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ABSTRACT

A 3-month practicum utilized teacher workshops and biweekly consultation to provide all fourth grade teachers (N=11) in a public school district with higher level questioning strategies to meet gifted students' cognitive needs. A total of six fourth grade students were identified as gifted and talented. At the workshops, higher level questioning strategies, based on Bloom's Taxonomy and Hilda Taba's Concept Development and Interpretation of Data, were modeled. Teachers used these strategies in their daily questioning routines. Strategy implementation was individually addressed in biweekly consultations. Analysis of pre-post samples of questioning strategies indicated that teachers were using the strategies and that questions were of a significantly higher level. However, an attitude survey of teachers indicated that teachers continued to feel unsure about their ability to meet the needs of these students in the regular classroom and desired additional support. Students achieved a 7.27 percent improvement on the Ross Test of Higher Cognitive Processes. Appendices include the teacher attitude survey, question/statement components classified according to Bloom's taxonomy, results of analysis of teachers pre-post question samples based on Bloom's taxonomy, sample pre-post questions, and results of the pre-post cognitive test given to students. (Contains 25 references.) (DB)

Teaching Strategies Designed to meet the Cognitive Needs of the Gifted and Talented in the Regular Classroom

by

Lena Allegro Pryor

Cluster 48

A Practicum I Report Presented to the Ed.D Program in Child and Youth Studies in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

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PRACTICUM APPROVAL SHEET

This practicum took place as described.

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Approved:

1/11/94
Date of Final Approval of Report

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Teaching Strategies Designed to Meet the Cognitive Needs of the Gifted and Talented in the Regular Classroom. Pryor, Lena, 1993: Practicum Report, Nova University, Center for the Advancement of Education. Descriptor: Gifted and Talented/Exceptional Students/ Elementary/Heterogeneous Groups/Higher Level Questioning Strategies

Fourth grade regular classroom teachers perceived they did not possess sufficient teaching strategies nor support in meeting the cognitive needs of totally mainstreamed gifted and talented students, thus, higher level thinking was not being sufficiently developed.

This practicum was designed to provide teachers of totally mainstreamed gifted and talented students with higher level questioning strategies that would meet their pupils' cognitive needs. Workshops were presented to all fourth grade teachers in a public school district. At the workshops, higher level questioning strategies, based on Bloom's Taxonomy, Hilda Taba's Concept Development and Interpretation of Data, were modeled. Teachers used these strategies in their daily questioning routine. To support the teachers, the writer visited each teacher biweekly to discuss the implementation. Teachers submitted pre and post attitude surveys and pre and post samples of questioning strategies. Students were assessed by a pre and post test of The Ross Test of Higher Cognitive Processes.

Analysis of the data demonstrated that teachers' developed significantly higher level questioning strategies; among the gifted and talented students, higher level thinking skills improved; teachers continued to express a need for support in meeting the needs of the gifted and talented mainstreamed students.

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Permission Statement

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CHAPTER I

INTRODUCTION

Description of Community

The writer's work setting was in a public school system located in a suburban community. The community is located in a highly populated state along the eastern seaboard. The state is situated between two large urban centers.

The community, until recently, had been a rural farming community. Small vegetable and horse farms occupied much of the land. The residents had been mostly farmers and trades people. Now, most of the farms have given way to single home developments, townhouses, and garden apartments. The community's socioeconomic status is middle to upper middle class.

The community had a population of 22,000. While a few residents were still farmers, most people were employed in shops in strip malls that line the highways or at corporations located in the area. Many residents were professionals who commute to the urban centers

that are within an hour's ride along one of the several major highways that disect the community. The population was predominantly caucasian; however, there were some Asian and Hispanic families.

Writer's Work Setting and Role

The writer's school district was comprised of four elementary schools, grades K-5; one intermediate school, grades 6-8; and one high school, grades 9-12. The total student population for the district is 3,104. The elementary schools had 1,477 students, the intermediate school has 710 students, and the high school had 917 students. Reflecting the racial and socioeconomic makeup of the community, the students were predominantly white and came from middle class homes.

The practicum was conducted in each of the 11, heterogeneously grouped, fourth grade classes in the district. The 11 fourth grade classes were distributed among the four elementary schools with a total of 218 students. The average class size of the fourth grades was 20 students.

The teachers involved in this practicum average 16.8 years teaching experience. One of the teachers had an advanced degree.

The 11 heterogeneously grouped fourth grade classes contained students with wide ranges of abilities. Based upon the results of their most recent standardized test, the Iowa Test of Basic Skills, the stanine scores within the district's fourth grade ranged from 2 to 9 with an average of 6.5. This range indicated a wide span of academic growth. Stanine scores were defined as normalized standard scores with a range from 1 to 9 and an average value of 5. Like percentile ranks, they were status scores within a particular norm group, (Hieronymus, Hoover & Lindquist, 1986).

Within the district, 6 of the fourth grade students, or 2.8 percent of the population, were identified as gifted and talented.

The students in the writer's school district, identified as gifted and talented, were selected through a five-part process. This process included significant scores on: (a) group I.Q. tests, (b) standardized achievement tests, (c) teacher rating, (d) special rating (peer or parental), and (e) teacher recommendation.

The writer's role was that of full-time Chapter I teacher and head teacher of the school. In the capacity of Chapter I teacher, the writer identified

the students in need of basic skills, assessed those needs, prescribed the program, and taught the students. These services were delivered through either a pull-out program or in-class support, depending on the regular classroom teacher's schedule.

The writer was also the head teacher of the school. In the capacity of head teacher, the writer managed and administered the assigned school to promote the educational development of each child. The writer assumed the responsibility for the building in the absence of the principal.

The writer's professional experience included 21 years as an elementary school teacher. The writer taught grades 2 through 6. The writer had earned a Bachelor of Arts Degree in Elementary Education and a Master of Education Degree in Educational Administration and Supervision. The writer participated in many in-service workshops and served on several curriculum revision committees.

The writer's powerbase was such that, this practicum was only conducted with the expressed permission of the district Assistant Superintendent (see Appendix A). As a full-time Chapter I teacher, the writer was not able to visit the other schools in the district during the regular school day. Therefore

any contact with the participants in this practicum was restricted to the 2, one half day workshops and brief after school meetings.

CHAPTER II

STUDY OF THE PROBLEM

Problem Description

Fourth grade regular classroom teachers perceived that they did not possess sufficient teaching strategies to meet the cognitive needs of totally mainstreamed gifted and talented students. As a result, higher level thinking skills were not being sufficiently developed.

For the purposes of this paper, the word cognitive, was defined according to Guralnik & Friend's Webster's New World Dictionary (1964) as having to do with the process of knowing or perceiving; perception. The term, thinking skills, was defined by Alvino (1990) as "The set of basic and advanced skills and subskills that govern a person's mental processes. These skills consist of knowledge, dispositions, and cognitive and metecognitive operations. They are frequently contrasted to `basic skills' and called `basics of tomorrow'" (p. 50).

