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ABSTRACT

This practicum project used a combination of strategies to improve creative thinking skills in second- and third-grade gifted students. Sixteen students were targeted for the intervention. Over a 12-week implementation period, students participated in 90-minute interventions twice weekly. The intervention was comprised of 30-minute creative problem-solving encounters with peers; 30 minutes of computer software use to produce original writing, and to experiment and create in open-ended settings; and a 30-minute period of activities alternating between relaxation and imagery exercises and the use of imagery in creative writing. There were four objectives to the intervention: (1) increasing verbal and figural creativity; (2) increasing figural and verbal fluency; (3) increasing figural and verbal originality; and (4) increasing verbal flexibility. The Torrance Tests of Creative Thinking, Figural and Verbal Models and the Inventory of Creative Behaviors were used to assess the impact of the intervention. Informal teacher observations were conducted throughout implementation. The Inventory of Creative Behaviors was completed weekly and at the conclusion of the implementation period. Findings indicated that the proposed number of students met the projected percentage of increase of 80 percent or above in overall figural and verbal creativity, verbal originality, and verbal flexibility. Fewer than the proposed number of students met the projected increase in figural and verbal fluency and figural originality, although all students showed significant increases in these areas. (Eighteen appendices include School Profile, Inventory of Creative Behaviors, software evaluations, schedule of computer use, and pre- and posttest results and comparisons. Contains 17 references.) (Author/KDFB)

INCREASING CREATIVE THINKING SKILLS IN SECOND AND THIRD GRADE GIFTED STUDENTS USING IMAGERY, COMPUTERS AND CREATIVE PROBLEM SOLVING

by

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A Final Report submitted to the faculty of the Fischler Center for the Advancement of Education of Nova Southeastern University in partial fulfillment of the requirements for the degree of Master of Science

An abstract of this report may be placed in the University database system for reference

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Abstract

Increasing Creative Thinking Skills in Second and Third Grade Gifted Students Using Imagery, Computers and Creative Problem Solving
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The purpose of this project was to introduce a combination of strategies that worked successfully in a systematic manner to improve creative thinking skills in second and third gifted grade students. The components addressed during the 12-week implementation period consisted of overall figural and verbal creative thinking skills and the sub-areas of fluency, flexibility and originality. The students' creative thinking skills were severely deficient as determined by the Torrance Tests of Creative Thinking, Figural and Verbal Models and a teacher-made Inventory of Creative Behaviors. Students were expected to learn how to use imagery to enhance creative thinking and writing. They participated in creative problem solving encounters with their peers and used computer software to produce original writing, and to experiment and create in open-ended settings. Four objectives were targeted by this project: increasing overall verbal and figural creativity, increasing figural and verbal fluency, increasing, figural and verbal originality, and increasing verbal flexibility. The proposed number of students met the projected percentage of increase of 80% or above in overall figural and verbal creativity, verbal originality, and verbal flexibility. Less than the proposed number of students met the projected increase in the areas of figural and verbal fluency and figural originality, although all the students did evidence a significant increase in these areas. Formal evaluation took place at the end of the implementation period. The instruments used were the Torrance Tests of Creative Thinking, Figural and Verbal Models as well as the Inventory of Creative Behaviors. Informal teacher observations were conducted throughout implementation and the Inventory of Creative Behaviors was completed on a weekly basis as well as at the conclusion

of the implementation period. The results of the project were rewarding to the author, even though the objectives were partially met, inasmuch as most students' scores in all areas rose to above the average. Appendices include School Profile, Inventory of Creative Behaviors, software evaluations, schedule of computer use and pre and post test results and comparisons.

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CHAPTER I

Purpose

Background

The school facility targeted for this research was an elementary school servicing grades pre-kindergarten through fifth. According to the 1994-95 School Profile (Appendix A, p.45) the school was established in 1990 and was built on a 10-acre site with an intended capacity of 1,031 students. There were 48 classrooms and nine portable classrooms in the facility. Due to an influx in student population the school was functioning at 159% of its established capacity.

The population found in the school's vicinity was mainly Hispanic and was composed of upper middle and lower class families. Some of the lower socioeconomic level families were faced with limited education, language barriers and in some cases had recently arrived in the country. The community surrounding the school consisted primarily of single family homes, apartment buildings, a trailer community, neighborhood stores and other small businesses.

The breakdown of students per grade was as follows: 20 students in pre-kindergarten, 308 students in kindergarten, 239

students in first grade, 299 students in second grade, 267 students in third grade, 271 students in fourth grade and 234 students in fifth grade. The student population was 95% Hispanic, four percent white non-Hispanic, one-half percent black non-Hispanic, and one-half percent Asian/American Indian. The percentage of students with limited English proficiency was 35. Sixty five percent of the student population received free or reduced lunch. The average student attendance was 95%.

The administrative staff consisted of a principal, an assistant principal and a lead teacher. The instructional staff was composed of 70 teachers which included one Spanish as a second language (Spanish SL) teacher, four English for Speakers of Other Languages (ESOL) teachers, one resource teacher, two and one-half music teachers, two art teachers, and three and one-half physical education teachers. Additionally there were two guidance counselors, two media specialists, two exceptional education teachers and as of the 1995-96 school year there was one teacher of the gifted. Twenty-seven percent of the staff had Masters degrees, 11% had Specialists degrees and eight percent were beginning teachers. The ethnic composition of the staff was as follows: Sixty-six percent Hispanic, 10% white non-Hispanic,

23% percent black non-Hispanic, and one percent Asian/American Indian.

