To the Graduate Council:

I am submitting herewith a thesis written by Beverly Porter Jatko entitled "A Comparative Study of the Development of Problem Solving Skills in Fourth Grade Students Representing Three Socioeconomically Diverse Schools." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Special Education.

Laurence Coleman, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

A Comparative Study of the Development of Problem Solving Skills
in Fourth Grade Students
Representing Three Socioeconomically Diverse Schools

A Thesis
Presented for the
Master of Science
Degree
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Beverly Porter Jatko
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DEDICATION

This thesis is dedicated with love to my parents,

Floyd L. Porter (1924 - 1987)

and

Eva L. Porter

ACKNOWLEDGMENTS

There are many people to whom I am grateful for helping to make this thesis possible. I wish to express my gratitude to the principals and teachers who not only allowed this study but recognized its value. I would like to thank the supervisor of the talented and gifted program in which I teach for allowing the flexibility in my schedule so that I incorporate this study into my teaching duties. I would also like to thank the director of the Tennessee Future Problem Solving Program, Jann Bohnenberger, for giving unselfishly of her time and energy to evaluate my problem solving packets.

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Lastly, I would like to thank my husband, Bruce, and my children, Stacey and Brandon, for their love and patience. Without their support, this undertaking would not have been possible.

ABSTRACT

The identification of children from low-income populations for participation in talented and gifted programs has been problematic for the field of gifted education. An action research approach was used to evaluate the effectiveness of a non-traditional identification technique for economically disadvantaged students known as the "whole classroom tryout technique". Fourth grade students from three socioeconomically diverse schools were selected for participation in Future Problem Solving, one component of this teacher's talented and gifted curriculum. The students selected by the tryout technique competed in Future Problem Solving against students selected by traditional means. Data were collected: (1) to chart the progress of individual teams, (2) to compare the performance of teams within each school based upon the mode of selection, and (3) to compare the teams as a competitive sample. The analysis showed that the whole classroom tryout is an effective means to identify economically disadvantaged students for a talented and gifted program and could be used in combination with traditional techniques.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER I

INTRODUCTION

As an inner city teacher in a talented and gifted program, I became concerned that economically disadvantaged children with gifted traits were being overlooked due to established methods of identification. I talked with inner city classroom teachers (who had the responsibility of nominating children for my program) about the relationship of certain traits to the goals of my program and the Future Problem Solving Program, a part of my required curriculum. Anecdotal evidence from those teachers suggested that the children deemed by them to be the most creative and the best problem solvers on day-to-day tasks were not always selected for the talented and gifted program. Even though I encouraged those teachers to make recommendations, I received the name of only one student. Children who were missed by the established methods of identification did not have access to my program, and I did not have an opportunity to observe their gifted traits in another setting. This situation was not acceptable to me and presented an opportunity to incorporate *action research* into my teaching (Borg, Gall, & Gall, 1993). Action research is designed to answer questions or address problems that arise in one's work (Chapter II is devoted to an in-depth explanation of the action research process). The purpose of this study was to use action research to address the problem of identification and selection of economically disadvantaged gifted students for participation in my talented and gifted program.

The Problem

The identification and selection of students from low income populations has been a persistent problem for the field of gifted education. These populations are consistently under represented in talented and gifted programs. While critics of gifted education call the programs elitist and skewed to the wealthy white child, researchers argue for more sensitive identification measures to increase the proportion of children from low income populations in these programs (Mitchell, 1988; Richert, 1987; Borland, 1989). When standardized tests are the only measure used to identify giftedness, socioeconomic factors can account for large differences in incidence. Using IQ tests solely, researchers have found that a community with a high standard of living will produce approximately 3 percent of the children tested as having an IQ of 140 or higher. Only ½ to 1 percent of the children living in an average to lower socioeconomic community will test at that same level (Hewett, 1977). In other words, children from low socioeconomic backgrounds make up 20% of the school population but only 4% of those tested at the 95th percentile or above on standardized tests.

Because economically disadvantaged students are overlooked by standardized tests which are insensitive to their gifted traits, and established methods used for identification are not as successful in identifying them as we would like (VanTassel-Baska, Patton, & Prillaman, 1989), non-traditional identification techniques have been proposed. Coleman (1985) noted children get missed for a variety of reasons, ranging from instruments which do not appropriately measure their abilities, to misguided teacher judgment, to children whose behavior is not deemed indicative of giftedness. He offered a tongue-in-cheek suggestion that a school should construct a sign advertising a gifted program and allowing the children who decided that they were "it" to sign up. VanTassel-Baska et al. (1989) have also recommended that more non-traditional identification techniques need to be utilized. One such technique that has shown promise involves a tryout for all children on gifted activities in the regular classroom. The "whole classroom tryout" technique gives all children an equal opportunity to participate in gifted activities and to be judged upon their readiness to perform in a specific component of a talented and gifted program's curriculum. I decided to use the tryout technique in addition to my established methods to identify children for my program.

Rationale for the Study

My study examined the utility of a tryout technique for the identification and selection of economically disadvantaged children who deserved placement into a talented and gifted program. In order to insure that the technique picked children appropriate for my program, I compared (using performance in the Future Problem Solving Program) economically disadvantaged students selected using the whole classroom tryout technique (1) to students selected in the same school using standardized test scores for identification and also (2) to children from an affluent community who were selected using standardized test scores. Three pieces of information influenced my conception for the study: the Tennessee Comprehensive Achievement Program (TCAP) scores, traits of gifted children, and the Future Problem Solving (FPS) program. The school system in which I teach uses the TCAP, a standardized test, as a primary means to identify students for the TAG program. The TCAP test measures a student's progress (compared with other students on the same grade level) in five subject areas: (1) reading, (2) math, (3) language, (4) science, and (5) social studies. A total battery score is derived from the reading, math, and language scores. The students receive six national percentile (NP) scores, one in each subject area plus one in total battery. The percentile scores indicate the percentage of students who performed equal to or below that student's level (Tennessee State Department of Education, 1994). Two scores at or above the 96th percentile automatically qualifies a student for TAG. Because the number of students who automatically qualify for this program from inner city (lower socioeconomic) schools has been significantly smaller than the number who qualify from schools in the more affluent suburbs, teachers adjusted the TCAP criterion for inner city schools to one score at the 96th percentile. Even with this change, very few economically disadvantaged students were identified, yet classroom teachers reported that they had bright children in their classrooms.

Economically disadvantaged children can exhibit traits associated with being gifted which cannot be identified by standardized test scores. Barbara Clark (1983, p. 333) listed twenty-one traits which can be observed but not always verified through testing of economically disadvantaged gifted children. A subset of the six following traits seemed promising because of their importance to my program:

1. alertness, curiosity
2. initiative, eagerness to do new things
3. imagination in thinking
4. flexibility in approach to problems
5. originality and creativity in thinking
6. ability to solve problems by ingenious methods

These traits were relevant to my program because they are necessary for the successful performance of students in Future Problem Solving (FPS). The association between traits and performance is significant because authorities (Feldhusen, Asher, & Hoover, 1984; Coleman, 1985; Gallagher & Gallagher, 1994) in gifted education have argued that selection should be based on a program's objectives. In this study I combined the ideas of identification by gifted traits, the importance of these traits to my curriculum, and the tryout technique. This combination offered all of the students in three classrooms an opportunity to display their untestable gifted traits on problem solving activities as a tryout for the TAG program by becoming part of FPS.