Gifted and talented students are described in many ways: Clendening and Davies (1980) said, "Educators commonly define the young gifted and talented population as the upper 3 to 5 percent of school-age children and youth who are clearly superior to their peers not only in intellectual ability but also in specific academic aptitude, creative and/or productive thinking, and achievement in the visual and performing arts" (p.13).

F. Gagne (1985) defined giftedness in terms of skill or ability, and talent as related to intelligence. Gagne stated, "Giftedness corresponds to competence which is distinctly above average in one or more domains of ability. Talent refers to performance which is distinctly above average in one or more fields of human intelligence" (Parke, 1989, p. 10).

The U.S. Congress, Educational Amendment of 1978 details gifted and talented students as having above average ability. This document stated:

> [The gifted and talented are]... children and, whenever applicable, youth who are identified at the preschool, elementary or secondary level as posessing demonstrated or potential abilities that give evidence of high performance capability in areas such as intellectual, creative, specific academic, leadership ability or in performing or

visual arts, and who by reason thereof require services or activities not ordinarily provided by the school. (Parke, 1989, p. 7)

The U.S.Commissioner of Education, in a report entitled Education of Gifted and Talented, stated, "Gifted and talented children are those identified by professionally qualified persons who, by virtue of outstanding abilities, are capable of high performance. These are children who require differentiated educational programs and services beyond those normally provided by the regular school program in order to realize their contribution to self and society" (Clendening & Davies, 1980, p. 388).

Regular classroom teachers in the writer's school district had an average of 20 students in their classrooms. This was a relatively large size class. These classes contained students with wide ranges of abilities.

Previously, the district utilized a gifted and talented identification process and had a pull-out program for them. The mainstreamed identified gifted and talented students attended a weekly enrichment program. This program provided additional intellectual stimulus for the gifted and talented population of the schools. The pull-out program was discontinued. The

regular classroom teacher was totally responsible for meeting the cognitive needs of their gifted and talented students.

Briefly stated, the problem was teachers in regular heterogeneously grouped classrooms needed strategies designed to develop the higher level thinking skills of their gifted and talented students.

Problem Documentation

There was ample evidence to support the existence of a problem. A teacher of the gifted and talented was not hired for the 1991-1992 school year, and the position was discontinued.

The difficulties that fourth grade teachers encounter were varied. In order to teach effectively, a teacher had to tailor the lesson to fit the cognitive abilities of each of the students in their class including the low achiever as well as the high achiever. There were additional demands on teachers' energies, such as new curricula added in addition to the traditional content (e.g. anti-drug abuse program). Since the gifted and talented pull-out program was discontinued, the regular classroom teachers had the sole responsibility for meeting the cognitive needs of the gifted and talented.

The persons most affected by the problem were first, the teachers who felt a keen sense of responsibility to their students and second, the gifted and talented students themselves. In reality, however, the problem was felt by everyone in the school community.

The school's administration realized that a problem existed. As an example, the curriculum coordinator had introduced the integrated language process, in the form of whole language, partially, as a means of promoting divergent thinking. The coordinator had introduced a new mathematics program that included increased emphasis thinking skills. The coordinator had also attempted to introduce Renzulli's Enrichment Triad. However, the teachers opted to postpone the utilization of Renzulli's Enrichment Triad until they had fully integrated the whole language process and the math program. Then they will attempt this program for the gifted and talented. The curriculum coordinator respected their wishes.

The curriculum coordinator, in an interview with the writer, expressed the need for the district to design a, "process for meeting the needs of the gifted and talented in the classroom" (Interview, Dr. Jay Angster, April, 1992).

Only six of the 218 fourth grade students, or 2.8 percent of the grade, were identified as gifted and talented. This was because the identification process ceased when the pull-out program ended. One could only assume that more gifted and talented students remained unidentified. All of these gifted and talented students were taught exclusively in heterogeneously grouped classrooms. In order to document the problem, the writer conducted a survey (see Appendix B). Nine out of 11 fourth grade teachers responded as follows:

1. Most philosophically agreed that gifted and talented education should be conducted in the regular classroom.

2. All perceived a need for support in meeting the needs of the gifted and talented in the regular classroom.

3. Most said they did not have knowledge of specific teaching strategies to meet the needs of the gifted and talented in their classrooms.

4. Most replied that they would be receptive to training opportunities that would provide them with strategies and techniques designed to meet the needs of their gifted and talented students.

5. All felt that the needs of the gifted and talented could be met through further enrichment of the

curriculum.

6. All agreed that teaching strategies designed for the gifted and talented could be used for every student (see Appendix B).

Causative Analysis

The writer believed there were several causes of the problem. The defeat of the 1991-1992 school budget imposed fiscal constraints that mandated cutbacks in staff. These cutbacks resulted in an end to the gifted and talented program because a teacher of the gifted was not hired for that year and, the position abolished. Furthermore, gifted and talented students formerly serviced by a weekly pull-out program, no longer received those services and the entire responsibility for the enrichment of their educational program rested with regular classroom teachers.

Teachers perceived a need for the knowledge of specific teaching strategies and support as they took on yet another task. This perception needed to be addressed before teachers could effectively meet the cognitive needs of their gifted and talented students.

Causal factors included the formidable task of instructing a heterogeneously grouped class containing

students with wide ranges of abilities. The teacher needed to take into consideration the students' level of ability, the students' cognitive and affective needs, their learning style, their own style of teaching, the myriad activities associated with planning and executing lessons, evaluating students, record keeping, and housekeeping. There was little wonder that teachers felt frustrated when they were given additional responsibilities formerly addressed by an additional teacher.

The specific causes of the problem in the writer's school setting were two fold:

1. The inclusion of gifted and talented students in the regular classroom placed added demands on the resources of regular classroom teachers. Therefore they needed strategies to meet the cognitive needs of the identified students.

2. Teachers perceived a need support in their efforts to provide meaningful programs for all of their students.

Relationship of the problem to the literature

The literature contained many references to the problem as described in the writer's work setting. Many other teachers, based in self-contained

heterogeneously grouped classrooms, had concerns about meeting the needs of their gifted and talented students.

The problem was fourth grade teachers of students in heterogeneously grouped, self-contained classes needed techniques and strategies designed to develop the higher level thinking skills of their gifted and talented students. Parke (1989) states:

> Whether or not they have been officially identified, or a designated program for the gifted and talented exists in your school, it is the responsibility of each educational professional to make sure that these students are receiving a proper education commensurate with their abilities (p. 12)

The idea of the regular classroom teacher attempting to be "all things to all people" was also addressed by Treffinger (1982). He further suggested that with a large class and limited resources, the classroom teacher could not be "everything for everyone". However educators began to realize that many valuable, stimulating, and important services for gifted students could be provided effectively and efficiently in regular classrooms and should be provided there.

The gifted and talented students were being mainstreamed in the self-contained heterogeneously grouped classroom in order for them to derive the benefits of working with diverse groups. While this helped alleviate the concern for being singled out for special instruction and being labeled "superior" or "elite", they still faced their own unique problems. They needed to be challenged to explore and to grow. Cox (1979), "...came to realize that gifted and talented students are a poorly handled and often tragically mishandled group of exceptional students" (p. 75).

