZAR teacher alone (Sisk, 1982), a team composed of the MIZAR teacher, MIZAR coordinators, the counselor, and the parent(s) developed an extended program for the student. This flexible plan included seminars, mentorships, independent study, cross-grade programming, or any activity which best met the need of the student. Also, areas of weakness identified by the Structure of Intellect Test (Meeker, 1975) were addressed by the regular MIZAR trained teacher or counselor to prevent possible learning gaps.

Because most elementary teachers were more comfortable in serving students in language arts and/or social studies, the program of extended learning focused primarily on the areas of math and science. Trained teachers and coordinators developed units of study (mini-studies) in specific academic content areas for differentiated curricula designed to extend student involvement beyond the "basics."

Intermediate students were given released time to write original computer programs and conduct research. In math, MIZAR students were encouraged to develop original brain teasers, logic problems, and original formulas to explain and/or prove mathematical experiences.

Since 1978, the MIZAR program has trained, in cooperation with Texas Woman's University and North Texas State University, 90 percent of the elementary staff to teach gifted and talented students within the classroom. Under the direction and consistent support of two coordinators during the 1981-82 school year, the District was able to accomplish the following:

- Trained 70 additional teachers in the basic MIZAR Core Program.
- Completed development of 115 original mini-studies to be used with gifted students.
- Expanded the teacher training manual.
- Developed and implemented student guides for conducting independent study.
- Developed and implemented a gifted and talented IEP form to assist the regular classroom teacher in systematically planning for student needs.
- Expanded the MIZAR Instructional Center, where activities for the gifted are developed and where specialized materials are available for check out to teachers, parents, and students.
- Completed identification of academic strengths for every student in grades 2-8 that met any of the following criteria:

1. 130+ IQ

2. Above the 95th percentile on the Iowa Test of Basic Skills in Math, Language Arts, or Social Studies

3. Attains a score of 34 points on the Student MIZAR Abilities Survey

4. Shows a rating of "gifted" in at least three areas of the SOI

5. Classroom performance which demonstrates need for specialized work on a high level

6. Teacher recommendation

· Tested minority students in grades 2-6 using the System of Multicultural Pluralistic Assessment (SOMPA) (Mercer, 1978) to determine whether "estimated learning potentials" would locate students missed during normal screening process.

· Lead District Parent Volunteer Advisory Committee in expanding its search for mentors to assist students involved with independent study.

· Served 649 identified students through 201 trained classroom teachers and at the same time enriched the learning environment for many of their classmates in the regular classroom setting.

After a student's strengths were identified, he or she was placed with a teacher who had been trained to provide

for his or her unique needs. How far a teacher took the child depended on the teacher's ability. Teachers were encouraged to recognize their own limits and to create a "learning team" when those limits had been reached.

Actual programming for the gifted student focused on the development (from the content) of higher level critical thinking skills and problem solving (Torrance, 1977). This approach led to self-learning via independent study or other Type III activities (Renzulli, 1977).

Giftedness is in itself dynamic, never static; therefore, those involved in gifted education are honor bound to keep stretching their own thinking. If teachers emulate their gifted charges and thoughtfully seek to challenge, question, and probe some of gifted education's traditions, they can develop new models and approaches that will be practical, cost efficient, and readily implemented into the school setting (Treffinger, 1982, p. 6).

CHAPTER III

DESIGN AND PROCEDURES

Over 200 elementary classroom teachers in a North Central Texas school district have received long-term MIZAR training in teaching gifted and talented students. The training has emphasized thinking and learning methods particularly designed for teaching young gifted students within the regular classroom setting. This study reports on the extent to which elementary teachers with MIZAR training have integrated the MIZAR strategies into their existing curricula.

A number of questions were posed to guide the investigation. The processes for collecting the data are reported statistically and descriptively. The results are discussed in the Report of Findings in Chapter IV.

The sections that follow in this chapter describe:

1. How the study began.
2. The development of the instrument appropriate for the research questions.
3. Selection of Samples.
4. Data collection procedures.
5. Statistical measures used in the analysis of the

data.

Pilot Study

A pilot study was conducted by the researcher to determine the feasibility of a proposed investigation of the extent to which 11 creative thinking behaviors were utilized by classroom teachers who had been trained to integrate these behaviors in their daily curricula. The 11 thinking behaviors being assessed in both the pilot study and the research study included analysis, synthesis, evaluation, fluency, flexibility, elaboration, originality, complexity, curiosity, risk taking, and imagination.

Collection of data for this research study was based on thirty-minute audio cassette tape recordings of classroom interaction between teachers and their students. In the pilot study, five tapes were rated by the two raters who would evaluate the audio cassette tapes for the research project. The pilot tapes were representative of five different subject areas taught by MIZAR trained teachers. This process gave the raters practice in rating the 11 creative thinking behaviors across different subject areas. The raters listened independently to each of the pilot tapes 11 different times; once for each of the 11 dependent variables being assessed. After listening to the tapes independently, the raters listened once more to each of the pilot tapes

together in order to refine the instrument and their rating skills.

The results of the pilot study aided the investigator in modifying the instrument and the recording index (See Appendix A). Pilot study information indicated the need for a method to determine flexibility scores in brainstorming sessions conducted by teachers during the tapings. The raters were directed by the investigator to stop the tape as necessary to record each fluency response elicited from the students by their teacher. The fluent responses were then classified as either "usual" or "unusual" (Torrance, 1974). Each unusual or unique response was assigned a flexibility point value of one (Torrance). As an illustration, consider the two following examples for unusual uses of an ashtray:

Example A	Example B
1. Paperweight	1. Melt it and make a glass
2. Bookmark	2. Melt it for sculpture
3. Electrical insulator	3. Hold ice cubes
4. Melt it for sculpture	4. Hold marbles
5. Frisbee	5. Hold sand
6. Swimming pool for a flea	6. Hold gravel

Each of the above examples receives a fluency score of six. A value is given for each idea listed. The list in

Example A also receives a flexibility score of six since each idea is of a different kind, whereas Example B receives a flexibility score of only two. In Example B, uses 1 and 2 are of the same kind referring to melting the ashtray. Uses 3 through 6 in Example B are of the same kind referring to the ashtray as an object for holding something else. It is evident that having six different kinds of ideas requires having at least six ideas, but having six ideas does not guarantee a flexibility score greater than one (Torrance, 1974).

It was through the pilot study that the investigator was able to assess the need to add or delete observational criteria in the instrument which was developed for this study. The pilot study was also essential to the raters in order to refine their rating skills.

Instrument

This investigator developed the instrument, Criteria for Evaluating Teacher Implementation of Creative Thinking Behaviors into the Academic Content (see Appendix B), specifically for this research project. The instrument was designed by adapting and combining two well known models for encouraging thinking skills. The first model used in the construction of this instrument included analysis, synthesis, and evaluation from the Cognitive Functioning

Categories adapted from Bloom's Taxonomy (1956). Fluency, flexibility, elaboration, originality, complexity, curiosity, risk taking, and imagination were the eight remaining behaviors adapted from Williams' Model, A Total Creativity Program for Individualizing and Humanizing the Learning Process (1970), to complete the instrument design.

These particular 11 creative thinking behaviors were selected because they represent creative thinking skills which Group I teachers had been trained to incorporate in their instruction. Also, utilization of these particular behaviors within the context of the daily curricula, which were actually designed by the MIZAR teachers themselves, would indicate internalization of methods and techniques presented in the MIZAR training course.

The analysis of the audiotape recordings provided the data for the dependent variables of this study. The 11 dependent variables of analysis, synthesis, evaluation, fluency, flexibility, elaboration, originality, complexity, curiosity, risk taking, and imagination as measured by the Criteria for Evaluating Teacher Implementation of Creative Thinking Behaviors into the Academic Content are defined as follows:

1. Analysis--the breakdown of the material into its constituent parts and detection of the relationships of the parts and of the way they are organized (Bloom, 1956). The

distinctive feature of analysis is that it requires solutions of problems in the light of conscious knowledge of the parts and processes of reasoning. In analysis the student must be conscious of the intellectual process he is performing and know the rules for reaching a valid and true conclusion (Sanders, 1966).

2. Synthesis--the drawing upon elements from many sources and putting these together into a structure or pattern not clearly there before. The student's efforts should yield an original product--something that can be observed through one or more of the senses and which is clearly more than the materials with which the student began (Bloom, 1956).

Bloom goes on to explain that the product of synthesis is rendered unique because of the great latitude allowed the individual in putting his own feelings, ideas, and experiences into it. In other words, much of the content of the synthesis is not rigorously predetermined by the requirements of the task; it flows from the person and is used by him if he alone deems it worthy of incorporating in his work (Bloom). This is not completely free expression since the student must still meet certain minimum requirements.

3. Evaluation--the making of judgments about the value, for some purpose, of ideas, works, solutions, methods, materials, etc. It involves the use of criteria as well as

standards for appraising the extent to which particulars are accurate, effective, economical, or satisfying. The judgments may be either quantitative or qualitative, and the criteria may be either those determined by the student or those which are given by him (Bloom, 1956).

4. Fluency--to generate a ready flow of ideas, possibilities, consequences, and objects (Torrance, 1962). The intent is to build a large store of information or material for selective use at a later time (Williams, 1971).