Future Problem Solving, one component of my TAG program, is a competitive program designed to encourage the development of creative thinking and problem-solving skills. The traits necessary for successful participation in FPS are similar to the six traits mentioned by Clark (1983). I wondered how children, identified by my observation of these untestable gifted traits (which are associated with successful performance in the FPS program), would compare on the FPS program to children identified through TCAP scores. If children identified by these traits performed as well on FPS as the children identified by TCAP scores, then I would have a new useful identification procedure for disadvantaged children. If economically disadvantaged children identified by these traits performed as well on FPS as advantaged children identified by using TCAP scores, then the procedure would have even greater value for my program. The value would lie in dispelling the idea of some teachers that economically disadvantaged children in inner city schools cannot be competitive against children from the more affluent suburbs.

Research Questions

I had one general and three specific questions for this study. My general question was: Will the whole classroom tryout technique prove to be effective in identifying children for my program? My three specific questions were:

1. Would selection for Future Problem Solving through a tryout or by TCAP scores produce a more effective team?
2. Would socioeconomic factors play a significant role in the effectiveness of the selection process or in the rate at which problem solving skills were acquired?
3. Could inner city teams be competitive with teams from the more affluent suburbs based upon equal access to instruction and materials?

Because my teaching situation was not comparable to those described in the literature, action research was the appropriate research methodology for gathering data to answer these questions.

CHAPTER II

ACTION RESEARCH

Action research has been called "an emergent and potentially powerful form of research" (Tomlinson, 1995). This type of research, however, is not new. Even though teachers in Great Britain have used this practice for more than thirty years to gather data on aspects of the curriculum that they considered questionable, action research has not been favored in the United States. In recent years teachers in the United States who believed that traditional research does not address their concerns have begun to use this avenue for gathering practical information. The effect is that action research is now considered to be on the "forefront of current educational investigation and practice" (Tomlinson, 1995, p.5).

Comparing Action Research with Formal Research

Even though action research and formal research share some common goals of increasing knowledge and improving understanding, these methods differ in the training of researchers, in the goals of research, in the research process (problem identification, purpose, and application of research), and in the application of the findings (Borg et al., 1993). Whereas extensive training and experience are necessary for formal research to be conducted properly, most teachers possess the skills that are necessary to be an effective action researcher.

Formal research strives to produce a generalizable theory while action research seeks to produce knowledge for a specific problem or situation. An investigator in formal research identifies a problem through a literature search; however, an investigator in action research selects problems that interfere directly with her work. A random sample is essential in formal research so that bias can be eliminated, but a sample of students with whom the action researcher is already working is necessary to directly answer her questions. Formal research seeks statistical significance while action research focuses on practical significance. Formal research emphasizes theory plus implications for further research, but action research emphasizes applying the findings immediately to improve one's teaching situation (Borg et al., pp. 397-399). This ability to immediately improve a situation is encouraging, and the action research process is more readily incorporated into one's teaching than is the process of formal research.

The Process

Several models for conducting action research have been proposed which divide the process into steps. Perry-Sheldon & Allain (1987) recommend the four steps of (1) reconnaissance, (2) plan, (3) act, and (4) reflect, while Wood (1988) recommends the four steps of (1) plan, (2) act, (3) observe, and (4) reflect. Borg et al. (1993) propose seven steps so that action research can be seen to be comparable to a description of formal research methods: (1) define the problem, (2) select a design, (3) select a sample, (4) select measures, (5) analyze the data, (6) interpret and apply the findings, and (7) report the findings.

Tomlinson (1995) proposes a more user-friendly model. She advocates a "systematic reflection" time period in which the teacher asks a question such as, "How might I modify what I am doing so that it is more effective?" The teacher begins to take notes about questions that arise and writes observations into a daily journal. Notes and journal entries are reviewed periodically so that patterns become evident. During this time period, Tomlinson suggests that teachers examine information in publications in order to add depth to the topic of concern.

Systematic reflection may last for an extended period of time, even months, before the teacher is ready to pose an initial research question. At this point, the teacher is directed to consult with colleagues or a university professor if possible. The additional contacts may provide suggestions for data collection methods or resources that are needed to make the action research project successful.

In the data gathering phase, detailed records and information are essential so that the experience can be preserved and verified. Questionnaires, checklists, surveys, interviews, tape recordings, and anecdotes, in addition to a detailed journal, are a few of the suggested means for gathering data. The use of multiple data sources makes action research credible to those with whom the information is shared when the project is complete.

The next phase of action research is data analysis. The data gathering and data analysis occur almost simultaneously in action research. As the teacher observes and notes occurrences, patterns begin to emerge. Tomlinson suggests that the teacher find a "critical friend" (p. 16) to help guide the analysis strategies and to help expand the teacher-researcher's thinking. At the conclusion of the phase of data analysis in action research, the teacher implements the changes and may well begin the cycle all over again in order to judge the effectiveness of the changes.

The final phase of action research is a formal sharing of insights. Even though improvement of one's teaching is of primary importance in this type of research, sharing information that is gained from this hands-on approach may "have a ripple effect beyond the individual classroom and practitioner which are at the core of the research endeavor" (p. 19). This "ripple effect" is just one of many advantages that can be expected from the use of action research.

Research findings do not generally affect the everyday work of educators; action research provides a means to answer questions directly (Borg et al., 1993). Participation in this research enables educators to develop the skills necessary to read and apply the findings of others. When teachers share their insights and information, they build a support network and improve communication skills. Action research requires that the teacher be specific in identifying a problem and be open to trying solutions. It can be effective whether it is used for one classroom or an entire school system.

CHAPTER III

A PLAN OF ACTION

This chapter provides an overview of the process I used to combine action research and Future Problem Solving (FPS) to address the problem of identification and selection of economically disadvantaged gifted students for participation in my talented and gifted program. The study was designed so that children identified by typical guidelines for forming Future Problem Solving teams as part of a talented and gifted programs' curriculum could be compared with children identified by a whole classroom "tryout" technique. In this chapter I review the literature concerning various traditional and non-traditional identification techniques. I explain how schools and subjects were selected. Specific information on the relationship between the economic status of a community and the standardized test scores of its students are presented. The history of FPS and its design as a competitive program are also included.

A Period of Reflection

Anecdotal evidence from inner city teachers concerning their opinion that the most creative and best problem solving students were often overlooked during the identification and selection process for Future Problem Solving and TAG precipitated a period of systematic reflection. I asked myself, "What can I do to improve my identification and selection process for inner city children so that a larger percentage of these children with untestable gifted traits will have an opportunity to be included in my talented and gifted program?" Approximately five months were spent researching the literature on disadvantaged gifted populations and identification techniques. During this same time period, I consulted with colleagues and two instructors associated with a university. I reviewed the application of several techniques (traditional and non-traditional) that are commonly used to supplement the identification process.

Review of the Literature

Three traditional identification techniques (1) teacher recommendation, (2) parent referral, and (3) peer nomination are commonly used to supplement standardized test scores when children are identified for participation in a talented and gifted program. The most frequently used technique is the teacher recommendation (Marland, 1972; Butler & Borland, 1980; Cox, Daniel, & Boston, 1985). A classic study (Pegnato & Birch, 1959) indicated that teachers were not reliable in predicting which students would have a high IQ; however, teachers in later studies, when given a checklist of behaviors indicative of giftedness, were quite good at recognizing these behaviors in their students (Gordon & Thomas, 1967; Keogh & Smith, 1970; Gear, 1978). In order for teacher recommendation to be a useful technique in identifying students, the checklist of behaviors that the teachers are asked to complete should directly address the characteristics of the students who are being sought for the program

(Borland, 1989). This checklist reduces the chance that a teacher will use a recommendation just as a reward for appropriate behavior instead of basing the recommendation upon a child's gifted behaviors.