Parke (1989) found, that "Although they may appear to be achieving, it cannot be assumed that gifted students, when left to their own devices, will achieve at a level commensurate with their abilities" (p.5). Vance (1983) said some bright children perform poorly in arithmetic because of a lack of interest in routines or insufficient challenge.

The gifted and talented student, in the regular classroom, were not able to sustain the academic advantage, the heightened creativity, or the ability to solve problems creatively on his own initiative. Evidence showed that these students had to be constantly challenged or they lost their momentum.

Ness and Latessa (1979) suggested that when gifted and talented students did not receive appropriate programs, there was evidence to suggest they lost much of the advantage that they have when they arrive at school (Parke, 1989).

For teachers to suggest that they needed support and strategies to meet the needs of their gifted students, was not an admission of failure. It was an unrealistic expectation to assume that they could and would be able to easily perform all these tasks. Clendening and Davies (1980) found, "In most situations, the classroom teacher is a generalist who lacks the specialized preparation needed to work with the gifted and talented. The classroom teacher with a heterogeneous population can only be expected to find alternatives for the gifted and talented and to guide them toward alternatives. The teacher is not a failure because she realizes her inadequacies and inability to be all things to all children" (p. 49-50).

Teachers also found that suddenly, they had the sole responsibility for meeting the needs of the gifted and talented students in their regular classroom. Alvino and Gourley (1977) said many schools had no system for dealing with the needs of outstanding students. Because of budget constraints, teachers in

the writer's district found that they had to be totally responsible for the cognitive needs of their students. There was no program in place.

There was evidence in the literature to suggest that teachers of the gifted needed support in their efforts to meet the cognitive needs of their students. In a survey of experts in education, conducted by Dole and Adams (1983), the respondents reported that many teachers were ineffective in instructing gifted readers. The respondents cited seven explanations for this belief:

1. lack of understanding as to the nature of giftedness;

2. limited understsanding of individual differences and ways to individualize instruction;

3. too oriented to the needs of students of lesser ability;

4. no readily available curriculum;

5. inflexibility and rigidity in using grade level materials;

6. overly skill-oriented instruction; and

7. inability to deal with the higher-level cognitive processes (cited in Reis and Renzulli, 1989, p. 93).

There were several causes of the problem found in

the writer's district. Standardized test scores of heterogeneously grouped students revealed that there were wide ranges of student abilities within the regular classroom. The regular classroom teacher had to deal with the wide ranges of student abilities. Vance (1983) stated that, "Given the heavy responsibility of the teacher, in self-contained classrooms and the need to give special attention to pupils who experience difficulty, little time is available to design a special program for bright pupils" (p. 24). Feldhusen (1977) found that a number of children in typical elementary classrooms had above average talents and creative abilities or were substantially advanced in their basic skills. With the great demands placed upon teachers by the average and below average student, there was often little time left for the gifted, creative, talented student, and those who were substantially above average in basic skills. A survey among teachers and students of a school near Purdue University was conducted. The results of the survey found agreement among teachers and students that there was a need for special attention for gifted, creative, talented, and academically advanced students which teachers found difficult to provide (Gowan, Khatena & Torrance, 1979).

Another cause perceived by the teachers was the need for support in teaching the gifted and talented in the regular classroom. This support came in the form of staff development. There had been less money available for staff development within the writer's school district. The 1991-1992 school budget defeat exacerbated the problem. There had not, been an emphasis on staff development. Mangieri and Madigan (1984) conducted a survey that determined regular classroom teachers were responsible for the majority of reading instruction to gifted students even though little or no staff development had been provided to upgrade their instructional proficiencies in this area (Reis and Renzulli, 1989).

CHAPTER III

ANTICIPATED OUTCOMES AND EVALUATION INSTRUMENTS

Goals and Expectations

After analyzing the results of the fourth grade survey of the teaching staff and after reviewing the literature, the writer has several goals.

The following goals and outcomes are developed for this practicum:

1. The writer will devise a means to enable regular fourth grade classroom teachers to become more proficient in using teaching strategies designed to improve the higher level thinking skills of their gifted and talented students.

2. The gifted and talented students in the 11 fourth grades in the writer's district will demonstrate improved scores on a thinking skills test.

3. The fourth grade teachers in the writer's district will indicate that support has been given in their effort to meet the cognitive needs of the gifted and talented in their classrooms.

Expected Outcomes

At the conclusion of this practicum, several outcomes are anticipated. Seven of the 11 participating fourth grade teachers will demonstrate that they are more proficient in using teaching strategies designed to improve the higher level thinking skills of their gifted and talented students. Teachers will submit a pre and post practicum sample of 10 instructional questions of their own design and founded on social studies or science content. Proficiency will be determined by an increase of at least three, or seven out of 10 questions designed to elicit students' higher level thinking, based on Bloom's Taxonomy.

A second expected outcome will be that four out of six gifted and talented fourth grade students will demonstrate improved raw scores on a commercially produced test of higher level thinking based upon Bloom's Taxonomy. Scores will be considered sufficiently improved if the students demonstrated an increase of 15 percent of the post test raw score in comparison to the pre test raw score.

A third expected outcome would be that 7 of 11 teachers will indicate on a survey question, given at the end of the practicum experience, that support has

been provided by this practicum experience in their efforts to meet the cognitive needs of the gifted and talented students in their classrooms.

Measurement of Outcomes

The measurement of outcomes was determined in several ways. For the first outcome, regular fourth grade classroom teachers will become more proficient in using teaching strategies designed to improve the higher level thinking skills of their gifted and talented students. The teachers submitted pre and post practicum samples of typical questions used in teaching a lesson to the writer. Ten questions were submitted at the outset of the initial workshop as a survey of questions before the practicum began and 10 samples of instructional questions were submitted by the teachers at the end of the practicum experience.

In an effort to reduce tension, the anonymity of the teachers was maintained by having each teacher choose an alpha letter that they affixed to the pre and post samples, therefore providing a means for the writer to make comparisons for each individual.

The pre and post sampling of the instructional questions were analyzed to determine if any of the questions were based on educational objectives that

fell into the three higher classifications of Bloom's Taxonomy. A determination of increased proficiency for each teacher was made if there was an increase of three or more questions, or a total of seven questions, in the three higher ranks of Bloom's Taxonomy.

For the second measurement of outcomes, gifted and talented students will score higher on a test of thinking skills. The measurement instrument was the Ross Test of Higher Cognitive Processes. This test was designed to measure ability in the levels of higher level thinking referred to in Bloom's Taxonomy of Educational Objectives, Handbook I as analysis, synthesis, and evaluation. The gifted and talented students were required to demonstrate improved raw scores in a comparison of pre and post practicum tests. The standard of achievement for this outcome was based on four of the six identified gifted and talented students demonstrating improved scores on the Ross test of Higher Cognitive Processes.