5. Flexibility--to use many different approaches or strategies in solving a problem; the willingness to change direction and modify given information (Torrance, 1962; Williams, 1970).

6. Originality--to produce clever, unique, and unusual responses (Torrance, 1962).

7. Elaboration--to expand, develop, embroider, and embellish one's ideas, stories, and illustrations (Torrance, 1962).

8. Curiosity--inquisitiveness, a strong desire to know about something. It is exploratory behavior directed toward acquiring information. It involves the use of all the senses to investigate, test out, and to confirm guesses and hunches about the unfamiliar or unknown (Williams, 1971).

9. Risk Taking--involves speculation, prediction, wisdom, and foresight. The probability of success and the

chance of failure are estimated before action is taken. Risk taking is characterized by the will, disposition, and desire to set greater goals in anticipation of greater gains. Consideration for the elements of chance, liking the unknown, adventure, and a tolerance for insecurity are traits common to the risk taker. He or she may also be described as perceptive, inquiring, intuitive, and predictive (Williams, 1971).

10. Complexity--willing to accept a challenge. It represents a desire to work with or handle involved details and an inclination to dig into knotty problems. Challenges may be in the form of intricate ideas, difficult problems, complex designs, or complicated theories (Williams, 1971).

11. Imagination--to have the power to visualize, build mental images, and dream about things that have never happened. To have the power to feel intuitively and reach beyond sensual or real boundaries (Williams, 1971).

Population and Sample

The target population for this research project consisted of elementary classroom teachers in the North Central Texas Metroplex. The study included collection of data from 75 elementary teachers from four different school districts.

Group I was comprised of 44 MIZAR trained teachers and Group II was made up of 31 teachers from three other school

districts who had not received any training in teaching gifted students. The 75 elementary classroom teachers who served as subjects for this study volunteered to participate after having received a letter of request from their own local superintendent, assistant superintendent or curriculum director (see Appendix C). None of the subjects were aware that the study involved gifted education.

Careful consideration was taken to obtain a small number of samples from several different school districts for Group II. This was important to the study because the high interest in gifted education in this area of Texas could have been a contaminating factor in this study. Personal interest in the validity of this study was incurred, however, by the cooperating superintendents, assistant superintendents, or elementary curriculum directors from the participating Group II school districts.

The two groups of samples in this study were considered to be independent samples, for there was no a priori connection between a particular score in Group I and any of the individual scores in Group II.

Data Collection

The data for this research study were collected from thirty-minute audiotape recordings of classroom instruction by the 75 participating elementary teachers. Previous

studies by Aspy and Roebuck (1977) had already shown that audiotapes of classroom interactions were a desirable paradigm of data collection for a number of reasons; (a) fewer personnel are required; (b) there is less intrusion into the classroom; (c) teaching behaviors are "frozen" for repeated scoring; and (d) audiotape ratings concur at a high level with both on-site observations and videotape ratings (p. 21). This procedure also relates favorably to the well known Flanders Interaction Analysis (1959) in data collection procedures.

Each volunteer received an audio cassette tape and written instructions through the mail for recording a classroom session (see Appendix C). After completing the assignment, teachers were instructed to return their finished tapes to a centralized contact person who collected all the tapes and then randomly assigned the tapes to the raters.

The independent raters had extensive training in the area of gifted education. Both raters had also studied recording strategies utilized by Aspy and Roebuck (1977). Each trained rater was asked to evaluate independently eight segments to provide a measure of intra-rater reliability. The 16 ratings indicated a .96 inter-judge agreement by yielding Pearson product-moment correlation coefficients above .98 in each instance except the rating for "originality" which still indicated a moderate and acceptable

correlation of .60. After successful inter-rater reliability had been established, the raters began evaluation of the 75 audiotape recordings collected for this research study.

The procedure for analysis of the 75 tape recordings utilized in this research project consisted of the following steps:

1. Each trained rater was given randomly selected prerecorded tapes, "Data Collection Indices," and Criteria for Evaluating Teacher Implementation of Creative Thinking Behaviors into the Academic Content instruments (see Appendix A).

2. Each blind rater, experienced in rating tapes according to this scale, rated each of the thirty-minute segments according to her evaluation of the tapes in terms of the instrument developed for this particular study.

3. The blind raters independently rated each tape across the same set of 11 variables: Three cognitive categories from Bloom's Taxonomy (1956) and eight creative thinking behaviors from Williams' Model, A Total Creativity Program for Individualizing and Humanizing the Learning Process (1970).

Statistical Analysis

Differences between trained and untrained teachers on the 11 creative thinking behaviors were assessed by performing a multivariate *t*-test (Hotelling's T-square). This test compared the two groups of teachers and asked whether there was a difference between the groups on one or more of the 11 dependent variables, after adjustments had been made for possible correlations among the dependent variables and for the fact that more than just one dependent variable was involved.

The computational procedure that must be followed in getting a calculated value for T-square is quite complex; therefore, the assistance of a computer was required. The scores derived from the instrument as recorded on the "Data Collection Indices" were processed by the Texas Woman's University Computer Center. The .05 level ($p<.05$) was considered significant for T-square used in this research design.

Since a significant T-square value resulted, the 11 behaviors were then submitted to a two-group linear discriminant function analysis in order to determine exactly which dependent variable(s) contributed to the overall significant difference. The multiple discriminant function analysis test used in this study was evaluated by means of the Wilks'

Lambda test (Wilks, 1932).

Lastly, each of the 11 behaviors was analyzed by independent *t*-tests between the two groups. The independent *t*-test was utilized because of the unequal number of scores in the two groups plus the fact that Group I has had MIZAR training and Group II has not been exposed to MIZAR training. Because of the large number of independent *t*-test measures a minimum significance level of .039 was used to control for an inflated experiment-wise error rate of .43.

CHAPTER IV

REPORT OF THE FINDINGS

The purpose of this research study was to investigate the implementation of 11 creative thinking behaviors (see Appendix B), presented in the basic MIZAR training course, into the regular classroom curricula. This research project sought to determine the extent to which elementary teachers in a North Central Texas school district, who received forty-five clock hours of training for meeting the needs of gifted students within the regular classroom setting, were able to integrate those principles into their existing curricula.

The data for this study were collected from 75 thirty-minute audio cassette tapes of classroom teaching. Of the 75 elementary teachers who volunteered to submit tapes to the research project, 44 of the teachers, Group I, had participated in the basic MIZAR training course. The remaining 31 teachers, Group II, had not received MIZAR training. None of the 75 participants were aware the research project involved gifted education (see Appendix C). The findings of these analyses are presented in this chapter.

The first part of this chapter is organized according to an analysis of the data collected involving the status of the null hypothesis tested in this study. The second part of the chapter presents an analysis of the follow-up data and its relationship to the research questions asked by the researcher.

Data Relative to the Hypothesis

The null hypothesis for this study stated that the MIZAR trained teachers (Group I) and the teachers without MIZAR training (Group II) would have identical mean vectors for implementing the 11 creative thinking behavior (CTB) variables. The sample mean vectors for Groups I and II are presented in Table 1.

In order to test the null hypothesis of equal mean vectors of two groups with 11 variables, the centroids were subjected to the direct multivariate statistical analysis of the Hotelling's T^2. The test compared the two groups of teachers and asked whether there was a difference between the groups on one or more of the 11 dependent variables. The comparison of the Hotelling's T began after adjustments were made for possible correlations among the variables and for the fact that more than just one dependent variable was involved (Huck, 1974).

Table 1

Mean Vectors of 11 Creative Thinking Behavior (CTB) Variables for MIZAR Trained and Non-Trained Teachers

CTB Variables	MIZAR Trained Group I $\bar{x}$	Non-Trained Group II $\bar{x}$
Analysis	15.00	4.42
Synthesis	3.16	.94
Evaluation	8.07	2.65
Fluency	10.68	2.26
Flexibility	8.82	1.61
Originality	7.36	1.36
Elaboration	12.39	4.36
Curiosity	10.59	2.81
Risk Taking	37.36	16.97
Complexity	3.36	.07
Imagination	9.41	1.87
N=75	n_1=44	n_2=31

The two-sample Hotelling's T statistic had a value of 62.12; the associated F was 4.87, with degrees of freedom 11 and 63. Under the hypothesis of equal mean vectors, the probability of exceeding the F value of 4.87 would be less

than .001; therefore, the null hypothesis was rejected. The Hotelling's T results are displayed in Table 2.

Table 2

Group Effect of Multivariate Test of Significance

Test Name	Value	Approximate F	df	Significance of F
Hotelling's T	62.1209	4.8738	11,63	.001

Data Relating to Question One

1. Will there be a difference in the population mean vectors for implementing the 11 creative thinking behaviors between MIZAR trained teachers and non-MIZAR trained teachers?

In reviewing the data in Table 1 which were related to the hypothesis, it is evident that there was a difference between MIZAR trained teachers and non-MIZAR trained teachers who participated in this study on each of the 11 CTB variables. Hotelling's T indicated that the difference was significant ($p<.05$) for one or more of the 11 CTB variables (see Table 2).