In addition to teacher recommendation, studies show parent referral can be a useful tool for including children in a talented and gifted program (Jacobs, 1971; Richert, Alvino, & McDonald, 1982). Parents, knowing their children better than anyone else can know them, are in a good position to fill in gaps in information concerning developmental history, hobbies, activities, and interests (Clark, 1983; Borland, 1989). A problem occurs in disadvantaged populations when parent information is requested concerning only those students who were identified using standardized test scores or received a teacher recommendation. Many disadvantaged students have already been screened out of the identification process before the parent information can be requested (Richert, 1987). Parent referral forms should be made available to all parents, especially to the parents of disadvantaged students.

Teacher nominations and parent referrals are two traditional means to access data concerning students who might be otherwise missed; but in order to take advantage of all forms of information that are available to assist in the identification process, one must not overlook the value of peer nominations. Information gained from peer nominations is especially beneficial in locating children with leadership potential and/or creativity (Richert, 1987). Phillip Powell, an educator who recommends additional identification measures for students outside the mainstream of middle-class culture, uses peer nominations first. He believes that children can identify the smartest student in the classroom, just as the street smart kid can identify the one most likely to be a problem solver and/or survivor (Cox et al., 1985). Rather than asking direct questions concerning who the child thinks is gifted, one needs to ask who has the best ideas for games on the playground or who would be the most helpful on a science fair project (Borland, 1989). Even though the traditional techniques of peer nomination, teacher recommendation, and parent referral were already in use in this school system's TAG program, I was not satisfied that most of the children with gifted traits who would benefit from my program were being identified. This dissatisfaction with the results from the traditional techniques led me to explore the possibility of using non-traditional means to improve my identification process.

The non-traditional identification techniques discussed in the literature that have shown promise are the use of portfolios and the whole classroom tryout technique. Developmental portfolios are advocated (Wright & Borland, 1993) as a tool in the identification process for potentially gifted, disadvantaged students. The portfolio represents a systematic way to monitor the students' growth and to gather information that could prove useful in program development. The use of on-going assessments, as opposed to the one-time test, is suggested because test performance is depressed by the environment of the disadvantaged student, and portfolios can be used as a continuous attempt to identify the students' gifts. Even though this technique shows promise, the classroom teacher would have to be responsible for the portfolios' contents. I wanted to try a technique which allowed me to take a more active role in the identification process.

The concept of the whole classroom tryout technique provided the active role in the identification process that I was seeking. This technique (originally designed to be used by the classroom teacher) promotes the search for gifted traits in students who are not currently in the talented and gifted program (VanTassel-Baska et al., 1989). All students in a regular classroom setting are given an opportunity to perform on "gifted" activities. These gifted activities are designed to show readiness for a specific program that is a part of the talented and gifted curriculum. This approach equalizes opportunity for access to the TAG program based upon matching a student's traits with those that are needed for successful performance. Armed with this information and Piirto's (1993) recommendation that all students be given an opportunity to experience creative thinking activities with the ideas and products from these activities being used in the identification and selection process of students for FPS, I developed my plan of action and formed my research question. The question was: Will the whole classroom tryout technique prove to be effective in selecting children for my program? After formulating the research question, I was then prepared to select the schools and the individual classrooms for my study.

Schools

The study in its entirety was conducted in conjunction with the Talented and Gifted (TAG) Program of one school system. Three schools in which I teach (that serve elementary aged students) participated in this study: Old Bay, Battle Road, and Fiske Hill. These schools were selected because of the divergent socioeconomic backgrounds of the school populations. The socioeconomic status of the school population was determined by the percentage of children who were eligible for the free or reduced price lunch program.

Fiske Hill is located in an affluent community. The number of children who qualify for a free or reduced price lunch is approximately 7% of the school population. Battle Road is located in a lower-middle income community with approximately 54% of the school enrollment qualifying for meal assistance. Old Bay is in an older, less stable community with 75% of the school enrollment currently eligible for the free and reduced price lunch program.

The standardized test scores fall along predicted lines. Seventeen percent of the students at Fiske Hill score at or above the 95th percentile in total battery on the Tennessee Comprehensive Assessment Program (TCAP) test and qualify for the TAG program. The percentage falls below seven at Battle Road and falls below three at Old Bay (see Figure 1).

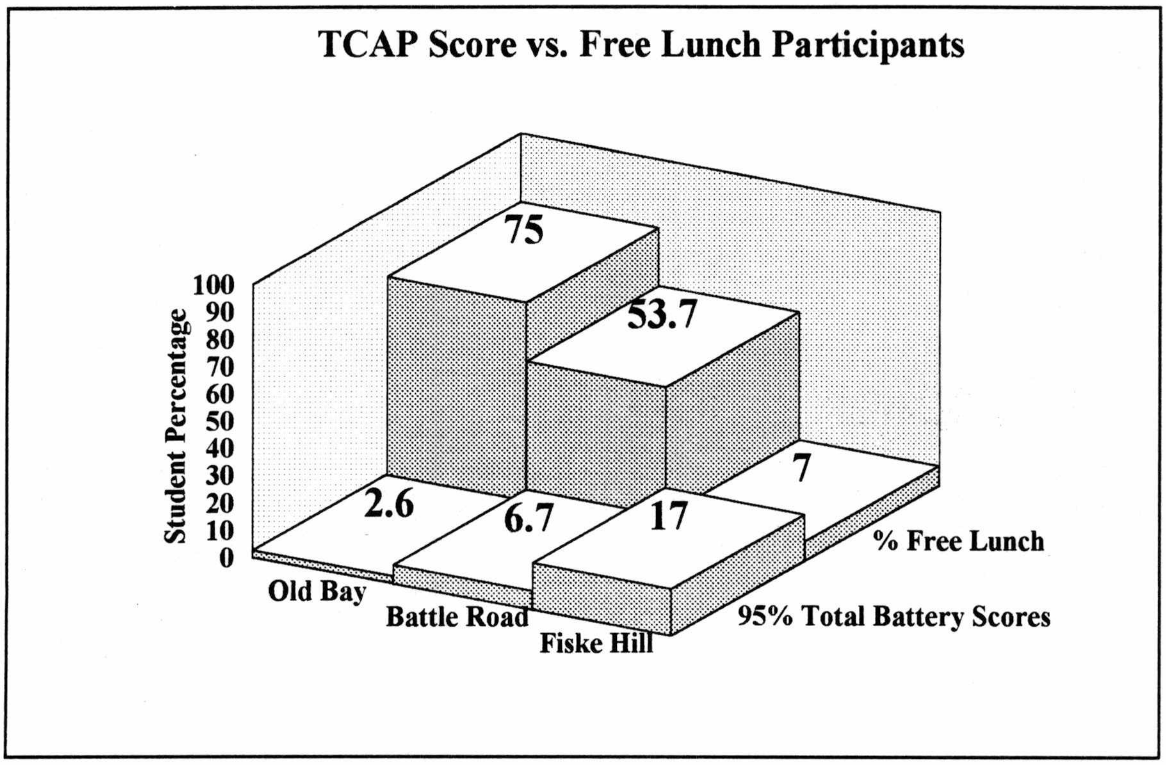

Figure 1. TCAP Scores vs. Free Lunch Participation. The figure shows a comparison of the percentage students participating in the free and reduced lunch program with the percentage of students placing in the 95th percentile on the Tennessee Comprehensive Assessment Program (TCAP) at the three subject schools.

The fourth grade TCAP distribution (see Figure 2) shows the percentage of children who perform at each stanine: stanines one through three represent below average performance, stanines four through six represent average performance, and stanines seven through nine represent above average performance.