The third measurement of outcomes is a comparison of the pre and post practicum survey (see Appendix C). Seven out of 11 teachers indicated a positive response to item two on the post survey indicating support was provided in their efforts to meet the cognitive needs of their gifted and talented students in the regular classroom.

Mechanism for Recording Unexpected Events

As a mechanism for recording unexpected results, the writer kept a journal. In the journal, an anecdotal record of the events that happen at all workshops and meetings conducted by the writer was kept. In addition, the writer recorded the personal observations of forseen and unforseen occurrences that impacted on the practicum, ideas generated by the writer on how to prevent or solve problems during the implementation process, as well as the results of all the measures of outcomes and a summation of the writers's thoughts at the end of the practicum experience.

CHAPTER IV

SOLUTION STRATEGY

Discussion and Evaluation of Possible Solutions

The problem, found in the writer's school district was that, fourth grade teachers in regular, heterogeneously grouped classrooms needed strategies designed to meet the cognitive needs of their gifted and talented students. Various strategies were suggested in the literature that would enable regular classroom teachers to meet their students' cognitive needs.

Treffinger (1982) stated that many schools were less concerned with pull-out programs and more in favor of providing challenging programs for all within the regular classroom. This was the case in the writer's school district. The administration felt that the needs of the district's gifted and talented students could best be met in the regular classroom and the writer's purpose in proposing this practicum was to further integrate programs that met the needs of these

students.

Feldhusen (1977) described a cooperative program between Purdue university and a local public school. The program was a course for undergraduate and graduate students which provided structured, practical experiences with gifted and talented students and at the same time, provided worthwhile experiences for the children. The results of the program were positive. It met the needs of the education students at Purdue and the local school children as well (cited in Gowan, Khatena & Torrance, 1979). While this was an exciting concept and certainly worthwhile for all stakeholders, a program of this scope would have required extensive planning and coordination between the local school district and the cooperating college. This would have required more time than this practicum permitted and would have been out of the writer's locus of control.

Vance (1983) and Cox (1979) suggested differentiated assignments, multilevel performance activities, and enrichment within a unit as strategies to be used with gifted and talented students in the regular classroom. The writer found from experience that these strategies were appropriate to the regular classroom. They would work particularly well with group and individual project activities. The teacher

could prepare differentiated assignments based on the students' abilities and all within the same project or individual projects. Yatvin (1982) said the necessary conditions for the gifted could be met in the regular classroom through project teaching, a system of regularly assigning sustained and complex tasks that have a purpose, a context, a specified audience and results.

Blurton (1983) said teacher-made science packets which ccould be extrapolated to any content area, offer self-directed, and open-ended activities. This writer has found that teacher-made packets had long been a mainstay of classroom teachers. These portable learning centers could be of great interest to students. The activities were designed to offer interesting activities that the gifted and talented students could continue to investigate outside the regular classroom.

The Hilda Taba Teaching Strategies were structured, generic methods in which the teacher lead the students through a series of thinking skills by the use of open-ended questions (Maker, 1982). These strategies could be used for all students in the heterogeneously grouped classroom because the open-ended questions could provide a vehicle for the

students to extend their thinking as far as their abilities permit. In addition, the strategies could be used in all content areas. The Hilda Taba Teaching Strategies offer a viable solution to the problems regular classroom teachers face in meeting the needs of their gifted and talented students.

Treffinger (1982) listed 60 characteristics of effective instruction for gifted students in the regular classroom. These characteristics included six general categories or areas of need:

1. individualizing basic instruction
2. appropriate enrichment
3. effective acceleration
4. independence and self-direction
5. personal and social growth
6. career perspectives with a futuristic orientation.

The 60 ingredients were time tested suggestions for teachers such as interest centers, testing students out of known material, and learning packets. Many of these ingredients were already incorporated in the classroom of the creative educator. The writer found these activities were an interesting assortment of ideas to enrich the program for our gifted and talented students. Several of Treffinger's 60 ingredients could

have been effectively utilized to offer variety and interest during the course of the school year.

Curriculum compacting was another way of challenging gifted and talented students. Starko (1989) used this technique to motivate gifted students. Several questions were asked about each student:

1. What did the student know? An assessment of known and unknown skills.

2. How would we be sure he knews the basics? The plan for teaching and assessing.

3. What acceleration/enrichment activities would we add? A means of deciding what activities are to be planned for the student.

Curriculum compacting was one means of meeting the basic skills needs and higher level cognitive needs of the gifted and talented students in the regular classroom. From the writer's experience, curriculum compacting was a workable solution. It required assessing each student, diagnosing their needs, and then prescribing their individual program. The program could be carried out through the use of student contracts. A program like this required much organization and follow through, which may not be suited to all teachers.

Parke (1989) stated that gifted and talented students could be engaged in meaningful activities by exposing them to guest speakers who were experts in their field. These experts could whet the appetites of these gifted learners and offer them the means to carry on their own investigations in that field.

Parke (1989) suggested classroom interest groups as a way to accommodate individual interests in the regular classroom. The teacher sets aside a block of time each week for the groups to meet. Outside experts could be brought in and research could be done by the students. At the end of the time period, the group reports to the class and then, new interest groups are formed.

Cohen (1983) and Parke (1989) offered the use of open-ended questioning techniques. This idea was particularly valuable because these activities could go on throughout the school day. Divergent questioning techniques could be utilized with all content areas and in informal classroom discussions. Students themselves would eventually begin to use open-ended questioning techniques. Cohen (1983) said, "Questions broad in nature should be posed that challenge the child's thinking and have the potential to stimulate such thinking beyond just that of deriving a specific

answer" (p. 377). Through a review of the literature, the writer found that Parke (1989) suggested guest speakers, Cohen (1983) suggested interest groups, and both Parke and Cohen said open-ended questions were all strategies recommended for the gifted and talented. However, Renzulli (1977) incorporated all three of these strategies along with open-ended projects and explorations in his Enrichment Triad.

The Enrichment Triad Model was a widely used programming model for the education of high ability students. Reis and Renzulli (1989) stated that, "It consists of three types of enrichment experiences.Types I and II Enrichment can be offered to all students and Type III Enrichment is usually more appropriate for students with higher levels of ability, interest, and task commitment" (p. 95). This model easily lends itself to the regular classroom because it has something for everyone. Reiss and Renzulli (1989) suggested that the Enrichment Triad Model could be used along with curriculum compacting. Curriculum compacting could free up the student to pursue their own interests within the Enrichment Triad Model.

The writer generated several ideas that enabled the regular classroom teacher to meet the cognitive needs of their gifted and talented students. One idea

was ability grouping within the regular classroom. Parke (1989), Starko (1989), and Reis and Renzulli (1989) suggested this activity in various forms. Students could have been tested for needed skills, their curriculum compacted, and then homogeneously grouped for special projects or placed in groups according to their interests.