A significant result in a multivariate *t* test of two groups required further analysis to find out exactly which dependent variable(s) contributed to the overall significant

difference. Thus, Hotelling's T^2 was a preliminary step in the multivariate process. The follow-up procedure utilized in this study was a two-group linear discriminant function analysis.

Scaled scores for each of the 11 CTB variables were used as the discriminating variables. The classification of MIZAR trained and non-MIZAR trained was used as the grouping variable in a step-wise discriminant analysis. The criterion for variable selection was that which minimized Wilk's Lambda, a measure of group discrimination. This test took into consideration the differences between each centroid within the two groups being analyzed.

Results of the step-wise discriminant analysis revealed there was a collection of creative thinking behaviors which demonstrated a strong discrimination between the MIZAR trained and non-MIZAR trained teachers who participated in this study. The means and standard deviations for each variable are displayed in Table 3. According the the Wilk's Lambda analysis, six of the 11 CTB variables significantly ($p<.05$) discriminated between the two groups. The six discriminating variables were Risk Taking, Complexity, Originality, Analysis, Evaluation, and Elaboration. The relative contribution of each variable and the direction of that contribution was determined by weights or standardized discriminant function coefficients (SDFC). See

Discriminant Analysis Summary Table 4.

Table 3

Means and Standard Deviations for 11 Creative Thinking Behavior (CTB) Variables

CTB Variables	$\bar{x}_1$	Standard Deviations	$\bar{x}_2$	Standard Deviations
Analysis	15.00	12.36	4.42	6.22
Synthesis	3.16	5.66	.94	3.37
Evaluation	8.07	12.90	2.65	4.93
Fluency	10.68	20.51	2.26	4.89
Flexibility	8.82	10.74	1.61	3.29
Originality	7.36	9.23	1.36	3.40
Elaboration	12.39	13.05	4.36	6.88
Curiosity	10.59	8.57	2.81	4.56
Risk Taking	37.36	27.42	16.97	17.24
Complexity	3.36	4.83	.07	.25
Imagination	9.41	10.56	1.87	3.52
N=75	n_1=44		n_2=31	

The first variable that was selected in the step-wise process using the Wilk's Lambda as the entry criterion was Analysis with a SDFC of .5988. Evaluation (SDFC=-.5465), Complexity (SDFC=.5457), Originality (SDFC=.4904), Risk

Table 4

Discriminant Analysis Summary

Step	Variable	Standardized Discriminant Function Coefficients	λ	p	Change in Rao's V	p
1	Analysis	.5988	.5721	p<.05*	5.04	.002**
2	Evaluation	-.5465	.5650	p<.05*	2.69	.101
3	Complexity	.5457	.6484	p<.05*	7.04	.001**
4	Originality	.4904	.5956	p<.05*	10.00	.008**
5	Risk Taking	.3712	.6918	p<.05*	11.28	.001**
6	Elaboration	.3598	.5543	p<.05*	2.50	.113

*Significant according to Wilk's Lambda.
**Significant creative thinking behaviors according to the Change in Rao's V.

Taking (SDFC=.3712), and Originality (SFDC=.3598) completed the linear combination of the discrimination variables. The negative sign for Evaluation (-.5465) was indicative of the direction of the variable. There was a higher Evaluation status of the MIZAR trained teachers when compared with the non-MIZAR trained teachers.

The canonical correlation for the single discriminant function was .668 which indicated that 45% of the variance of the discriminant function was explained by group membership. Table 4 contains the results of the step-wise

process. It shows the six variables that collectively contributed to the discrimination between MIZAR trained and non-MIZAR trained teachers.

A Change in Rao's V was also computed to show an even finer discrimination of the variables remaining in the step-wise process of Wilk's Lambda (λ) (see Table 4). The four remaining variables included Analysis, Complexity, Originality, and Risk Taking. These four variables used in combination formed the strongest discriminating cluster between the two groups.

Lastly, each of the 11 creative thinking behaviors was analyzed by independent *t*-tests between the two groups, using a minimum significance level of .039 to control for an inflated experiment-wise rate of .43. See Table 5 for a graphic display of the results of the univariate analysis. Each of the 11 creative thinking behaviors was significantly different at the predetermined .039 level.

Data Relating to Question Two

To what extent do MIZAR trained teachers incorporate the 11 creative thinking behaviors into their daily curriculum content?

Through the use of descriptive statistics utilizing frequency distribution count data and mean values for measurement of central tendency, it becomes apparent to what

Table 5

Differences Between MIZAR Trained and Non-MIZAR Trained on Single Creative Thinking Behavior (CTB) Variables

CTB Variables		MIZAR	Non-MIZAR	t	df	p
Analysis	Mean	15.00	4.42	4.9	67.0	<.001
	SD	12.36	6.22			
Synthesis	Mean	3.16	.94	2.1	71.3	.037
	SD	5.66	3.37			
Evaluation	Mean	8.07	2.65	2.5	59.0	.014
	SD	12.90	4.93			
Fluency	Mean	10.68	2.26	2.6	49.8	.012
	SD	20.51	4.89			
Flexibility	Mean	8.82	1.61	4.2	53.9	.001
	SD	10.74	3.29			
Originality	Mean	7.36	1.36	4.0	58.1	<.001
	SD	9.23	3.40			
Elaboration	Mean	12.39	4.36	3.5	68.4	.001
	SD	13.05	6.88			
Curiosity	Mean	10.59	2.81	5.1	68.6	<.001
	SD	8.57	4.56			
Risk Taking	Mean	37.36	16.97	4.0	72.2	<.001
	SD	27.42	17.24			
Complexity	Mean	3.36	.07	4.5	43.3	<.001
	SD	4.83	.24			
Imagination	Mean	9.41	1.87	4.4	55.6	<.001
	SD	10.56	3.52			

Significant p value must be less than .039 to control for an inflated experiment-wise rate of .43.

extent the MIZAR trained teachers incorporated the 11 CTB into their curriculum during the thirty-minute taping sessions. See Table 6 for display of frequencies and means of MIZAR trained teachers.

Table 6

Frequency Distribution Count and Means for MIZAR Trained Teachers on 11 Creative Thinking Behavior (CTB) Variables

CTB Variables	f	$\bar{x}$
Risk Taking	1,644	37.36
Analysis	660	15.00
Elaboration	536	12.39
Fluency	470	10.68
Curiosity	466	10.59
Imagination	414	9.41
Flexibility	388	8.82
Evaluation	355	8.07
Originality	324	7.36
Complexity	148	3.36
Synthesis	139	3.16
	$n_1=44$	

The 44 MIZAR trained teachers who participated in this study provided an opportunity for their students to take intellectual risks 1,644 times. The extent to which the MIZAR trained teacher incorporated Risk Taking into the

curriculum during this study averaged approximately 37 times in thirty minutes. Students were asked to analyze (f=660) an average of 15 times per thirty minutes. Elaboration (f=536) was incorporated into the curriculum an average of 12 times per lesson. Students were asked by their MIZAR teachers to be Fluent (f=470) and Curious (f=466) an average of 10 times a session. MIZAR teachers solicited Imagination (f=414) and Flexibility (f=388) from their students an average of nine times during the thirty-minute time limit while also averaging eight Evaluation (f=355) responses from their students. Original (f=324) responses were encouraged on the average of seven times per thirty minutes. Complexity (f=148) and Synthesis (f=139) opportunities were provided by the MIZAR teachers approximately three times per thirty minutes.

Additionally, a classification procedure was performed in which group membership was predicted using the discriminant function previously defined. This resulted in 82.7% accuracy in predicting actual group membership. These results can be found in Table 7.

According to the information presented in Table 7, 79.5% of the MIZAR teachers in Group I were correctly classified with their MIZAR trained colleagues. Of the MIZAR subjects, nine of the 44 (20.5%) resembled the non-trained teachers in their performance.

Table 7

Classification Results Using the

Discriminant Function

	N	Predicted Classification MIZAR Trained	Non-Trained
MIZAR Trained	44	35	9
		79.5%	20.5%
Non-Trained	31	4	27
		12.9%	87.1%
		% correctly classified = 82.67%	

Data Related to Question Three

To what extent do non-MIZAR trained teachers incorporate the 11 creative thinking behaviors into their daily curriculum content?

By observation of descriptive statistics utilizing frequency distribution count data and mean values for measurement of central tendency, it becomes apparent to what extent non-MIZAR trained teachers incorporated the 11 CTB into their curriculum during the thirty-minute taping sessions. See Table 8 for display of frequencies and means of non-MIZAR teachers.

Table 8

Frequency Distribution Count and Means for Non-MIZAR Teachers on Creative Thinking Behavior (CTB) Variables

CTB Variables	f	$\bar{x}$
Risk Taking	526	16.97
Analysis	137	4.42
Elaboration	135	4.36
Curiosity	87	2.81
Evaluation	82	2.65
Fluency	70	2.26
Imagination	58	1.87
Flexibility	50	1.61
Originality	42	1.36
Synthesis	29	.94
Complexity	2	.07
	n_2=31	

The 31 non-MIZAR trained teachers who participated in this study provided an opportunity for their students to take intellectual risks, as defined by the instrument used in this study (see Appendix B), a total of 526 times. The extent to which the non-MIZAR teacher incorporated Risk Taking into their curriculum during this study averaged approximately 17 times within the thirty-minute time limit.