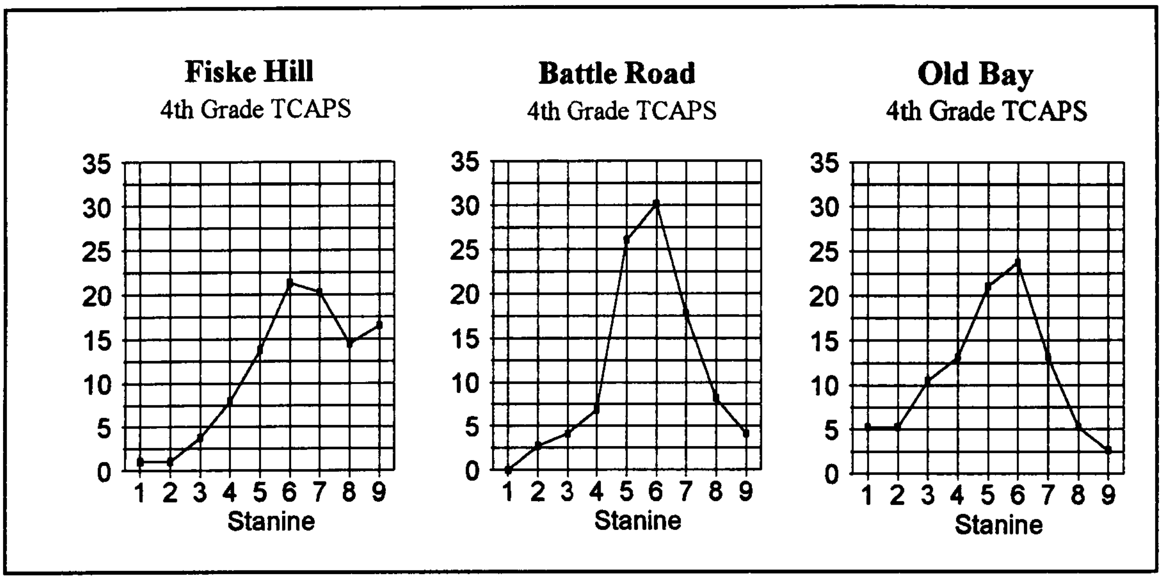

Figure 2. Fourth Grade TCAP Distribution. The figure shows the comparative distribution of Tennessee Comprehensive Assessment Program (TCAP) scores for all fourth graders at the subject schools. The Y-axis represents student percentages.

Subjects

The students eligible for this study were in the fourth grade (ages 9 - 10). I selected this grade because the Future Problem Solving (FPS) Program becomes competitive at the fourth grade level and because fourth grade is the first opportunity for FPS at these schools. None of the children had prior exposure to the FPS process as confirmed by a student survey.

I requested one fourth grade classroom of students from each of three schools for participation in the FPS program. The classroom at Fiske Hill contained 25 students with nine students qualifying for TAG (based upon two scores at the 96th percentile). The classroom at Battle Road contained 23 students with five qualifying for TAG (based upon one score at the 96th percentile). The classroom at Old Bay contained 28 students with five students qualifying for TAG (based upon one score at the 96th percentile for four students plus one student with a teacher recommendation). The classrooms were representative of the school population concerning TCAP scores by the percentage of students who had qualified for TAG.

Overview of Future Problem Solving

Future Problem Solving (FPS), the basis of comparison for the student teams in this study, is an international program that was begun by E. Paul Torrance in 1974. The FPS program is designed to encourage creative thinking as well as a concern for the future of this planet. FPS consists of a problem (fuzzy) situation which is set twenty-five or more years into the future. The students (working in teams of four) research the topic, brainstorm possible problems that could arise from this situation, generate alternative solutions for the most important problem, establish a criteria grid to evaluate solutions, and arrive at a best solution. This format is an adaptation of the creative problem solving process established by Alex Osborn in 1953. The program encourages the development of teamwork, communication, and research skills (Crabbe, 1991). The development and use of these skills is necessary in order to have a competitive team in the FPS program.

During the course of one competitive year, two practice problems and one qualifying problem are posed to all FPS teams. Evaluators from across the state assemble three times each year to score these packets. Feedback from the two practice problems is designed to help the competing teams improve their problem-solving skills for the qualifying problem. The teams which develop the most creative problem/solution packets are selected for state competition based upon the qualifying problem. Each packet is identified solely by a number so that the evaluation is impartial. The teams compete in divisions based upon grade level: junior teams (grades 4-6), intermediate teams (grades 7 -9), and senior teams (grades 10 - 12). The team that finishes in first place in each of the three divisions at the state competition advances to an international competition.

Materials

The primary source of the skill building exercises used with whole classroom tryout technique was the 1989 edition of *The Activity Book* by Anne B. Crabbe. This resource book was developed by Dr. Crabbe to assist coaches in the training of teams for the Future Problem Solving Program. *Middle Years,* a publication for middle-level educators, contains an article each month titled "Puzzles for Problem Solvers". Three of these puzzles were incorporated into the tryout activities. An additional activity that was used, "Autumn Brainstorming", appeared in the magazine *Challenge*.

As soon as the students were divided into teams, the materials used in the study were those published by the Future Problem Solving Program and the Tennessee Future Problem Solving Program. *Readings, Research, and Resources* (1994) is a compilation of articles that the executive director of FPS, Bonne Jensen, stated tries to present a balance of views (liberal and conservative) on the problem topics for this year. The problem topics were: Cities, Homelessness, and Kids and Violence.

The Tennessee Future Problem Solving Program published two booklets for all competitive teams. *Practice Problems for 1994-1995* contained a copy of the first and second practice problems for the 1994 - 1995 school year. A sample of a blank packet (see Appendix A1.1 thru A1.5) to be duplicated was also part of this booklet. The second booklet, *Tennessee Students Creating a Better Tomorrow*, listed key tips for coaches and Tennessee guidelines for evaluation. This publication gave essential elements and suggestions for writing a competitive FPS packet.

Gathering Data

After the fourth grade classrooms were selected, I used a systematic approach to teach every student the initial skills needed for Future Problem Solving. Brainstorming, one of the initial skills in the problem solving model, is an essential technique to learn (Crabbe, 1989). Brainstorming consists of four parts: withholding evaluation (no criticism), free wheeling (bizarre, creative ideas), striving for quantity, and hitch-hiking (changing a teammate's idea to create something new). All of the students (randomly sorted into four or five member teams) were encouraged to generate and to share ideas (no matter how wild or crazy the idea) with teammates. Activities designed to stimulate brainstorming included: list as many items as possible that are red, list as many things as possible that are associated with summer, list uses for a brick, and plan a party with a guest list containing people from history. The activities, while designed to stimulate brainstorming, gave each student in these three classrooms an equal opportunity to display eagerness to do new things, to use imagination in thinking, to try flexibility in their approach to problems, to exhibit originality and creativity in thinking, and to demonstrate an ability to solve problems.

While directing these activities, I kept a journal to record my observations of student behaviors as well as collected raw data which chronicled each student's progress. As the students participated in activities, I took advantage of the excellent opportunity to observe the traits I had hoped to find, i.e., alertness, eagerness, imagination, flexibility, originality, and creativity. Students also had an opportunity to exhibit teamwork as well as leadership skills; both are necessary on a problem solving team.

All of the students in each classroom worked in teams for a forty-five minute period each week for four consecutive weeks. At the end of the four-week whole classroom tryout period, I reviewed the notes that I had kept in my daily journal. The journal proved to be invaluable. Instead of having to rely on mental notes to cover the four week tryout, the journal (complete with observations, anecdotes, behaviors, and comments from the children) brought the entire process vividly into mind. After combining the data in my journal with the raw scores collected from the students' participation on activities, I made a list of the non-TCAP students who had exhibited the traits (or at least the potential to exhibit these traits) necessary for success in FPS. I needed a minimum of five non-TCAP students in order to have a four member (plus one alternate) FPS team. I asked each of the three classroom teachers to also compile a list of non-TCAP students whom they had observed displaying these same traits (the six traits mentioned by Clark) on day-to-day tasks. We compared our lists; and surprisingly, after the teachers became aware of the traits to watch for, our lists of non-TCAP students were almost identical.