Another idea was qualitative and/or quantitative enrichment in the regular heterogeneously grouped classroom. Qualitative enrichment involved special projects or enriching activities along with the regular curriculum and within the regular classroom. Vance (1983) suggests differentiated enrichment, multilevel performance learning activities, and enrichment within a unit. Cox (1979) told us the difference should be in the degree and type of impact one set of stimuli could have on an individual. Quantitative enrichment involved enabling the gifted and talented learner with the means to accomplish curriculum goals sooner than the average student. Either type of enrichment could have been managed within the context of the regular classroom.

Regular classroom teachers, concerned about meeting the cognitive needs of their gifted and talented students, could be using alternative teaching

strategies designed to enhance the students' higher level thinking skills. Cohen (1983) and Parke (1989) suggested teaching higher level thinking as a means of meeting the needs of the gifted and talented students. Many educators believe thinking skills can be infused throughout the curriculum. Infusing the curriculum with higher level thinking skills is a viable means of teaching students how to think and how to solve problems. By infusing these skills in the content, the teacher would not need to teach additional programs, but instead, uses the existing curriculum in a more meaningful and fruitful way.

Homogeneous grouping or tracking is a common means of meeting the needs of the gifted and talented. This is more commonly done in schools where the content is departmentalized.

The Renzulli Enrichment Triad Model (1977) was another option and offered enrichment activities for all the students while providing them with activities that are of special interest to them. This program enabled students to extend their learning beyond the regular curriculum. It fostered divergent thinking, problem solving, and allowed for freedom of choice.

Other ideas that came to mind were enrichment packets, multilevel activities, and learning centers.

Regular classroom teachers needed continuing inservice and exposure to new educational programs if they were to stay on the cutting edge of educational excellence. They need to use strategies that facilitated the teaching and learning experience, not just new programs that added to those already in place. Clendening and Davis (1980) told us that:

> Even when teachers of the gifted are carefully selected and represent the highest levels of professional competence, their teaching performance can be significantly improved through inservice study. Highly desirable changes in the quality of learning, communication, classroom content, and diversity of classroom experiences have resulted. (p. 419)

If regular classroom teachers were to be successful in their attempts to meet the needs of their gifted and talented students, then they ought to be provided with the teaching strategies and support necessary for them to succeed. The problem could not be ameliorated just by adding new programs for the gifted to a curriculum that was already full. Instead, we should find ways for teachers to "teach better", to utilize recognized strategies that involved higher level thinking, and to use problem solving skills, in

order to teach the curriculum in challenging and intriguing ways.

Treffinger (1982) suggested that in these times of change, many classroom teachers were already actively involved in meeting the needs of their gifted and talented students and that, "These teachers continue to be concerned with improving their provisions and services for these students" (p. 268). Treffinger suggested that 60 characteristics of effective instruction for gifted students that could be provided in the regular classroom. "These characteristics included six general categories or areas of need, (a) individualizing basic instruction, (b) appropriate enrichment, (c) effective acceleration, (d) independence and self direction, (e) personal and social growth, (f) career perspectives with a futuristic orientation" (p.268).

Description and Justification for the Solution Selected

The writer was mindful of the awesome responsibilities of regular classroom teachers. The writer was also aware of the inordinate demands on classroom teachers' time and energies. The writer was also cognizant of the teachers' desire for more knowledge of specific teaching strategies to meet the

needs of their gifted and talented students. Therefore, the writer devised an efficient and economical means for regular classroom teachers to teach the students the higher level thinking skills that are so important for them to become successful in a modern society. The writer felt that it was also important that teachers have a selection of these strategies easily available to use whenever an appropriate situation warrants.

The writer was prepared to try several steps. The writer researched several teaching strategies that had proven to enhance higher level thinking in students. The writer planned to present two inservice workshops of one half day each. The purpose of the workshops was to model and to discuss each of the strategies, to offer a format for the teachers to practice using them, and to provide handouts of the strategies for teachers to use in their classrooms. Finally, the writer planned to visit teachers biweekly to discuss the strategies and to offer suggestions and support.

The writer believed that the combination of the strategies, handouts, and inservice was an effective means of increasing teachers' knowledge of several teaching strategies suitable for the gifted and

talented students in their regular classrooms. The inservice and biweekly visits were a means of offering support to teachers in their efforts to meet the needs of their gifted and talented students. Finally, teachers became more proficient in using strategies designed to improve the higher level thinking skills of their students, thereby improving student scores on a thinking skills test.

The writer was prepared to take several steps in completing the practicum: (a) apply for and receive administrative approval for the implementation; (b) search and select from the literature, teaching strategies suitable for use with gifted and talented students in the regular classroom; (c) compile the strategies in the form of handouts; (d) plan and conduct the first of two inservice workshops for the district's fourth grade teachers where the strategies would be modeled, practiced, and a handout of those strategies provided; (e) test all fourth grade students identified as gifted and talented with the Ross Test of Higher Cognitive Processes, provided by the district, as a pretest of higher level thinking; (f) during the the implementation of the practicum visit two of the four schools every other week, alternating schools, at the end of the school day; (g) conduct a second

workshop midway through the practicum where additional strategies would be modeled, practiced, discussed, and handouts of those strategies provided; (h) post test identified gifted and talented fourth grade students using the Ross Test of Higher Cognitive Processes, at the end of the practicum experiences; (i) post sample teachers' instructional questions; (j) post survey teacher attitudes regarding gifted and talented education in the regular classroom; (k) disseminate the results of the measures to the teachers.

During the initial workshop, a presample of teachers' instructional questioning techniques was taken. The biweekly meetings with the fourth grade teachers in each of the buildings were a means of discussing concerns generated during their use of the strategies.

Calendar Plan

The writer adhered to a 12 week timeline.

Month 1 - Week 1: The writer presented a workshop to all fourth grade teachers in the district. During the workshop, the writer collected a presample of teachers' questioning techniques and modeled several of the strategies. The writer provided the participants with handouts explaining the strategies. The writer visited

each school and administered the Ross Test of Higher Cognitive Processes to identified gifted and talented fourth grade students.

Month 1 - Week 2: Teachers implemented strategies modeled at the initial workshop. The writer met with the fourth grade teachers at two of the four schools in order to discuss the strategies used by the teachers and tried to ameliorate any problems they had incurred.

Month 1 - Week 3: The fourth grade teachers continued to implement strategies introduced at the initial workshop. The writer met with the fourth grade teachers at the remaining two schools, discussed the strategies being used by the teachers and tried to solve any problems incurred.

Month 1 - Week 4: The writer met again with the fourth grade teachers at the first two schools, discussed the strategies used by the teachers, and tried to ameliorate any problems they had incurred during the previous two weeks.

Month 2 - Week 1: The fourth grade teachers continued to implement strategies introduced at the initial workshop. The writer met with the fourth grade teachers at the remaining two schools in order to discuss the strategies being used by the teachers and tried to solve any problems incurred.

Month 2 - Week 2: A second workshop was presented by the writer. Concerns were addressed and the remaining strategies were modeled. Additional handouts were provided. Teachers implemented all the strategies modeled at the two workshops.