Non-MIZAR teachers provided an average of four times per thirty minutes for their students to Analyze (f=137) and Elaborate (f=135). The opportunity to wonder (Curiosity, f=87) and make Evaluations (f=82) was provided by non-MIZAR trained teachers an average of three times during the time limit. Fluency (f=70), Imagination (f=58), and Flexibility (f=50) opportunities were provided an average of two times per thirty minutes. The students were asked to be Original (f=42) and to produce an original product (Synthesis, f=29) approximately one time during the time limit. The average student involvement in puzzling situations (Complexity, f=2) was less than once per thirty minutes.

Additionally, a classification procedure was performed in which non-trained group membership was predicted using the discriminant function previously defined. This resulted in 82.7% accuracy in predicting actual group membership of MIZAR trained and non-MIZAR trained teachers. Results can be found in Table 7. According to the information presented in Table 7, 81.1% of the non-MIZAR teachers in Group II tended to be correctly classified with their non-trained colleagues while four (12.9%) of the non-MIZAR trained teachers' techniques resembled the teaching styles of teachers with MIZAR training.

Summary of Findings

The null hypothesis which stated that MIZAR trained and non-MIZAR trained teachers would have identical mean vectors was rejected at the predetermined .05 level of significance. The actual results were less than .001. The regular classroom teachers with training did integrate the 11 creative thinking behaviors in their curricula significantly more than the classroom teachers without training. Of the non-MIZAR trained teachers, four of the 31 (12.9%) marginally resembled the MIZAR trained teachers. Of the 44 MIZAR trained teachers, nine (20.5%) marginally resembled non-trained teachers. Both groups had open environments where children were encouraged to interact with both their teachers and their peers. Both groups encouraged their students to take intellectual risks and elaborate on their ideas. Even so, the differences between the two groups were significant in favor of the teachers with training.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

Summary of Investigation

This study was designed to determine whether classroom teachers with training in teaching the gifted within the regular classroom setting could be differentiated from those without specific training. Data collected for this research study were gathered from 75 audio cassette tape recordings of thirty-minute teaching sessions by 75 teachers who volunteered to participate in the study. Group I was comprised of 44 teachers who participated in the MIZAR gifted and talented training course (see Appendix A). Group II included 31 teachers who had not received the basic MIZAR training course. The 75 tapes were randomly assigned to two blind raters who evaluated the tapes according to 11 predetermined creative thinking behavior (CTB) variables (see Appendix B).

Part one of this study investigated the possibility of predicting to a dichotomus criterion variable, MIZAR trained and non-MIZAR trained, on 11 predictor variables. In order to evaluate the data collection necessary for this part of

the study, multivariate statistical analysis was appropriate. First, a direct method of analysis, the Hotelling's T-Square, was initiated. Second, the primary follow-up procedure of Wilk's Lambda, a two-group linear discriminant function, was utilized to determine which of the 11 predictor variables collectively contributed most to the significant difference between MIZAR and non-MIZAR teachers. Lastly, independent *t*-tests were conducted with control for inflated experiment-wise error rate between the two groups.

The second part of this study investigated and described the extent to which 11 creative thinking behaviors, presented in the basic MIZAR training course, were implemented by 44 regular classroom teachers into their existing curricula. These MIZAR trained teachers received long-term training for meeting the needs of gifted students within the regular elementary classroom setting. The training consisted of 15 weeks or a total of 45 clock hours of concentrated in-service training designed specifically for classroom teachers working with young gifted students. Important to the study was the investigation of the extent to which the 11 creative thinking behaviors were implemented into the existing curricula of the 31 non-MIZAR teachers who participated in this research.

Before the actual investigation began, a pilot study was conducted to determine the possibility of a proposed

investigation of implementation of the CTB variables into existing classroom curricula. Feedback from the pilot study aided in determining questions for the investigation, selection and development of the instruments for data collection, and refinement of rating skills by the independent raters. The pilot study was extremely important to the independent raters because it gave them time to internalize the concepts of the instrument. A preliminary inter-rater reliability study was conducted, also. The degree of agreement between the raters on the 11 CTB variables was analyzed using the Pearson product moment correlation. Knowing that the research depended upon the accuracy of the raters, it was imperative that a high level of inter-rater reliability be developed during the reliability study. The inter-rater reliability correlation was .96.

Summary of the Results

The research questions and the results of the data collection for each question are summarized in the following sections:

1. Will there be a difference in the population mean vectors for implementing the 11 creative thinking behaviors between MIZAR trained teachers and non-MIZAR trained teachers?

The question was answered in the affirmative. There was a significant difference between the mean values of MIZAR trained and non-MIZAR trained teachers on each of the 11 creative thinking behaviors.

2. To what extent do MIZAR trained teachers incorporate the 11 creative thinking behaviors into their daily curriculum content?

In response to this question, the MIZAR trained teachers significantly incorporated each of the 11 creative thinking behaviors into their daily curriculum. The strongest discrimination between MIZAR and non-MIZAR teachers involved six of the creative thinking behaviors collectively. This discriminating group of behaviors included Risk Taking, Complexity, Originality, Analysis, Evaluation, and Elaboration. This group of behaviors was determined by the step-wise discriminant function analysis of the Wilk's Lambda at a contracted .05 level of significance. The actual significance resulted in a probability beyond the .001 level.

3. To what extent do non-MIZAR trained teachers incorporate the 11 creative thinking behaviors into their curriculum content?

In response to this question, the non-MIZAR trained teachers did not significantly utilize the creative thinking behaviors in their curriculum. Of the 11 creative thinking

behaviors, the non-MIZAR teachers ranged in mean values from 16.97 in Risk Taking to .07 in Complexity. Only 12.9% of the non-MIZAR trained teachers resembled the MIZAR trained teachers in incorporating the creative thinking behaviors into their curricular content.

Conclusions

In the opinion of this investigator, regular classroom teachers can learn to integrate creative thinking behaviors into their daily curricula. Within the limitations of this study and the significant findings mentioned previously, these conclusions are suggested:

1. Regular classroom teachers can be trained to incorporate creative thinking behaviors into the daily curricula.

2. It is unlikely that regular elementary classroom teachers will intuitively incorporate creative thinking behaviors into their daily curricula without training.

3. Utilization of creative thinking behaviors perpetuates an open environment where intellectual risk taking and teacher/peer interaction is prevalent.

4. In elementary classrooms where teachers have been trained to incorporate analysis into curriculum planning, young students are required to find solutions to problems in the light of conscious knowledge of the parts and processes of reasoning.

5. Elementary classroom teachers can be trained to encourage children through elaboration to expand, develop, and embellish their ideas, stories and illustrations within the curricular content.

6. Fluency, in order to generate a ready flow of ideas, possibilities, consequences, and objects, can be integrated by regular classroom teachers into various content areas at the elementary level.

7. Regular classroom teachers can be trained to capitalize on the natural inquisitiveness of young children by consistently planning curiosity into the daily curriculum design across all content areas.

8. In the regular classroom where the teacher has learned to incorporate imagination into the curriculum, children are encouraged to exercise the power to visualize, build mental images, and probe the metaphoric, intuitive modes of thinking in a way that encourages invention.

9. When regular classroom teachers plan flexible thinking behaviors into the curriculum, students are encouraged to take detours in thinking to include contrasting reasons, differing points of view, alternate plans, and various aspects of a situation within the topic of study.

10. Elementary classroom teachers can be trained to pose questions that are open-ended and require originality in the production of unusual or unanticipated responses that

are clever, remote, individual, uncommon, inventive, or creative in nature.

11. In a regular elementary classroom where the teachers have been trained to incorporate evaluation into curricular planning, young students are guided in learning to make judgments utilizing criteria as well as standards for appraising the extent to which particulars are accurate, effective, economical, or satisfying.

12. When complexity is integrated into the daily curricular design, the trained teachers lead students, within a protected classroom environment, to work with or handle involved details, and to value the problem solving process.

13. Elementary classroom teachers can be trained to incorporate synthesis into daily curricula and encourage young students to yield original products that can be observed through one or more of the senses and are clearly more than the materials with which the students began.

Discussion

A review of the literature revealed the need for more information concerning the possibility of training the regular classroom teacher to teach the gifted within the regular classroom setting. The investigator was unable to locate information concerning other programs that resembled the MIZAR program. The few studies that did involve

training regular classroom teachers, such as the REACH project (Juntune, 1979), did not appear to be incorporated across entire school districts. The REACH project seemed to be isolated to one school, Pike Lake, and to particular grade levels, third through sixth (Juntune). The program design for REACH was a careful meshing of the theories and research of many consultants (Juntune, 1979, p. 468). It was based on a continuum of collecting more and more gifted education theories. The new theories were then presented within the context of previously learned models (Juntune).

In contrast, the MIZAR program was streamlined to make it more manageable to the regular classroom teacher. One of the major goals in designing the MIZAR training program involved evaluating theories and models of gifted education in order to streamline and adapt the most practical concepts generated from research to the regular classroom setting. The teachers were taught to integrate the strategies into their daily curriculum, not add them on top of everything else they were required to teach. MIZAR teachers, in planning for the gifted on a daily basis, seemed to have internalized the training principles to the point of incorporating the behaviors across their total curricula.