There was no doubt about the students in the classroom at Old Bay; the teacher and I listed the same five students. These students were obvious to both of us because of their eagerness, imagination, and creativity. The teacher at Battle Road and I listed five students each, four of whom were common to both lists. This made a six student team; however, the one student (a female) from the classroom teacher's list that was not on my list asked to be excused from the process at the end of the first session as part of the non-TCAP team. The teacher at Fiske Hill and I had a more difficult time compiling a list of non-TCAP students for a team. Due to the large number of TAG students in the classroom at Fiske Hill (nine of her 25 students qualified for TAG based upon TCAP scores), the remaining pool of students from which to choose a non-TCAP team was much smaller than at the other schools. Each of us listed three students; the same three students. In order to have a non-TCAP team with one alternate, we had to select two more students. We discussed the remaining thirteen students and reached a consensus on two of them. All of teams were set; I would have seven, five-member teams (four TCAP and three non-TCAP), to work with for my study (the extra TCAP team is the result of so many students qualifying for TAG from Fiske Hill).

The non-TCAP students (whose names appeared on the combined lists) plus the students who had qualified for TAG (based upon TCAP scores) were pulled out of the regular classroom (beginning the fifth week) to form FPS teams and begin preparation for the competition. The TCAP students were placed on one FPS team, and the non-TCAP students (selected due to the display of gifted behaviors) were placed on another FPS team. In order to maintain the anonymity of the team members, each team chose a code name which followed them for the duration of the study. Now the students were ready to learn the problem solving process.

I introduced the topic for the first practice problem: Cities. At each school, we read and discussed the research material as a group so that reading levels would not affect the understanding of the vocabulary or the articles. The first practice problem required completion of only three of the six steps: generate possible problems based on the "fuzzy situation", choose an underlying (most important) problem, and generate possible solutions. Each team spent four class periods preparing problem solving packets and learning steps one, two, and three of the process.

Upon conclusion of practice problem number one, I typed the seven team packets into the FPS problem solving format. This prevented the recognition of handwriting over the course of the study. I gave the FPS packets to the Tennessee's State Director for FPS so that they could be evaluated. She scored them individually and evaluated them collectively as a sample. Due to the use of code names for the teams, the State Director was not aware of members' names or school affiliation. The results were used to chart the progress of the teams within this study. Upon the return of the evaluated packets from the state evaluator, I discussed with each team the positives and negatives of the team performance. This process was repeated for the second practice problem - Homelessness - except that the teams spent five class periods and steps four (develop criteria), five (evaluate solutions based upon the criteria), and six (write a best solution) of the problem solving process were also completed.

The third and final practice problem was approached differently because it was used as a qualifying problem for the FPS State Bowl. The students and I researched and discussed the third topic, Kids and Violence, for two class periods. The third class period lasted for two and one-half hours. We reviewed the entire FPS process with a question and answer session. The student teams were then placed in seclusion for a two hour block so that they could complete the FPS packet as a team. The teams were in individual rooms which had glass panels on the doors so I could observe their group as well as individual behavior during this process. I offered no help but was available in case problems arose among the team members. This last session not only required the knowledge of the process but also the self-discipline of the team members to work together and stay on task.

CHAPTER IV

DATA ANALYSIS AND RESULTS

Throughout this study, the FPS teams were evaluated individually and then ranked as a competitive sample on each practice problem. I used the data that was generated in three distinct ways: (1) to chart the progress of the individual teams, (2) to compare the performance of the TCAP and non-TCAP teams within each school, and (3) to compare all of the teams as a diverse and competitive sample. Because improving the identification and selection process for disadvantaged gifted children was my main goal, the knowledge that I gained from the progress of the individual teams and from the comparison of TCAP and non-TCAP teams within the same inner city schools was more significant to my program than the competitive rankings among the seven teams representing three schools. In this chapter I have presented the data analysis and results in this order: (1) team information, (2) individual team scoring on each practice problem (depicted by graphs which also show a comparative rate of progress between the schools as a competitive sample), (3) the difference in performance on each of the three practice problems between TCAP and non-TCAP teams within the individual schools, (4) the point spread among the teams on the three practice problems, and (5) individual team assessment profiles based upon FPS data and observations of the strengths and weaknesses of the team members.

Team Information

Table 1 offers an overview of the seven teams that participated in my study. Each team consisted of four competing members plus one alternate (in case of the loss of a competing member) except for the TCAP-2 from Fiske Hill, which did not have an alternate. The reader should note the vast difference in the team averages for total battery on the TCAP test. I was not aware that as drastic a difference existed until the study had been completed. Also note the strong association between the percent of team members receiving meal assistance (free of reduced price lunch) and the total battery average for the team.

Table 1. Information concerning the teams in this study.

School Affiliation	**Mode of Selection**	**Percent of Team on Meal Assistance**	**Total Battery Average**
Old Bay	Non-TCAP	80%	53.3%
Old Bay	TCAP	40%	87.4%
Fiske Hill	Non-TCAP	0%	88.6%
Fiske Hill	TCAP-1	0%	98.6%
Fiske Hill	TCAP-2	0%	98.0
Battle Road	Non-TCAP	40%	79.4%
Battle Road	TCAP	20%	96.8%

Future Problem Solving Evaluation Format

Because the evaluation of each of the six steps in FPS results in a numerical assessment, one can determine the progress of each team on the individual steps by comparing the increase or decrease in points earned from one practice problem (PP) to the next. The students received points (scores) on practice problem number one for (1) generating possible problems, (2) choosing an underlying problem (UP), and (3) generating possible solutions. Practice problems two and three received these three scores plus points for (4) developing criteria and evaluating the solutions and for (5) writing a best solution; in addition, they received points for (6) the overall presentation of the problem/solution packet.

The results from practice problems one, two, and three are displayed in Figure 3. This series of graphs show the composition of the scoring and point total for the individual teams. One can also use the graphs to compare the team scores as a competitive sample (for a numerical breakdown of the scores, the reader should consult Appendix A2). The students were allowed three hours to work on problem one and a three hour and forty-five minute time frame for problem two. Practice problem three (the only timed problem) had a two hour limit in which to complete the FPS process. The reader will note a decrease in most areas on this third problem concerning the points earned; this decrease is expected because of the two hour time limit available to complete the packet. Only one team improved its score between the second and third problem.