Month 2 - Week 3: The teachers implemented all strategies. The writer met with fourth grade teachers from two schools to discuss the strategies and to solve any problems.

Month 2 - Week 4: The teachers continued to implement all strategies. The writer met with fourth grade teachers from the alternate two schools to discuss their use of the strategies. Concerns were addressed.

Month 3 - Week 1: The implementation of all strategies by fourth grade teachers continued. The writer met with the fourth grade teachers of the alternate two schools in order to address concerns.

Month 3 - Week 2: Teachers continued to implement all strategies. The writer met with fourth grade teachers from the alternate two schools to discuss their use of the strategies. Concerns were addressed.

Month 3 - Week 3: The implementation of all strategies by fourth grade teachers continued. The writer met with the fourth grade teachers of the

alternate two schools and addressed concerns.

Month 3 - Week 4: The writer administered the Ross Test of Higher Cognitive Processes to all identified gifted and talented students as a posttest of higher level thinking. The writer obtained a post sample of teachers' questioning techniques and a post survey of teachers' attitudes toward gifted and talented education in the regular classroom was conducted. The writer held a final meeting after school in each building with the fourth grade teachers and discussed teacher satisfaction with the strategies and the implications for improved performance on the part of teachers and students.

Report of Action Taken

The writer undertook several steps in the implementation of this practicum:

1. The writer researched the Taxonomy of Educational Objectives, The Classification of Educational Goals Handbook I: Cognitive Domain (1956) edited by Benjamin Bloom. The writer located several handouts of questioning strategies. The writer adapted one handout of questioning strategies for use during the writer's workshop (Appendix D). The writer also researched the questioning strategies of Hilda Taba

(Hunkins, 1989; Institute for Staff Development, 1971; Maker, 1982); Creative Problem Solving (Noller, 1986); and Renzulli's Enrichment Triad Model (1977).

2. The writer initially conducted a teachers' workshop. The pre samples of teachers questioning strategies were collected. Bloom's Taxonomy of Educational Objectives were discussed and questioning strategies based on Blooms Taxonomy were modeled by the writer. The teachers, working in groups, cooperatively formed instructional questions from various content areas based on the more complex levels of Bloom's Taxonomy, analysis, synthesis, and evaluation. After the groups developed the questions, the queries were critiqued to determine if they fell into the three categories of questions that would engender higher level thinking on the part of their students. The teachers were encouraged to utilize similar higher level questioning strategies with all the students in their heterogeneously grouped classes as part of their regular instructional plan. A handout was provided to teachers to facilitate their use of higher level questioning strategies while planning and implementing lessons (Appendix D). One teacher was on sick leave and did not attend the workshop. The writer inserviced the returning teacher during one of the after school

visitations.

3. The writer pretested all six identified gifted and talented students in the district's fourth grade

4. The writer visited each fourth grade teacher biweekly after school.

5. A second workshop was conducted. The writer modeled Hilda Taba's Concept Development and Interpretation of Data strategies. Concept formation is a three step process which includes (a) identifying and listing data, (b) grouping the data according to some common trait, (c) categorizing and labeling data. Interpretation of data also contains three steps (a) enumerating important relationships, (b) exploring relationships, (c) inferring (Hunkins, 1989; Institute for Staff Development, 1971; Maker, 1992). The teachers worked in groups to develop lessons based on these strategies and presented them to their fellow teachers. The group critiqued them. The teachers were asked to utilize these techniques along with those strategies previously learned during the initial workshop, with all the students in their heterogeniously grouped classrooms.

6. The writer continued to visit all teachers after school until the last week of the practicum period.

7. A posttest was administered by the writer to the six identified gifted and talented students. A post survey of teachers' opinions and post sample of teachers' questioning strategies was conducted.

CHAPTER V

RESULTS, DISCUSSION, AND RECOMMENDATIONS

Results

The writer believed that the needs of the gifted and talented could be met in the regular classroom if teachers used teaching strategies that would challenge students of all abilities. It was in keeping with this philosophy that the writer began this practicum. The teachers were given questioning strategies that could be incorporated with their regular lessons.

The writer chose a sampling of teacher questions as means of determining whether the teachers had internalized the use of higher level questioning strategies.

The writer projected that seven of the 11 participating teachers would be more proficient in writing questions that fell into the three higher classifications of Bloom's Taxonomy, that is analysis, synthesis, and evaluation. These questions could be

those typically used by the teacher during the ongoing lesson or those questions used to evaluate the student's learning.

Ten questions would be submitted at the outset of the initial workshop as a survey of questions before the practicum began and 10 samples of instructional questions would be submitted by the teachers at the end of the practicum experience. The pre and post sampling of questions would be analyzed by the writer to determine how many of the questions fell into the three higher classifications of Bloom's Taxonomy, namely the categories of analysis, synthesis, or evaluation. A determination of increased proficiency for each teacher would be an increase of three or more questions, or a total of seven questions, in the three higher or most complex levels of Bloom's Taxonomy.

The results of the pre and post sample of teacher questions are presented in a table of the pre practicum sample, the post practicum sample, and the increase rating. Of the 11 teachers, 10 submitted questions for review (see table 1). Nine out of those 10 teachers demonstrated increased proficiency (see Appendix E). Of a total of 100 questions (10 questions from each of 10 teachers), the post questions proved to have 72 questions that could be classified in the three more

complex categories of Bloom's Taxonomy. This was an improvement of 44 questions. One teacher had three questions in the higher range of Bloom's Taxonomy on the pre questions and 10 questions in the higher range on the post questions, an increase of seven. Two teachers registered zero questions on the higher range in the pre questions and in the post questions one of those teachers registered eight and the other registered five. Appendices F and G offer an example of one teacher's improvement in higher level questioning strategies.

Table 1

Results of Pre and Post Sample of Teachers' Questioning Techniques Based on the Three Most Complex Categories of Bloom's Taxonomy: Analysis, Synthesis and Evaluation

Teacher	Pre	Post	Increase
A	3	7	+ 4
B	DID NOT SUBMIT SAMPLE QUESTIONS		
C	3	7	+ 4
D	1	9	+ 8
E	4	7	+ 3
F	0	8	+ 8
G	6	7	+ 1
H	0	5	+ 5
I	3	5	+ 2
J	5	7	+ 2
K	3	10	+ 7
Totals	28	72	+ 44

Teachers A, C, D, E, F, H, & K demonstrated + 3 or more improvement.

Teachers G & J demonstrated a total of seven on the post survey of questions.

This dramatic increase in proficiency in teacher questioning was attributable to the willingness of the teachers to use the strategies. Several teachers remarked about the depth of the responses the higher level questioning elicited. Another teacher stated that she had long heard of the Taba teaching strategies and was eager to use them. The availacility of the higher level questions in the handout made them easy to use instead of utilizing the low level questions generally found in textbooks. The writer felt that using higher order questioning strategies could be habit-forming if the teacher easily referred to higher order questions when writing lesson plans.