Risk Taking was the most frequently used creative thinking behavior by both groups of teachers. This would indicate that both MIZAR and non-MIZAR teachers in this

study were providing open learning environments where a high rate of interaction between teacher, students, and peers was normal. At first glance, it might be concluded that Risk Taking comes naturally to good teachers. To a certain extent this is true, however, in analyzing the audiotapes there was a difference between the two groups in the quality of Risk Taking opportunities. Non-MIZAR teachers generally tended to solicit convergent responses from their students. The learning environment provided by the non-MIZAR teachers was safe and open, yet questions were generally not open-ended in nature. The MIZAR teachers, on the other hand, seemed comfortable asking questions that were open-ended and required divergency on the part of the students. An open environment does seem to come naturally to good teachers, however, according to the data collected from this research, training can enhance the quality and depth of that open environment.

Analysis was the second most frequently used CTB utilized by both groups. The MIZAR trained teachers used Analysis ($\bar{x}$=15.00) approximately three times more than non-MIZAR teachers ($\bar{x}$=4.42). Where MIZAR trained teachers averaged 15 Analysis opportunities for their students in the thirty-minute time limit, non-MIZAR teachers averaged four Analysis experiences for their students in the same time limit.

Elaboration, the third most frequently used CTB, follows the same pattern as Analysis with MIZAR teachers ($\bar{x}$=12.39) providing approximately three times the opportunities for their student to elaborate than non-MIZAR teachers ($\bar{x}$=4.36). In comparing the mean values of both groups on each of the remaining CTB variables (see Table 3, page 48), significant contrast between the two groups is marked. The MIZAR trained teachers utilized Synthesis ($\bar{x}$=3.16), their least frequently used CTB, more than the non-MIZAR trained teachers employed Curiosity ($\bar{x}$=2.81), their fourth most frequently used CTB. After Risk Taking, the non-MIZAR teachers' mean values fall sharply. This would support previous research conclusions that creative thinking behaviors were not generally a part of the regular classroom teachers' repertoire of teaching techniques (Renzulli, 1977; Torrance, 1977; Treffinger, 1982).

As should be expected, Synthesis and Complexity were the least frequently used creative thinking behaviors in this research design. Synthesis requires a product from the student in order to receive credit as a Synthesis experience. Audiotapes are not particularly conducive to demonstrating a wide variety of products. A large portion of the thirty-minute time limit was consumed when students shared their synthesized products. Complexity required large blocks of time, also. It was extremely encouraging that MIZAR trained

teachers demonstrated, in conjunction with the other nine creative behaviors, the use of Synthesis ($\bar{x}$=3.16) and Complexity ($\bar{x}$=3.36) an average of three times each during the thirty-minute interval.

In perusing literature on gifted programming, the investigator found that mainstreaming of young children with special academic needs has never been an appropriate option for educational programming. Classroom teachers were not trained to meet students' special needs prior to integration (Stone, 1978). What little training might have been thrust upon the classroom teacher did not deal with the problems from the teacher's point of view. The one shot workshop may have been inspirational (Renzulli, 1977, pp. 186-187), but it did not address practical classroom management techniques for dealing with wide ranges of abilities over a long period of time. After the workshop, the teacher was often left without continued support or resources (Renzulli). The MIZAR program, therefore, should not be included under the heading of mainstreamed programming. Even though the MIZAR program does attempt to serve gifted students within the regular classroom setting, the classroom teacher must go through an extensive, in-depth training program before working with MIZAR students. The development of the MIZAR training course was specifically designed for regular classroom teachers who have 25-30 students, four to six of

which have been identified as gifted.

The MIZAR program, as Treffinger (1982) and others have suggested, is designed to provide an all out effort to incorporate programming which leads to a wide range of services that are considered valuable by the staff of the schools and the local community. Those services can not be effectively provided by classroom teachers in the regular program without extensive and on-going training in meeting the needs of gifted students within the classroom setting. The findings of this study agree with Torrance (1977) that implementation of creative thinking strategies in instruction is a skill that can be increased with training.

It is obvious that the MIZAR training itself is not enough to obtain the results reported in this study. Resources and full-time support are also required for the regular classroom teacher who is trying to meet the needs of gifted students within the regular classroom setting. The 201 MIZAR trained teachers in this program are consistently supported by two full time coordinators who provide resources, demonstration, in-services, mentors, original curricula, and consultations to nurture and enhance the performance of all staff members involved in the program.

From the point of view of this investigator, in order for a gifted program of this magnitude to be effective, district wide commitment is essential. The efforts of the

program must be integrated with, not isolated from, the other components of the school program. Creative thinking and problem solving must be seen as basic and beautiful by the entire school district and community. Schooling in the regular classroom setting must not be cloning but an art form brought to fruition through human articulation of creative thinking and problem solving.

It is discouraging that few college courses seem to be specifically designed to help regular classroom teachers identify or meet the needs of gifted students within their classes (Lindsey, 1980). Instead, college courses were designed to train those teachers who would teach the gifted in special instructional arrangements, although many gifted students spend a great deal of their academic day in the regular classroom (Lindsey).

The data from this research seem to support the conclusions drawn by Renzulli (1977), Treffinger (1982), and others that systematic, in-depth, research-based teacher training programs are necessary to effectively redirect teaching styles toward those which nurture creative thinking in children.

Hopefully, this research study has contributed insight into optional programming for the gifted in which student services are provided in ways that are responsive to the

diversity of student learning strengths and talents consistently throughout the academic year by the regular classroom teacher. The data from this investigation imply that there is yet another alternative to gifted programming; training the regular classroom teacher. When the classroom teacher is trained and supported in planning creative thinking behaviors into the daily scheme and developing from the content differentiated curricula, gifted programming will begin to weave itself into the total school program as Treffinger (1980) and others advocate.

Imagine a homeroom teacher who can identify personality traits and characteristics of the gifted as well as relate comfortably to them. Visualize a regular classroom setting in which the gifted learn to deal positively with their peers. Picture a classroom in which asking questions is important and in which opportunities abound to analyze, synthesize, and evaluate. This is an environment that teachers can learn to provide for gifted children. With this kind of regular classroom setting, whatever supplementary provisions a district and community may decide to make for its gifted program, learning opportunities will be limitless.

Recommendation for Further Study

As a direct result of this study, the review of significant literature related to this work, and the insights developed by the investigator as the study developed, certain prominent kinds of information have come to the surface. Consequently, additional studies of the types which follow merit investigation.

1. A replication of the present study should be conducted in various other education institutions, including secondary schools, to determine whether the findings of this study are relevant beyond the limitations of this research population.

2. A replication of a study of this nature should be done utilizing videotape recordings instead of audiotape recordings as the data collection procedure.

3. An in-depth study should be made of how student achievement is affected by having a regular classroom teacher who is trained to meet the needs of gifted students within the regular classroom setting.

4. An in-depth study should be conducted concerning the attitudes of creative students toward school when in a regular classroom with a teacher who has been trained to plan creative thinking behaviors into the curricula.

5. More research directed toward determining what curriculum and instruction successfully enhances creative thinking in gifted children is essential.

APPENDICES

APPENDIX A

MIZAR TEACHER TRAINING ADDENDUM

Course Syllabus
Department of Special Education
Texas Woman's University

Number and Title of Course: EDSE 5513, Teaching the Gifted Within the Regular Classroom-Non-Special Education Majors.

Names and Titles of Individuals Preparing Syllabus: Sue Nelle DeHart, doctoral student, and Ernest O. Watkins, Ph.D.

Brief Statement of Purpose of Course, Including How Course Relates to Other Courses:

Teaching the Gifted Student Within the Regular Classroom (EDSE 5513), Course for Non-Special Education majors, is designed to assist the regular educator in managing the differentiated curriculum/planning required for the gifted student. This course will provide an introduction to assessment, characteristics, and educational strategies for the academically gifted as well as the underachieving gifted. To assist the regular educator in understanding the strengths of exceptional individuals and the implications for the instructional processes is presented as an integral part of this course. Finally, as established by the Texas State Board of Education, the inclusion of this course satisfies requirements for elementary and secondary education majors at the provisional certification level.

Prerequisites: EDSE 5003 is recommended.

Competencies to be Developed:

1. The teacher will develop differentiated curriculum in the areas of math or science in the forms of mini-studies. The mini-study should not exceed thirty typewritten pages.

2. The teachers will provide a Renzulli Type II endeavor for at least two identified gifted students. Students will be invited to share their completed projects with the teachers taking the course.

3. Teachers will bring at least seven examples of children's work. These examples should be from either Type II or Type III levels of enrichment.

4. The teacher will demonstrate cognitive understanding of differentiated planning through short-term assignments with children in their own classrooms. I.E.P. planning will be done for at least two identified children. These assignments will be observed and evaluated by the instructor.

5. Teachers will demonstrate knowledge of informal assessment procedures in order to become "talent spotters" within the regular classroom.

6. Teachers will demonstrate, through class discussion and tests, the knowledge of educational strategies related to gifted students. They will also share implementation examples of horizontally enriched curricula emphasizing individualized expectations. These should incorporate classroom management techniques that are compatible to student diversities.