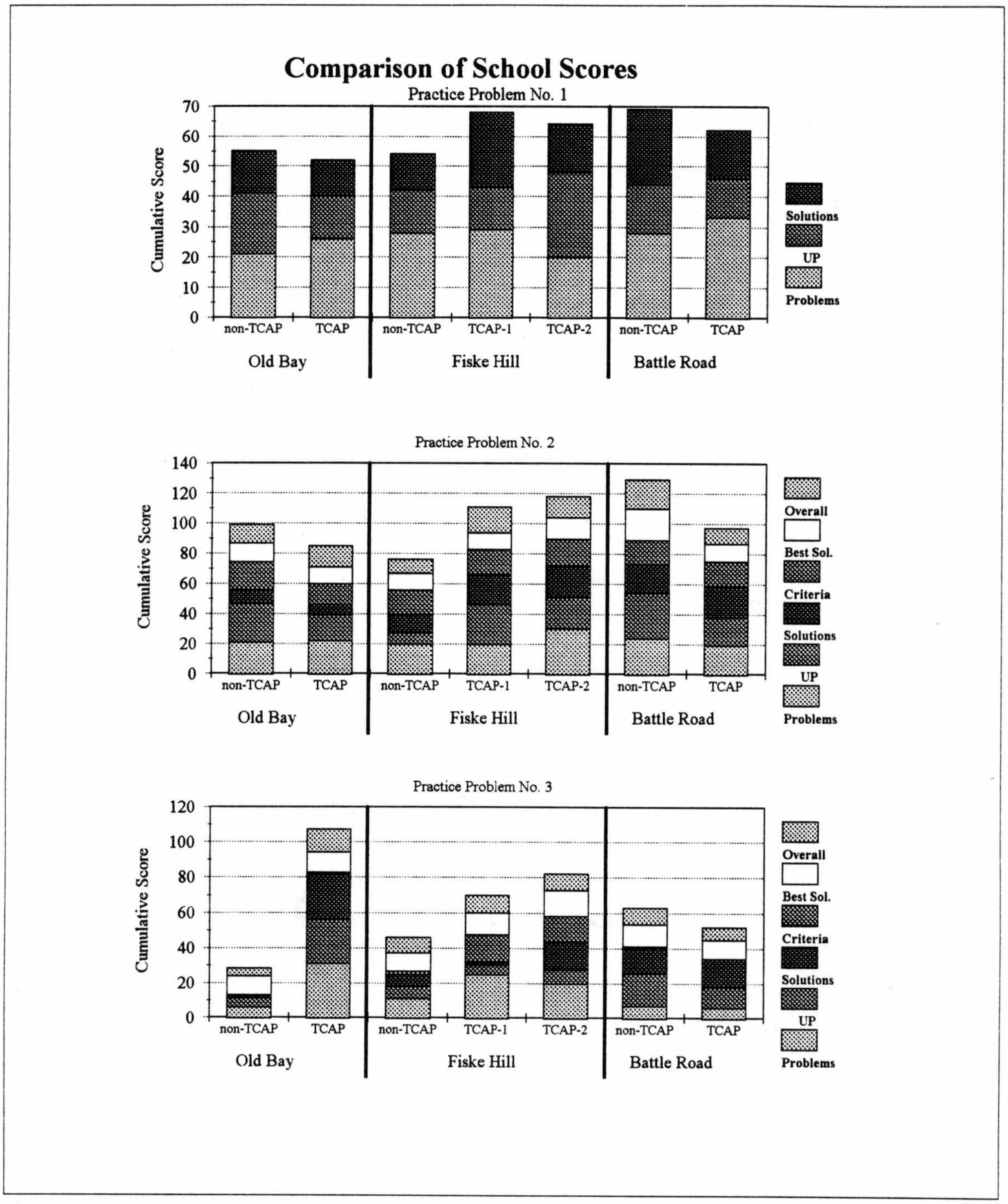

Figure 3. Comparison of School Scores. The figure shows the composition and point total for each individual team score on practice problems one, two, and three. One can also use the figure to compare the team scores as a competitive sample. The categories in which the students could earn points are listed to the right of each graph.

TCAP vs. non-TCAP Teams

After assessing the individual progress of each team, I compared the progress of the TCAP and non-TCAP teams within each school setting to determine whether the whole classroom tryout technique was effective in choosing problem solving teams on an individual school basis. The non-TCAP FPS team at Old Bay (see Figure 4) performed slightly better on practice problems one and two than the TCAP team. The non-TCAP team had great difficulty on practice problem three due to observed lack of self-discipline on the part of two of its members. I realized at that moment that creativity and imagination are not all that is necessary under competitive circumstances.

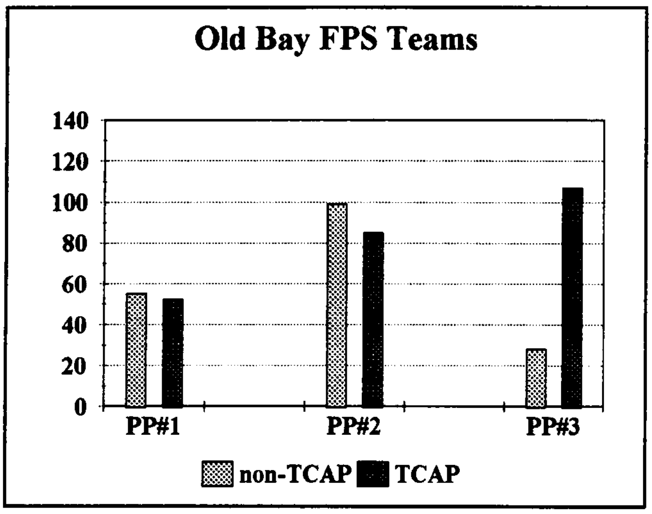

Figure 4. Old Bay FPS Teams.

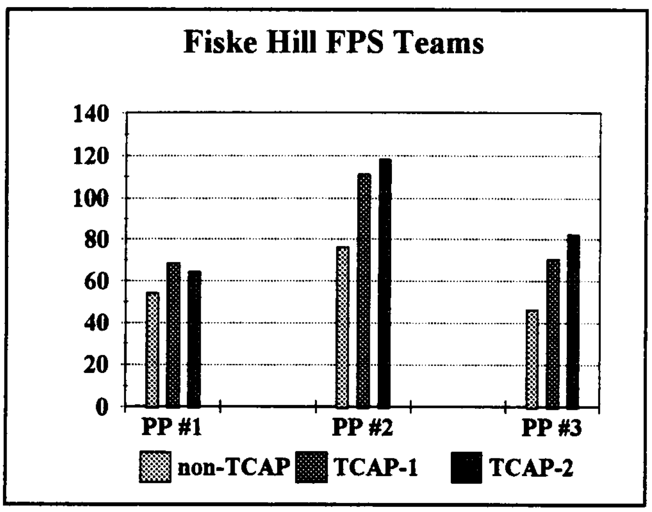

Figure 5. Fiske Hill FPS Teams.

The two TCAP teams at Fiske Hill alternated ranking on top among the three FPS teams at their school (see Figure 5). The non-TCAP team did not seem to "jell". The results from this tryout technique were not as encouraging in this school where so many students already qualify for the talented and gifted program.

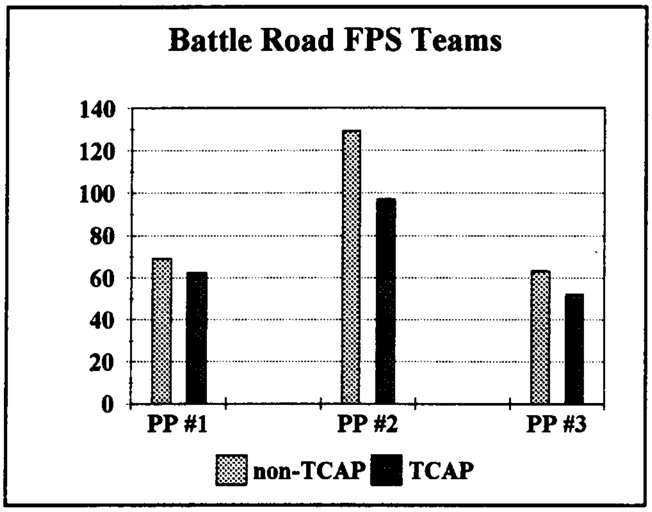

Figure 6. Battle Road FPS Teams.

The non-TCAP FPS team at Battle Road (see Figure 6) outscored the TCAP team on each of the three practice problems. The non-TCAP team managed to do this on the third problem without their co-leader (a female) who was ill on the day of the competition. The alternate member had to compete unexpectedly. Apparently this change caused the non-TCAP team (which had placed first in the competitive sample on the two previous problems) to drop in the overall ranking for practice problem three; nevertheless, this tryout technique was an overwhelming success at Battle Road.