The measurement and analysis of the second anticipated outcome was conducted differently. Gifted and talented students scored higher on the Ross Test of Higher Cognitive Processes. This test was designed to measure ability in the higher levels of thinking referred to in Bloom's Taxonomy of Educational Objectives, Handbook I as analysis, synthesis, and evaluation.

The gifted and talented students were expected to demonstrate an improvement in raw scores through a comparison of pre and post practicum tests. The standard of achievement for this goal was based

upon four of the six identified gifted and talented students demonstrating 15 percent improvement of raw scores on these tests. This data is presented in detail in a table depicting a comparison of all students' pre and post test scores (see Appendix H).

Of the six students, only one demonstrated an improvement of 15 percent in a comparison of the pre-test and posttest raw scores (see Table 2). A second student's pretest score was too high to permit a score of higher than 15 percent. This student's pretest raw score was 94, a 15 percent increase would have necessitated a posttest score of 108, an impossibility, as there were only 105 items on the test. Still, there was an improvement of 9.57 percent, scoring 103 out of 105 on the posttest.

TABLE 2

Results of Ross Test of Higher Cognitive Processes Pre and Post Test Raw Score Results, Differences and Percentages of Increase

Student	Pre	Post	Diff.	Percent
A	69	83	14	20.28 %
B	92	96	4	4.35 %
C	81	84	3	3.70 %
D	94	103	9	9.57 %
E	87	96	9	10.34 %
F	58	54	- 4	1 6.90 %
Totals	481	516	35	7.27 %
Mean Total	80.17	86	5.83	7.27 %

The fact that only one student out of six exceeded the 15 percent demarcation was not as negative as it would appear. The authors of the Ross Test of Higher Cognitive Processes (1976) only predicted a 19.2 percent mean raw score for gifted students.

The pretest was normed in the fall of the year and the posttest in the spring. This represented a much greater time period than the 12 week duration of

the practicum. The writer, it appears, was overly optimistic in attempting to accomplish in 3 months what the authors of the test had accomplished in 8 or 9 months.

The writer suggests that if the mean total increase achieved by the practicum students was extrapolated, it would meet the percentages suggested by the authors (Ross & Ross, p. 20).

A third expected outcome was that seven out of 11 teachers would indicate on a survey question given at the end of the practicum experience that support had been provided by this practicum experience, in their efforts to meet the needs of their gifted and talented students (question # 2, Appendix C). Only two out of nine teachers felt that support had been provided. One teacher was unsure and six responded that they still perceived a need for support in meeting the needs of the gifted and talented in the regular classroom. The response could have been indicative of one of two factors. Either the question was unclear and perhaps a differently worded survey with questions that related specifically to the effectiveness and support offered by the practicum should have been devised, or indeed, not enough support was offered by the writer during the practicum experience. In the second case, the

visitations could have been augmented by further modeling or presenting additional inservice meetings.

Discussion

The purpose of this 12 week practicum was to increase the teachers' use of higher level thinking strategies in the regular classroom in order to meet the needs of their gifted and talented students.

The results of this practicum experience lead the writer to believe that teachers and all students benefit from the use of higher level questioning strategies used in the regular classroom. Teachers received more diversified and intriguing responses when their students learned, through practice, to consider and answer challenging, open-ended questions. R. Hyman (1974) stated, "The divergent questions, in particular, tap and develop the students' creative dimension. The teacher must ask these questions with the realization that the students' performance is closely related to his own. That is to say, students answer the questions the teacher asks of them" (p. 307).

Teachers often became mired in the shallow questioning strategies offered by textbooks. Teachers needed to expand their questioning techniques to include higher order questions. The continued use of

these challenging strategies could become habit forming. The continued use of higher level questioning could lead the teacher to abandon the banal questions provided by the text, allowing the teachers' own creativity to be expressed.

This practicum demonstrated that students could grow in their ability to respond to higher level questions when provided with the opportunity to practice the skills inherent in higher level thinking. It was incumbant upon teachers to provide their students with this opportunity.

In conclusion, the needs of the gifted and talented, and indeed all students, could be met in the regular classroom. The teacher needed to offer learning activities and questions that not only challenged their students, but also actively engaged them in the learning process. If we could accomplish this, schools and school work would become more meaningful for all of our students, gifted and non-gifted alike.

Recommendations

The results of this practicum suggested several recommendations. The following suggestions are presented:

1. Gifted and non-gifted students could be tested in order to compare how the use of higher level questioning strategies impacted on each group.

2. The teachers should have been offered additional support during the practicum process in the form of more inservice meetings, mini-lessons during the bi-weekly visitations, and/or providing literature and or literature reviews to bolster their efforts.

3. The post survey should specifically refer to the type of support that was offered during the implementation of the practicum and its ultimate value to the teachers.

Dissemination

The writer will disseminate the practicum results among colleagues by placing a copy of the practicum report in the professional library of each school. Further, this practicum and the resulting data will be shared with the building principals and assistant superintendent at an administrator's in-service presented by the writer.

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APPENDIX A

PERMISSION TO IMPLEMENT PRACTICUM I

JAY R. ANGSTER, Ed.D
ASSISTANT SUPERINTENDENT

February 11, 1993

Mary Ellen Sapp, Ph.D.
Nova University
Center for the Advancement of Education
3301 College Ave.
Fort Lauderdale, Fla 33314

Dear Dr. Sapp,

This is to advise you that Lena Pryor has my permission to conduct her practicum in Teaching Strategies Designed to Meet the Cognitive Needs of the Gifted and Talented in the Regular Classroom with fourth grade teachers in our district.

Sincerely,

Jay R. Angster, Jr.

JA/rd

APPENDIX B

SURVEY OF TEACHERS' ATTITUDE

The following is a survey designed by Lena Pryor as part of a Nova University Practicum Experience. Thank you for your consideration. **Please do not sign your name.**

Gifted and Talented Education (GATE) in the Regular Classroom

Please circle yes or no

1. Do you philosophically agree with GATE in the regular classroom? Y N

2. Do you perceive a need for support in meeting the needs of the gifted and talented in the regular classroom? Y N

3. Do you have sufficient knowledge of specific teaching strategies to meet the needs of the gifted and talented in your classroom? Y N

4. Would you be receptive to training opportunities that would provide you with strategies and techniques to meet the needs of all your students? Y N

5. Do you believe the needs of the gifted and talented can be met through a further enrichment of the curriculum? Y N

6. Do you believe that teaching strategies designed for the gifted and talented can be used for all students? Y N

Comments

APPENDIX C

RESULTS OF TEACHERS' PRE AND POST ATTITUDE SURVEY

RESULTS OF TEACHERS'PRE AND POST ATTITUDE SURVEY

Gifted and Talented Education (GATE) in the Regular Classroom

Question		Y	N	U
1. Do you philosophically agree with GATE in the regular classroom?	PRE	7	2	0
	POST	7	2	0
2. Do you perceive a need for support in meeting the needs of the gifted and talented in the regular classroom?	PRE	9	0	0
	POST	6	2	1
3. Do you have sufficient knowledge of specific teaching strategies to meet the needs of the gifted and talented in your classroom?	PRE	2	6	1
	POST	5	2	2
4. Would you be receptive to training opportunities that would provide you with strategies and techniques to meet the needs of all your students ?	PRE	8	1	0
	POST	8	1	0
5. Do you believe the needs of the gifted and talented can be met through a further enrichment of the curriculum?	PRE	9	0	0
	POST	9	0	0
6. Do you believe that teaching strategies designed for the gifted and talented can be used for all students?	PRE	9	0	0
	POST	7	1	1

Note: Nine out of eleven teachers responded.