Summary of Activities and Assignment, Including Text, Reading References, Films, Laboratory and Practicum Experiences, Lectures, etc.:

1. Assigned texts
2. Professional journal readings
3. Popular literature readings (dealing with working with gifted children)
4. Class lectures
5. Class participation
6. Evaluation of materials
7. Mini-study for gifted students in the area of math or science incorporating 11 creative thinking behaviors covered in class
8. Examples of implementation of course concepts
9. Students' Type III presentations (arranged by each student's teacher)

Overview of the MIZAR Training Program

The basic MIZAR training course covered a time span of 15 weeks. Each of the 15 weekly sessions lasted for three hours. Following is a brief description of what was covered in the training program.

Week One. Group dynamics was the major theme for the first week. Teachers were expected to participate as learners in several group dynamics activities that could be replicated in their own classrooms. The group dynamics activities were also webbed into mathematics when the teachers (as students) were asked to design original graphs from the group dynamics data. The objectives of group dynamics were discussed in order to emphasize the importance of developing a classroom environment conducive to creative thinking.

Week Two. Characteristics of gifted children was the major topic of the second week. Teachers were asked to analyze the characteristics of gifted children from the perspective of the whole child in order to become talent spotters. Teachers were asked to consider learning styles (Gregoric, 1977) and temperaments (LaHay, 1977) of young children. Teachers were also led to analyze their own development as teachers according to Lilian Katz's Stages of Teacher Development (1972). Each week teachers shared problems and successes of activities and experiences they had tried with their

students during the previous week.

Weeks Three-Thirteen. During the following 11 weeks, each of the 11 creative thinking behaviors was studied in depth. The teachers participated as learners in sample activities to demonstrate how creative thinking could be integrated into academic curricula. The instructor modeled how the activities were to be planned, presented, and monitored. Following active participation in the creative thinking activities, teachers were led into discussions concerning theory, research, content webbing, and objectives of each lesson. The major emphasis of these 11 weeks dealt with the importance of planning the creative thinking behaviors into the existing curricula. These 11 creative thinking behaviors represented level II in Renzulli's Enrichment Triad continuum (Renzulli, 1977). Teachers were taught to utilize the Individual Education Plan (IEP) and the Pink Planning Sheet in order to help themselves in planning for the gifted within their classrooms. Examples of the MIZAR IEP and Pink Sheet are included in this section of the appendix.

Week Fourteen. Type III (Renzulli, 1977) or differentiated curriculum planning was presented at this time. The Blue Sheet, so called because it was run off on blue paper, was used to help explain the four criteria necessary for developing differentiated curriculum for gifted students

within the regular classroom setting. An example is included in this appendix. The independent study system specifically designed for MIZAR identified students was studied as an instrument for differentiating curriculum. Classroom management techniques were webbed into each of the 15 sessions.

Week Fifteen. Original curricula in the form of mini-studies written by MIZAR teachers in training were shared with the class. Teachers were also asked to share what they had personally gained from the training. Special recognition was awarded to each new MIZAR teacher. The dream of the MIZAR program along with its responsibilities and ownership were ceremoniously presented to each teacher who had completed the MIZAR training.

MIZAR INDIVIDUALIZED EDUCATIONAL PLAN

NAME OF STUDENT _____ REPORTING PERIOD _____

NAME OF TEACHER _____ GRADE _____ SCHOOL _____

IDENTIFIED TALENTS: Math/Non Verbal____ LangArts/Verbal____ General Ability____

TYPE I ACTIVITIES - Input	Lang. Arts/ Reading						Math						Spelling						Health/ Science						Social St.					
Knowledge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Comprehension	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Application	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TYPE II ACTIVITIES - Process	**Lang. Arts/ Reading**						**Math**						**Spelling**						**Health/ Science**						**Social St.**					
Analysis - take apart																														
Synthesis - rearrange/new way																														
Evaluation - assess, judge																														
Fluency - many																														
Flexibility - adapt																														
Originality - unique																														
Elaboration - add to																														
Curiosity - wonder																														
Risk Taking - guess																														
Complexity - order from chaos																														
Imagination - visualize																														

TYPE III ACTIVITIES - Product: Tangible evidence of Type II Activities

What differentiated curriculum (Type III Activities) has this student experienced this past six weeks?

_____

_____

_____

_____

_____

In Type III Activities:
1. Students take an active part in formulating both the problem and the methods for solving it.
2. No routine method of solution is predetermined.
3. Investigations are open-ended and their major purpose is to provide a forum for showing tangible evidence of Type II Activities.
4. Students manifest the attitude of producer rather than consumer throughout the project.

FROBISHER'S QUEST Title: (4th, 5th, & 6th grades only)

_____

ADAPTED FROM BLOOM'S COGNITIVE DOMAIN (1956)

ADAPTED FROM WILLIAM'S MODEL FOR ENCOURAGING CREATIVITY (1969)

ANALYSIS

Key Word: ANALYZE

- take apart
  - compare
    - classify
- examine parts
  - dissect
    - solve a secret code
- arrange in an order
  - logic problems
    - pick apart...
  - attribute listing
- What are the causes?
- participation in science experiments
  - Tangrams
- unscramble (ex. spelling or vocabulary words)

SYNTHESIS

Key Words: CREATING ORIGINAL PRODUCTS, PATTERNS OR STRUCTURES

- make something new/ original from something old
- make up an original code
  - create an original ___
- design an original map, graph, etc.
  - write a new caption
    - recycle
      - improve
- Let's redesign a _____
  - invent
- combine objects, words, etc. to make an original project
- eliminate or rearrange to create something orig.

EVALUATION

Key Word: CRITIQUE

- tell why you chose this..
- justify
  - defend choice or answer
    - judge
- rank or rate
- "I learned" statements
- summary statements for graphs or science experiments
- debates, panels
  - argue all sides
- Is it good? How? Why?
- Will it work? Why?
- What was it in the story that made you think...

FLUENCY

Key Word: MANY

- List all you can think of to ....
- Write as many sentences as you can about ....
- Look for many answers or ideas.
- Show all the ways you can ....
- list attributes of ....
- Find as many _____ as possible.
  - Brainstorm
- Invent as many ways to _____ as you can.
- How many ways can you _____?

FLEXIBILITY

Key Words: BREAK A MIND SET

- see things from a different point of view
- What would happen if ....
- How would you feel if ...
- Imagine what it would be like if ....
- Show a variety of ....
- Adapt this ____ to form a new _____.
- List different ways to...
- What are some alternatives?
- How could we change...?
- Let's shift gears and take a different approach
- Brainteasers
  - Find the misspelled words.

ORIGINALITY

Key Words: UNIQUE, NEW, FRESH IDEAS

- Think of an original idea to ....
- What are some different, less obvious ways we could...?
- unusual responses
- Find new uses for...
- What are some ways to improve...?

ELABORATION

Key Word: EMBELLISH

- Take this idea and expand it.
- Make bigger, longer, prettier, uglier, etc.
- Add more details
  - to ADD on to ...
- Embroider upon a simple idea to make it more elegant.
  - Elaborate
- What additional ideas can you ...?
- Clarify ideas

CURIOSITY

Key Words: TO WONDER ABOUT

- I wonder... • Suppose...
- What would happen if ...
- Science experiments
  - follow a hunch
    - ponder
- Provocative questions
- How could we ...?
- Can anyone think of ways we could ...?
- mysteries, puzzles, brainteasers
- CHOOSE YOUR OWN ADVENTURE stories
- How does it work?

RISK TAKING

Key Words: HAVING COURAGE TO -

- predict
- make a guess
- share ideas, poems, products, etc.
- make an estimate
- experiment
- try out
- be different
- have a different idea
- take a stand
- defend an idea
- any questions?
- Who can tell me...?

COMPLEXITY

Key Word: PUZZLING

- complex
  - to be challenged to ...
- bring a logical order from chaos
- brainteasers
  - Logic problems
- delve into intricate "what if's"
- in depth skills of search
- Rubic's Cube, strategy puzzles/games, Tangrams Black Box, Chess, etc.
- HARNADEK materials

IMAGINATION

Key Words: MENTAL PICTURES

- visualize
  - daydream
    - fantasize
      - pretend you ....
- Creative Expression: writing, dramatization, music, dance, art illustrations
- graphs
  - Tangrams
    - imagine you are ....
- SCAMPER, Put Your Mother on the Ceiling
- analogies • Black Box
- Use your imagination to see....
- Haikus, poems, etc. are WORD PICTURES

THE BLUE SHEET

Explanation and Examples of Type III Activities

A Type III Activity must include all four steps in order to be classified as differentiated curricula for the gifted.

Step One: Students take an active part in formulating both the problem and the methods for solving it.

Have my students taken an active part in determining what they want to study and how they plan to acquire the needed information? Active implies cooperation between the teacher and the students.

Determining WHAT to study: (a) Small groups of MIZAR students might brainstorm questions they wish to investigate pertaining to the content area being studied by their class. (Don't forget to encourage students to use the Bloom Sheet for developing more effective questions.) (b) Students will peruse questions and mark through those to which they already have the answer. (c) The teacher should guide each group in evaluating and selecting from their remaining questions those most feasible for study.