A Competitive Sample

I wanted to have the problem solving packets evaluated as a competitive sample so that I could determine whether socioeconomic factors or lower TCAP scores would have an effect upon the performance of the teams. Many teachers in my talented and gifted program have expressed a concern that teams of inner city children cannot be competitive with teams of children from affluent suburbs. I wanted an opportunity to put that idea to the test while I was evaluating the tryout technique. Even though my results are not generalizable to other programs, my results are certainly applicable to other children in this same program who are also attending inner city schools.

My data showed that the inner city TCAP team from Old Bay developed the problem solving skills at a much slower rate than the two TCAP teams from Fiske Hill; but by the end of the competitive year, this inner city team had not only reached but surpassed the skill level of these same two teams from the suburbs. The total battery average of the Old Bay TCAP team (87.4%) was at least 9% lower than all other TCAP teams (98.6%, 98.0%, and 96.8%), and Old Bay feeds 75% of the school population with the free and reduced lunch program; neither of these factors negatively effected the outcome. The classroom teacher at Fiske Hill, commenting on her teams' lower than expected placement, stated that perhaps her students had so many opportunities for competition that no single activity seemed important anymore. Her statement made me reflect upon the importance of this competition to the inner city children because so few of these activities are available. Children in inner city schools need activities that challenge and excite them. All children, regardless of economic status, need activities that are challenging and exciting.

A final look at results from the competitive sample involving the seven teams revealed a surprise for me. After talking with others who are knowledgable about the progress of problem solving teams, I assumed that the largest difference in the spread of points would be initially due to economic differences among the teams (children who are economically disadvantaged do not have access to the experiences of more economically advantaged children and may initially score lower). I was incorrect in that assumption. The difference actually grew larger as the competition progressed, and I am not sure why that happened. The teams completed practice problem number one with scores that were very similar. After the evaluation for practice problem number two, the difference between the highest and lowest score was fifty-three points. By the end of practice problem three, the difference between the highest and lowest score was seventy-nine points. Figure 7 shows practice problems two and three only because they are comparable in length (steps 1 - 6) and possible points.

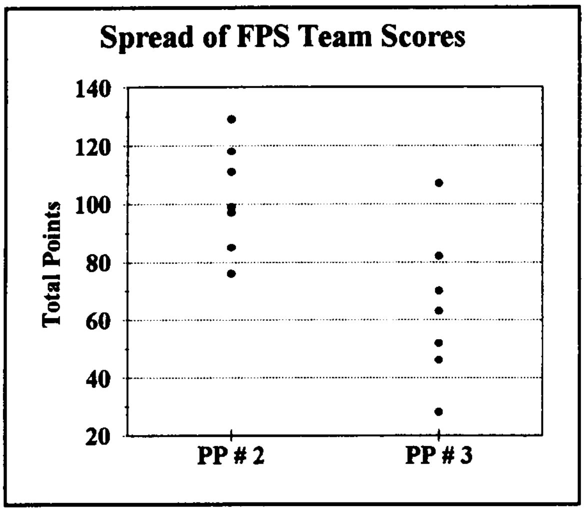

Figure 7. Spread of FPS Team Scores.

Final Progress Assessments on the Individual Team

Old Bay

The non-TCAP team from Old Bay (code name - Bald Eagles) consisted of four males and one female with the lowest TCAP total battery average (53.3%) of any team that competed.

Two leaders emerged, one male and one female, who worked hard and carried the team while the three other members added ideas verbally but placed few of them on paper. The leaders, who showed interest and perseverance equivalent to any child that I worked with in my program this year, will be placed in my TAG program next year with FPS as option if they are interested. The three remaining males will receive periodic enrichment for their creativity but will not be added to my TAG role.

The TCAP team from Old Bay (code name -Tigers) was the dark horse team of my study. This team consisting of four females and one male had the lowest total battery average (87.4%) among all four TCAP teams and second from the lowest average of all teams in the study; however, they made the greatest efforts to improve their team performance each time we had a meeting. The members, collectively, appeared to be the most motivated and self-directed. This was the only team to score higher on practice problem number three (the only timed problem) than it had scored on practice problem number two. They began the study in last place and finished on top. The best part of this study for them was the pride that came when their inner city team beat three teams from Fiske Hill. I had considered dropping FPS from this school next year, but these students are already talking about the competition when they are in the fifth grade.

Fiske Hill

Even though the non-TCAP team from Fiske Hill (code name - Panthers) had a total battery TCAP average (88.6%) in the middle of the range for the seven teams, this team remained at or near the bottom of the sample for all three of the FPS problems. The team of four males and one female never learned to work together. They argued more than the other six teams combined.

The TCAP-1 team from Fiske Hill (code name - Cheetahs) had the highest total battery TCAP average (98.6%) among the seven teams. This team consisted of three males and two females and was a joy to observe because of the self confidence displayed by the members. Beginning with the first problem, the team members appeared to contribute equally and asked few questions. They worked together well and enjoyed the competitiveness of FPS. This team, however, was never in first place in the competitive sample.

The TCAP-2 team from Fiske Hill (code name - Jaguars), with a total battery TCAP average (98.0%) second only to the TCAP-1 team, were the quietest team in my study. The team of three females and one male worked consistently, and the members smiled frequently but with few sounds being made. This team earned the highest cumulative total points scored for the entire study, but did not finish any single practice problem in first place.

Battle Road

The non-TCAP team from Battle Road (code name - Orcas) consisting of three females and two males possessed next to the lowest total battery TCAP average (79.4%); however, one member displayed the most impressive slate of gifted traits of anyone (including the TCAP students) in the three classrooms in my study. I am convinced that he is the reason that this team finished in first place in the competitive sample on both the first and second practice problems. This male would not have been in my FPS or TAG classes at all without this whole classroom tryout. Finding this child made the entire year long study worthwhile.

Even though the TCAP team from Battle Road (code name - Scorpions) had a seventeen percentage point advantage in total battery average (96.8%) when compared with the non-TCAP team (79.4%) from the same school, they never scored higher than the non-TCAP team on any of the practice problems. The team of four males and one female appeared to work in slow motion and had difficulty completing the problem solving packets. The difficulty was not due to a lack of understanding but a lack of motivation. I tried several approaches to encourage them, but I did not feel successful. These children will be in TAG next year because of their TCAPS, but I will make FPS optional.

CHAPTER V

DISCUSSION

My experience with the whole classroom tryout technique has convinced me that this can be an effective tool for increasing the number of economically disadvantaged children in my talented and gifted program. This technique was valuable because it gave me an opportunity to observe the "gifts" of children and to include them into my program when they otherwise would not have access. By the end of the first forty-five minute tryout session, the potential of several of the children in the regular classroom was as obvious to me as if they were waving red flags. I was discouraged to think that other teachers had not recognized their gifts. At the beginning of this study, I had decided that if I found just one student who had been missed by the established identification techniques, I would feel this effort had been successful. Between Old Bay and Battle Road, I identified five economically disadvantaged children that have become a permanent part of my TAG group. Two students from the Fiske Hill team were also permanently added to the TAG program.

The encouraging results did not end with the identification of additional students. The whole classroom tryout technique not only helped to identify disadvantaged children but also promoted goodwill between the classroom teachers and the talented and gifted program. The regular classroom teachers revealed that they considered the tryout an effective procedure for observing all of the children and allowing equal opportunity for access to my program. The teachers told me that they appreciated the extra effort that I was making to include them in the identification process. Several teachers of the other fourth grade classrooms (that I did not include in my study) came to me and stated that they also had bright children who needed to be included in my program. An additional five students were recommended for my program after the teachers and I discussed the traits in children who could benefit from my curriculum.