Appendix D

QUESTION/STATEMENT COMPONENTS CLASSIFIED ACCORDING TO BLOOM'S TAXONOMY

QUESTION/STATEMENT COMPONENTS CLASSIFIED ACCORDING TO BLOOM'S TAXONOMY

I. KNOWLEDGE (Recalling what has been read, told, or seen)	II. COMPREHENSION (Understanding and translating material in own words)	III. APPLICATION (Putting abstractions to use in new concrete situations)	IV. ANALYSIS (Breaking down into parts so components and relationships are clear)	V. SYNTHESIS (Putting parts together to make a new and unique whole)	VI. EVALUATION (Making value judgments)
Check	Calculate	Adopt	Assume	Analyze a situation,	Appraise
Choose	Classify	Apply	Conclude	determine critical	Assess
Cite	Condense this paragraph	Choose	Differentiate	relationships,	Classify
Define	Convert	Construct	Divide	formulate a hypothesis,	Conclude
Describe	Define	How, when, where, why	Examine	Build	Criticize
Group	Demonstrate	Make use of	Identify	Change	Decide
Identify	Depict	Manipulate	Inspect	Choose	Determine
Label	Give an example	Mobilize	Justify conclusion	Combine	Discriminate
List	Indicate	Operate	Make a distinction	Compile	Evaluate
Locate	Infer	Organize	Search	Compose	Grade
Name	Judge	Predict	Simplify	Create	Interpret
Omit	Project	Put into action	State the point of view of	Design	Judge
Outline	Propose	Put to use	Study	Develop a model, plan	Locate mistakes
Recite	Restate the reasons	Solve	Subdivide	Evolve	Prioritize
Repeat	Show in a graph, table	Tell	The author's opinion is . . .	Find a new way to	Rate
Reproduce		Try	The implications are . . .	Generate	Reject
Sort		Use	What is true, false;	Make	Support
State		What would happen if . . .	fact, opinion	Make up	Weigh
Tally				Plan	
Transfer				Propose a theory	
Underline				Reorder	

(Adapted with permission from Taylor, T. R. Curriculum Design for Excellence, PO Box 4505 Oakbrook, IL 60522)

APPENDIX E

ANALYSIS OF TEACHERS'PRE AND POST QUESTION SAMPLES BASED ON BLOOM'S TAXONOMY

ANALYSIS OF TEACHERS' PRE AND POST QUESTION SAMPLES BASED ON BLOOM'S TAXONOMY

	Pre sample						Post Sample						+
Teacher	K	C	AP	AN	S	E	K	C	AP	AN	S	E	
A	7	0	0	2	0	1	0	2	1	1	2	4	+ 4
B	DID NOT SUBMIT POST SURVEY												
C	3	2	1	1	1	1	0	3	0	1	6	0	+ 4
D	6	2	1	1	0	0	1	0	0	2	6	1	+ 8
E	5	1	0	2	1	1	2	1	0	2	4	1	+ 3
F	10	0	0	0	0	0	0	2	0	3	3	2	+ 8
G	4	0	0	5	1	0	0	2	1	2	3	2	+ 1
H	5	5	0	0	0	0	0	1	1	3	1	1	+ 5
I	4	3	0	1	1	1	1	4	0	0	5	0	+ 2
J	5	0	0	3	0	2	0	1	0	2	1	4	+ 2
K	2	5	0	3	0	0	0	0	0	1	6	3	+ 7
Totals	51	18	2	18	4	6	4	16	3	17	37	18	+44
Total (AN + S + E)					28						72		

Key

K = Knowledge
C = Comprehension
AN = Analysis
AP = Application
S = Synthesis
E = Evaluation
\+ = Increase

Appendix F

SAMPLE OF A TEACHER'S PRE QUESTIONS

SAMPLE OF A TEACHER'S PRE QUESTIONS

Ten Pre Questions

1. Why did the colonists think it was unfair for the British government to make them pay taxes?
2. Why was our state important during the Revolutionary War?
3. Why was the Battle of Trenton so important for Americans?
4. How was the Revolutionary War hard on the colonists of our state?
5. Why was Hannah Caldwell important at the Battle of Connecticut Farms?
6. How did the Sons of Liberty benefit the colonists?
7. Why do you think the British would not give up the colonies without a fight?
8. Why was the Battle of Bunker Hill so important?
9. Why was Molly Pitcher a brave woman?
10. Why did the French help the American colonists fight the British?

APPENDIX G

SAMPLE OF A TEACHER'S POST QUESTIONS

SAMPLE OF A TEACHER'S POST QUESTIONS

TEN POST QUESTIONS

1. Explain what is occurring when we hear thunder.

2. What is the relationship between an updraft and a downdraft?

3. Support the idea that you should not stand in an open field during a lightning storm.

4. Summarize what we actually see when lightning occurs.

5. How else could you determine temperature, wind speed, and wind direction without using the typical instruments?

6. Design a new weather instrument. It can measure something other instruments measure, but it must be original and workable.

7. Based on what you know about warm and cold air, what facts lead you to the conclusion that warm air always rises.

8. Make a distinction between a cyclone, hurricane, and tornado.

9. Rank the following in terms of destruction power (number 1 being the most powerful, number 6 being the least powerful).

tornado	cyclone
whirlwind	hurricane
tidal wave	thunderstorm

10. Find an unusual way to predict the weather.

APPENDIX H

RESULTS OF PRE AND POST TEST OF THE ROSS TEST HIGHER COGNITIVE PROCESSES

RESULTS OF THE PRE AND POST TEST OF THE ROSS TEST OF HIGHER COGNITIVE PROCESSES

PRE TEST

Student Test Section	I	II	III	IV	V	VI	VII	VIII	TTL
A	8	14	6	11	0	9	9	12	69
B	12	17	7	14	7	10	11	14	92
C	11	18	6	11	0	9	13	13	81
D	12	18	8	14	8	10	12	12	94
E	12	14	7	11	7	11	12	13	87
F	3	13	2	11	4	9	4	12	58
Totals	58	94	36	72	26	58	61	76	481

POST TEST

Student Test Section	I	II	III	IV	V	VI	VII	VIII	TTL
A	8	16	5	12	7	11	10	14	83
B	12	17	6	14	7	11	14	15	96
C	13	16	6	13	0	9	12	15	84
D	13	18	8	14	10	12	13	15	103
E	12	18	8	13	7	11	12	15	96
F	6	10	4	8	1	6	8	11	54
Totals	64	95	37	74	32	60	69	85	516