Determining HOW to collect information: At this point, students should be ready to come to a group consensus concerning HOW they plan to acquire information and divide responsibilities.

Examples of sources for information:

- interview experts
- watch films
- read books, periodicals, etc.
- write letters
- listen or view cassette tapes or videotapes
- visit museums, exhibitions, etc.
- develop experiments
- watch television documentaries
- attend seminars, lectures, etc.
- design original surveys, polls

At this time, you may wish to use contracts, time lines, etc. to lead students toward the completion of their project.

Step Two: No routine method of solution is predetermined.

Have I allowed my students to determine and design their methods for approaching and sharing this investigation?

Have I given them the support and encouragement to work within their own personal learning styles in this particular situation?

See the reverse side of this sheet for an explanation, examples, and ideas for teaching within the four learning styles.

Step Three: Investigations are open-ended and their major purpose is to provide a forum for showing tangible evidence of Type II Activities.

What Type II behaviors are these students using in this project?

Are they analyzing?
Are they synthesizing?
Are they making evaluations?
Are they fluent?

Step Four: Students manifest the attitude of producer rather than consumer throughout the project.

Have I served as a resource person to them during their investigation? Was this project their product?

Bonus: Did I learn something new from their study?

Role of Teacher:

- to generate broad topics from regular academic content
- to arrange periodic conferences with groups
- to aid students in time management, due dates, sharing times, etc.
- to provide group meeting and working times
- to monitor group progress
- to set date, time, and place for sharing

Role of Student:

- to determine specific question(s) to investigate
- to determine how to acquire information to answer question(s)
- to work cooperatively with others to achieve a common goal
- to meet responsibilities, deadlines, etc.
- to design and develop method of presentation
- to share new information (new to students) gleaned from the study

Examples of Presentation Ideas:

- videotape
- debate
- short dramatic presentation
- article written for publication
- original student-made books, brochures, learning kits, etc. for the school library
- panel discussion (involving questions from the class)
- display (experiments, posted results, etc.)
- oral report
- short slide presentation
- scientific demonstration
- original games incorporating data collected
- creative writing products - songs or ballads poems, journals, short stories, etc.
- original time lines, murals designed by group

Has this activity included all four of the preceding steps? If so, the title of this mini-project should be recorded on the I.E.P. as a Type III Activity.

FOUR LEARNING STYLES

If we as educators are to successfully address the need of differentiating the curriculum for the gifted, we must relate teaching styles to individual learning preferences. Definitions of the four learning styles are built from a combination of four descriptors: Concrete (senses), Sequential (structure), Abstract (apart from the senses), and Random (apart from structure). To aid understanding of the learning preference models, we offer the following descriptions:

The Concrete-Sequential Learner:

This student's learning preference is characterized by a finely tuned ability to obtain information through direct, hands-on experiences. This learner exhibits extraordinary development of the five senses.

Order and logical sequence of the "if-then" situations are appreciated. If the eye is being studied in health, a plastic model handled by the teacher is insufficient for *this* learner. He would really rather dissect a cow's eye himself.

This learner prefers step-by-step directions when confronted with a learning assignment/situation. He is one who not only looks for directions, but also follows them. He likes clearly ordered presentations. This student will defer to authority and guidance in the learning environment and will usually not tolerate distractions.

Materials that appeal to the Concrete Sequential Learner include:

workbooks, lab manuals, lectures accompanied by overhead transparencies, drawings or models, hands-on materials and equipment, programmed or computer-assisted instruction, and well structured field trips.

The Concrete-Random Learner:

This student's learning preference is characterized by an experimental attitude and accompanying behavior. Such learners get the gist of ideas quickly and demonstrate the uncanny ability to make intuitive leaps in exploring unstructured problem-solving experiences. Occasionally, however, they also have insights and make leaps in structured situations. The children are then often chided for not showing their steps or for jumping to conclusions.

The trial-and-error approach is utilized when acquiring information. These students do not like cut-and-dried procedures which deny them opportunities to find answers in their own ways. They do not respond very well to teacher intervention in their independent efforts.

Materials and teaching approaches which appeal to the Concrete-Random Learner include:

a stimulus-rich environment, games, simulations, Frobisher's Quest, optional reading assignments, problem-solving activity, mini-projects, brief mini-lectures that set the stage for exploration.

The Abstract-Sequential Learner:

This student's preference is characterized by excellent decoding abilities in the area of written, verbal, and image symbols. He has a wealth of conceptual "pictures" in his mind against which he matches what he reads, hears, or sees in graphic and pictorial form. He has and likes to use reading skills, listening skills, and visual translation abilities. A symbol is worth a thousand words to this person.

A presentation that has substance, is rational, and is sequential will be preferred by this student. He is able to extract main ideas from such an approach. Such a learner is not deterred by a dull lecturer if the material presented is well-organized and meaningful. This preference also includes deference to authority in an assignment/learning situation. He has a low tolerance for environmental distractions which could cause him to divert energy from the task at hand.

Materials and teaching approaches which appeal to the Abstract-Sequential Learner include:

extensive reading, lectures, audiotapes, instructional phonograph records, and quiet well-controlled environment.

The Abstract-Random Learner:

The Abstract-Random Learner is distinguishable by his attention to human behavior and an extraordinary ability to sense and interpret "vibrations". He is attuned to nuances of atmosphere and mood. This learner associates the medium with the message. He ties a speaker's manner, delivery, and personality to the message being conveyed. In doing so, he evaluates a learning experience as a whole.

This student prefers to receive information in an unstructured manner and is therefore comfortable in group discussions, activities which involve multi-sensory use, and busy environments. He seems to gather information and delay reaction. He then organizes material through reflection to get out of it what he wants.

Materials and teaching approaches which appeal to the Abstract-Random Learner include:

short reading assignments followed by class activities, group discussions, group or team work, Frobisher's Quest, filmstrips with records, movies, television documentaries/specials, and assignments that permit reflection or "soaking" time.

(Gregoric,1977)

APPENDIX B

INSTRUMENT AND DATA RECORDING INDEX

CRITERIA FOR EVALUATING TEACHER IMPLEMENTATION OF CREATIVE THINKING BEHAVIORS INTO THE ACADEMIC CONTENT

ADAPTED FROM BLOOM'S COGNITIVE DOMAIN (1956)

ADAPTED FROM WILLIAM'S MODEL FOR ENCOURAGING CREATIVITY (1969)

ANALYSIS	SYNTHESIS	EVALUATION	FLUENCY	FLEXIBILITY
Key Word: ANALYZE •take apart •compare •classify •examine parts •dissect •solve a secret code •arrange in an order •logic problems •pick apart... •attribute listing •What are the causes? •participation in science experiments •Tangrams •unscramble (ex. spelling or vocabulary words)	Key Words: CREATING ORIGINAL PRODUCTS, PATTERNS OR STRUCTURES •make something new/ original from something old •make up an original code •create an original ___ •design an original map, graph, etc. •write a new caption •recycle •improve •Let's redesign a _____ •invent •combine objects, words, etc. to make an original project •eliminate or rearrange to create something orig.	Key Word: CRITIQUE •tell why you chose this.. •justify •defend choice or answer •judge •rank or rate •"I learned" statements •summary statements for graphs or science experiments •debates, panels •argue all sides •Is it good? How? Why? •Will it work? Why? •What was it in the story that made you think...	Key Word: MANY •List all you can think of to .... •Write as many sentences as you can about .... •Look for many answers or ideas. •Show all the ways you can .... •list attributes of .... •Find as many _____ as possible. •Brainstorm •Invent as many ways to _____ as you can. •How many ways can you _____?	Key Words: BREAK A MIND SET •see things from a different point of view •What would happen if .... •How would you feel if ... •Imagine what it would be like if .... •Show a variety of .... •Adapt this ____ to form a new _____. •List different ways to... •What are some alternatives? •How could we change...? •Let's shift gears and take a different approach •Brainteasers •Find the misspelled words.