In the end, the students were the major beneficiaries of this technique. Even though the non-TCAP teams (with the exception of the Battle Road non-TCAP team) were not as competitive on the final FPS practice problem as the TCAP teams, these creative children deserve to have access to other facets of my program which can stimulate their interests and enhance their gifts. I will make some adjustments in the use of this technique in the future. The teams, based upon my observations, might have been more effective if the TCAP and non-TCAP students had been mixed together on teams instead of separated (this will be my new topic to study next year). I noticed that when teams were heavy with creative minds and lower on TCAP scores, the teams seemed to have a difficult time staying on task. This problem was especially evident with the non-TCAP team at Old Bay. This team functioned well when I monitored the first and second practice problems but fell apart when left to regulate their own behavior on the third problem. Perhaps one's ability to perform well on TCAP tests is also indicative of another characteristic: one's ability to stay on task. I found this characteristic to be evident among the TCAP team members that finished first, second, and third in my study. I would like to help my economically disadvantaged students, who do not possess the important skill of staying on task, to develop that sense of commitment.

One conclusion stands out for me. The level of participation in a competitive program by disadvantaged students could not be distinguished from that of the students from the more affluent suburbs. According to the Tennessee State Director for Future Problem Solving, she could not distinguish the FPS packets of the disadvantaged students from the advantaged students based upon creativity or quality of ideas. Because a team from one of my inner city schools finished in first place at the end of the competition, all inner city TAG teachers should feel encouraged by the prospects of these results.

I am not advocating that this technique replace the identification techniques that are currently in place in the TAG program. I think that we need to access as much information as possible if we are to decrease the chances of missing these children who could benefit from our curriculum. This technique along with TCAP scores, teacher recommendation, parent referral, and peer nomination are all needed in our efforts to identify gifted children. My sentiments are well expressed in Richert (1987, p. 154) concerning the identification of all students with potential:

> It is only when the regular classroom, to which all students have access, becomes a place where gifted potential (i.e. higher level cognitive and affective potential) is evoked that we will be able to identify all students, whatever their configuration of background, characteristics, and exceptional potential. This is a long-range but critical goal for every school that can improve the quality of education for all of America's students.

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APPENDIX

Contents--Appendix A

Step I. Brainstorming Possible Problems

Now that you have thoroughly read and discussed the Fuzzy Situation, it is time to consider the many problems and difficulties related to it. Begin by brainstorming as many of those problems as you can. Select the TWENTY that you think are the most important. Write your 20 problems below; word them clearly and thoroughly, and use statement (rather than question) form. (Use reverse side, if necessary.)

1.
2.
(consecutive numbering continues)
20.

A1.1 FPS Step I. Brainstorming Possible Problems

Step II. Identifying an Underlying Problem

Based on the problems you listed in Step I., identify a problem of major improtance. Write your Underlying Problem in question form, beginning with the words, "In what ways might we...?" or "How might we...?" Your problem should clearly explain what you want to do, why it should be done, and any specific conditions.

(Optional -- This will not be scored)
To show a connection between Steps I. and II., identify by number the Step I. problem(s) from which your Underlying Problem was developed:

A1.2 FPS Step II. Identifying an Underlying Problem

Step III. Brainstorming Alternative Solutions

Brainstorm as many possible solutions as you can to your Underlying Problem. Choose your TWENTY most promising solutions to list below. Write each solution so that it describes WHO will carry out WHAT action. HOW it will be done, WHY it will solve the problem, and WHERE and WHEN this solution will take place. (Use reverse side, if necessary.)

1.
2.
(consecutive numbering continues)
20.

A1.3 FPS Step III. Brainstorming Alternative Solutions

Step IV. Choosing Criteria for Evaluating Alternative Solutions

Your task now is to select the best solution from your Step III. List. Brainstorm criteria that will help you decide which solution does the best job of solving *your* Underlying Problem. List below the FIVE criteria that you think are the most important for evaluating your solutions. Each criterion should have a different focus.

1.
2.
3.
4.
5.

Step V. Evaluating Alternative Solutions

From your list of solutions, select the TEN solutions that you think have the most potential. Use each criterion to rank the solutions on a scale from 1 (poorest) to 10 (best), and enter the numbers in the TOTAL column.

		Criteria					
Sol. #	Alternative Solutions	1	2	3	4	5	Total

A1.4 FPS Step IV. Choosing Criteria for Evaluating Alternate Solutions and Step V. Evaluating Alternative Solutions

Step VI. Describing the Best Solution

Your task now is to describe your best solution. Explain what the solution will do, how it will work, why it will solve your Underlying Problem, and how it will relate to the Fuzzy Situation.

Include a description of your plan of action for carrying out the solution. You might consider some of the following concerns: Who will be involved? What actions will be taken? When and where will the plan be carried out? How might you overcome any obstacles? (Use reverse side, if necessary.)

A1.5 FPS Step VI. Describing the Best Solution

		Problems	UP	Solutions	Criteria	Best Sol.	Overall	Total Pts
Old Bay								
non-TCAP								
	PP # 1	**21**	**20**	**14**				**55**
	PP # 2	**21**	**26**	**9**	**18**	**13**	**12**	**99**
	PP # 3	**6**	**5**	**2**	**0**	**11**	**4**	**28**
TCAP								
	PP # 1	**26**	**14**	**12**				**52**
	PP # 2	**22**	**17**	**7**	**14**	**11**	**14**	**85**
	PP # 3	**31**	**25**	**26**	**1**	**11**	**13**	**107**
Fiske Hill								
non-TCAP								
	PP # 1	**28**	**14**	**12**				**54**
	PP # 2	**20**	**7**	**13**	**16**	**11**	**9**	**76**
	PP # 3	**11**	**7**	**7**	**2**	**10**	**9**	**46**
TCAP-1								
	PP # 1	**29**	**14**	**25**				**68**
	PP # 2	**20**	**26**	**20**	**17**	**11**	**17**	**111**
	PP # 3	**25**	**5**	**2**	**16**	**12**	**10**	**70**
TCAP-2								
	PP # 1	**20**	**28**	**16**				**64**
	PP # 2	**30**	**21**	**21**	**18**	**14**	**14**	**118**
	PP # 3	**20**	**8**	**16**	**14**	**15**	**9**	**82**
Battle Road								
non-TCAP								
	PP # 1	**28**	**16**	**25**				**69**
	PP # 2	**24**	**30**	**19**	**16**	**21**	**19**	**129**
	PP # 3	**7**	**19**	**14**	**1**	**13**	**9**	**63**
TCAP								
	PP # 1	**33**	**13**	**16**				**62**
	PP # 2	**19**	**19**	**21**	**16**	**12**	**10**	**97**
	PP # 3	**6**	**12**	**16**	**0**	**11**	**7**	**52**

A2. Numerical Breakdown of Practice Problems One, Two, and Three

VITA

Beverly Porter was born in Guntersville, Alabama, on February 19, 1954. At the age of two months, she moved with her family to Spring City, Tennessee, where she attended public schools through the eleventh grade. She was accepted as an early admission student by the University of Tennessee at Knoxville in June, 1971. She married W. Bruce Jatko in March, 1973, and earned a B.S. degree in education with a major in biomedical sciences in June, 1975. She returned to the University that same year to add an elementary certification to her teacher's license.

After teaching in a middle school for five years, she took a leave so that she could be at home with her two young children, Stacey and Brandon. She returned to work at a private school while attending the University of Tennessee to renew her teaching certificate. She returned to her former school system as a substitute teacher before accepting a full time teaching position. In 1993, she began graduate school working toward an M.S. degree in special education with an emphasis in gifted education.

She presently works as an itinerant teacher in a Talented and Gifted Program where she is responsible for three schools: two inner city elementary schools and one rural middle school. She plans to continue her education at the University while working to improve the identification practices for disadvantaged gifted students.