ORIGINALITY	ELABORATION	CURIOSITY	RISK TAKING	COMPLEXITY	IMAGINATION
Key Words: UNIQUE, NEW, FRESH IDEAS •Think of an original idea to .... •What are some different, less obvious ways we could...? •unusual responses •Find new uses for... •What are some ways to improve...?	Key Word: EMBELLISH •Take this idea and expand it. •Make bigger, longer, prettier, uglier, etc. •Add more details •to ADD on to ... •Embroider upon a simple idea to make it more elegant. •Elaborate •What additional ideas can you ...? •Clarify ideas	Key Words: TO WONDER ABOUT •I wonder... •Suppose... •What would happen if ... •Science experiments •follow a hunch •ponder •Provocative questions •How could we ...? •Can anyone think of ways we could ...? •mysteries, puzzles, brainteasers •CHOOSE YOUR OWN ADVENTURE stories •How does it work?	Key Words: HAVING COURAGE TO – •predict •make a guess •share ideas, poems, products, etc. •make an estimate •experiment •try out •be different •have a different idea •take a stand •defend an idea •any questions? •Who can tell me...?	Key Word: PUZZLING •complex •to be challenged to ... •bring a logical order from chaos •brainteasers •Logic problems •delve into intricate "what if's" •in depth skills of search •Rubic's Cube, strategy puzzles/games, Tangrams Black Box, Chess, etc. •HARNADEK materials	Key Words: MENTAL PICTURES •visualize •daydream •fantasize •pretend you .... •Creative Expression: writing, dramatization, music, dance, art illustrations •graphs •Tangrams •imagine you are .... •SCAMPER, Put Your Mother on the Ceiling •analogies •Black Box •Use your imagination to see.... •Haikus, poems, etc. are WORD PICTURES

DATA COLLECTION INDEX

Tape Number: _____ Rater: _____

TYPE II BEHAVIORS INTEGRATED INTO THE ACADEMIC CONTENT - Process

												Total
Analysis - *Analyze*											Analysis	
Synthesis - *Create original products, patterns, structures*											Synthesis	
Evaluation - *Critique*											Evaluation	
Fluency - *Many*											Fluency	
Flexibility - *Break a mind set*											Flexibility	
Originality - *Unique, new, fresh*											Originality	
Elaboration - *Embellish*											Elaboration	
Curiosity - *To wonder*											Curiosity	
Risk Taking - *Having courage to*											Risk Taking	
Complexity - *Puzzling*											Complexity	
Imagination - *Mental pictures*											Imagination	

Comments: _____

Content Area: _____

Grade Level: _____

MIZAR Teacher? yes no

Number of MIZAR students in this class _____

ADAPTED FROM BLOOM'S COGNITIVE DOMAIN (1956)

and

WILLIAM'S MODEL FOR ENCOURAGING CREATIVITY (1969)

APPENDIX C

PROCEDURAL FORMS AND LETTERS

DENTON PUBLIC SCHOOLS
1205 UNIVERSITY DRIVE WEST
DENTON, TEXAS 76201
387-6151

ASSISTANT SUPERINTENDENT
CURRICULUM AND INSTRUCTION

Dear Teacher:

Our school district is one of four in the state of Texas that has been asked to participate in an elementary education study.

The quality of education within your classroom deserves to be recognized. Therefore, I would like for as many of our outstanding teachers as possible to be included in this study.

Participating teachers are being asked to record one thirty minute lesson from any content area of their choice. If you would be willing to do this, a blank cassette tape will be provided.

It has also been requested that participating teachers adhere to the following guidelines:

1. Please *do not* write anything on the outside of the tape. Just return it to my secretary, Angie Miller, through inter-office mail when you have completed your taping.

2. Please do not identify yourself in any way on the tape.

3. Please do not include your grade level or subject being taped.

Return the bottom portion of this letter as soon as possible to Angie Miller so she can send you a cassette tape.

Thank you,

Ray Chancellor

Ray Chancellor

Dear Dr. Chancellor:

I would be willing to record a thirty minute lesson for this study.

Please send me a blank cassette tape.

Signed _____

MIZAR

A DOUBLE STAR
A DOUBLE PURPOSE

March 31, 1982

SUE NELLE DeHART
DINAH CHANCELLOR

DENTON INDEPENDENT SCHOOL DISTRICT
1205 UNIVERSITY DR. WEST (817) 387-4387
DENTON, TEXAS 76201

Dear Dr. Harmon;

Thank you so much for taking on this added responsibility of helping us with our research. We will be happy to send you the results of the study.

When your teachers have completed their tapes, they should return them to you. I would appreciate it very much if you would ask them to return the completed tapes to you within a week. After you have received all ten tapes, you will need to send them to Dr. Chancellor.

The teachers from your district who volunteer to do tapes should be regular classroom teachers who have not had any training in the area of gifted education. They should not be involved in your school district's gifted program.

Inclosed with this letter is a sample letter to go to teachers explaining the taping procedures. This letter should be typed on your district's letter head.

One other thing, when a teacher returns the tape to you, please write the teacher's grade level on the back of the tape. The back of the tape is the side without a code number. The code numbers are to insure that the tapes have been distributed randomly.

Thanks again, Dr. Harmon, for your gracious cooperation!

Sincerely,
Sue Nelle DeHart
Sue Nelle DeHart

P.S. If you have any questions, call me collect. My home number is (817) 383-4492 and my office number is (817) 387-4387.

Dear Teachers:

Our school district is one of four in the state of Texas that has been asked to participate in an elementary education study.

The quality of education within your classroom deserves to be recognized. Therefore, I would like for you, one of our outstanding teachers, to be included in this study.

Participating teachers are being asked to record one thirty minute lesson from any content area of their choice. If you would be willing to do this, a blank cassette tape will be provided.

It has also been requested that participating teachers adhere to the following guidelines.

1. Please do not write anything on the outside of the tape. Just return it to me when you have completed your taping.

2. Please do not identify yourself in any way on the tape.

3. Please do not include your grade level or the subject being taped.

Return the bottom portion of this letter to me as soon as posible so I can send you a cassette tape.

Thank you,

Yes, I would be willing to record a thirty minute lesson of this study. Please send me a blank cassette tape.

Signed_____

MIZAR

A DOUBLE STAR
A DOUBLE PURPOSE

March 31, 1982

SUE NELLE DEHART
DINAH CHANCELLOR

DENTON INDEPENDENT SCHOOL DISTRICT
1205 UNIVERSITY DR. WEST (817) 387-4387
DENTON, TEXAS 76201

Dear Committee Chairperson,

In the Denton Public Schools, we have conducted four years of extensive inservice on how to teach the gifted child within the regular classroom. We have presented specific teaching strategies and techniques with follow-up and support to 201 of our classroom teachers.

We would now like to assess our training. We are not evaluating teacher delivery, amount of teacher talk, teacher-child interaction, etc. We are not making a comparison study between school districts. We are looking for evidence from our own teachers of particular teaching strategies we taught them to use in their classrooms. We want to know if the Denton teachers, who went through the training program, have actually been able to implement some of these strategies into their daily content. Some of the questions we are trying to answer include:

1. Did our teachers understand what we presented to them?
2. Do these strategies just come naturally without training?
3. When regular classroom teachers have extensive inservice and support in meeting the needs of the exceptional students within their classrooms, do they change their teaching habits?
4. Does extensive, long-term training make a difference in internalizing new or different teaching techniques?

We have asked our teachers to make a thirty-minute audio cassette tape in any content area of their choice. The request came from the curriculum office instead of the gifted and talented department, MIZAR. We did not want the teachers to feel pressured to do their best MIZAR. In order to add validity to the research design, it will be necessary to include tapes from teachers outside our own district.

We would appreciate it very much if you would allow ten of your regular classroom teachers who have not had training in gifted education to make a thirty-minute tape to be used in this study. It would be most helpful to our district and to my own post graduate work. Of course I would be happy to share my finding with your school district. As you requested, I would send two copies of the results of this study to your research committee.

Thank your for considering my request.

Sincerely,
Sue Nelle DeHart
Sue Nelle DeHart
MIZAR Coordinator

CARROLLTON-FARMERS BRANCH PUBLIC SCHOOLS

REQUEST TO CONDUCT RESEARCH

Date March 31,1982

Person(s) conducting research Sue Nelle DeHart

Address 2605 Sheraton Rd. , Denton, Tex.76201 Phone (817)-387-4387

Project Title MIZAR Evaluation

Please attach a detailed description of the project.

Major Professor or Advisor Dr. Rose Spicola Texas Woman's University

Department Education

Description of Needs: Teachers 10 Students none

Level Regular Classroom Ability

Time (be specific) A 30 min. cassette tape from ten classroom teachers

Special Procedures or Equipment Required (tape recorder) Tapes will be provided. Teachers should not identify themselves or their school district on the tape. They may tape from any content area of their choice.

NOTE: At least two (2) copies of the results of the research must be filed with the District research committee. More copies may be required depending on the nature of the research. Major professors and/or departments will be notified if this requirement is not met. I will be happy to share the results with your District research committee.

DO NOT WRITE BELOW THIS LINE

Date Received Date Considered

Approved Disapproved

Building(s) Referred

Researcher Notified Date

Final Report Received

MIZAR

A DOUBLE STAR
A DOUBLE PURPOSE

March 16, 1982

SUE NELLE DEHART
DINAH CHANCELLOR

DENTON INDEPENDENT SCHOOL DISTRICT
1205 UNIVERSITY DR. WEST (817) 387-4387
DENTON, TEXAS 76201

Dear Lee,

Thank you ever so much for taking on this added responsibility of helping me with my research.

When your teachers have completed their tapes, they should return them to you. I would apprectiate it very much if you would ask them to return the completed tape to you within a week. After you have received all ten tapes, you will need to get them to Dr. Spicola.

The teachers you ask to do tapes should be regular classroom teachers who have not had any training in the area of gifted education. They should not be involved in your school district's gifted and talented program.

One other thing, when a teacher returns the tape to you, please write the teacher's grade level on the back of the tape. The back of the tape is the side without a code number. The code numbers are to insure that the tapes have been distributed randomly.

Thanks again, Lee, for your gracious cooperation!

Sincerely,

Sue Nelle DeHart

Sue Nelle DeHart

P.S. If you have any questions, call me collect. My home number is (817) 383-4492 and my office number is (817) 387-4387.

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