A variety of programs existed at the targeted school. Some programs addressed special needs of students, such as the emotionally handicapped, the learning disabled, the limited English proficient and the limited Spanish proficient. A home-based gifted center and an after school Academic Excellence Program were geared toward more challenging educational goals. There was also a before and after school care program accessible to all students on the premises. In addition to trying to meet the needs of the students there was a parent outreach program geared toward informing and educating the parents.

The school, in partnership with a state university, implemented a bilingual framework and philosophy referred to as Bilingual School Organization (BISO). The BISO curriculum called for 40% instruction in Spanish, and 60% instruction in English. The students alternated between one English and one Spanish teacher within their grade level. Some classrooms were self-contained and the students were taught in both languages by the same teacher. Most of these self-contained classrooms were also ESOL self-contained classrooms. All students received language arts instruction in English and in Spanish, content instruction in both languages, and mathematics instruction in English.

This writer had been teaching in the public school system for five years. Three of those years had been spent as a member of the targeted school's faculty. This writer had experience teaching a variety of grades and subjects including pre-kindergarten, kindergarten, second grade, ESOL, and at the time of this research, was teaching a home-based gifted center. The author of this practicum had been a member of the school's Steering Committee for two years, as well as the school's Budget Committee and was also a member of the school's Storytelling Committee.

The participants of this practicum project were from a combined second and third grade gifted class. The school's gifted program was a home-based center that serviced students two full days a week. This was the first year of its inception. The core of instruction was thematically planned and encouraged maximum development in the district's two fundamental goals for gifted education: creative and critical thinking as well as academic areas, practical communication skills, leadership qualities, self-esteem, social responsibilities, independent study and research skills.

The class in which this practicum was implemented consisted of four second grade students and 16 third grade students. Nineteen of

the students were Hispanic and one student was black non-Hispanic. There were no ESOL students in the class.

Problem Statement

After careful analysis and collaboration with the administration on the students' scores on the Torrance Test of Creative Thinking Figural Model (TTCT-F), this writer determined that the students exhibited a significant deficiency in the area of creative thinking. In addition, the Torrance Test of Creative Thinking Verbal Model (TTCT-V) and the teacher made Inventory of Creative Behaviors (Appendix B, pp.47-53) were administered to the students and the scores also yielded a deficiency in creative thinking.

The diagnosis of the test scores revealed that 16 students in the writer's targeted class scored below the mean in the TTCT-F (Appendix C, p.55) and also scored below the mean in the TTCT-V (Appendix D, p.57). The students also received below average scores on the Inventory of Creative Behaviors (Appendix B, pp.47-53). Average standard scores of 100 in the TTCT-F and in the TTCT-V were determined to be the expected performance level for an average student at any grade level. Scores between 21 and 37 were considered to be average in the Inventory of Creative Behaviors (Appendix B, pp.47-53). The students' scores averaged 89 in the TTCT-F, 85 in the TTCT-V

and 18 in the Inventory of Creative Behaviors (Appendix B, pp.47-53). There was a discrepancy of 11 points in TTCT-F, of 15 points in the TTCT-V and of 5 points in the Inventory of Creative Behaviors (Appendix B, pp.47-53), in what was, as opposed to what should have been, in order for this writer to have determined that the students in the target group possessed at least average creative thinking skills.

The TTCT-F measured creative thinking skills in the areas of fluency, originality and elaboration. A standard score of 100 in each area was determined to be an average score. The students' scores were found to be deficient in the areas of fluency and originality but were found to be above average in the area of elaboration. In the area of fluency the students' standard scores averaged 84. In the area of originality the students' standard scores averaged 89. In the area of elaboration the students' standard scores averaged 123.

The TTCT-V measured creative thinking skills in the areas of fluency, flexibility and originality. A standard score of 100 in each area was determined to be an average score. The students' scores were found to be deficient in each area of the TTCT-V. In the area of fluency the students' standard scores averaged 85. In the area of flexibility the students' standard scores averaged 84. In the area of originality the students' standard scores averaged 86. The Inventory of Creative

Behaviors (Appendix B, pp.47-53) was a teacher-made checklist designed to assess strengths and weaknesses in overall creativity.

As society's problems continue to grow, so does the demand for well-rounded individuals who can attack such problems with skill, confidence and innovative thinking. Educators are primarily responsible in the challenge for producing tomorrow's contributing citizens. However, the focus of education has not completely shifted from the traditional, restrictive forms which inhibit rather than spark creativity.

Students are frequently taught to conform rather than to express their individuality. There is often little time in classroom environments for students to work creatively. Teachers may provide the entire group with occasional creative activities, but for the most part, the teacher is far too busy making sure that the students are receiving the basic instruction needed to master grade level competencies. Even if teachers wished to provide more frequent or individual creative activities, time constraints and the pressures of standardized testing may present obstacles barring achievement of their intentions. All of these factors contributed to the existing discrepancy between adequate levels of creativity and the deficient levels found in this writer's classroom. If children are not accustomed to think

creatively they will not generate a creative product, although they may possess the ability to do so.

Objectives

One of the district's two fundamental goals for students participating in gifted programs and one of the emerging trends in education is to maximize students' creative thinking potential. Although the students participating in the school's gifted program exhibited high academic abilities, their creative thinking abilities were severely below average. It was this writer's position that all elementary school students' creative thinking skills could be enhanced by direct instruction in creative thinking and creativity training.

For purposes of narrowing the scope and sequence of the study and to establish a foundation, the author of this practicum focused on improving the creative thinking skills of the students in the primary grades group. The writer was determined to raise the creative thinking skills of the students by a minimum of 20% from the pre-test to the post-test in overall figural and verbal creativity. The writer was also determined to raise the creative thinking skills of the students by a minimum of 20% from the pre-test to the post-test in each of three sub-areas of creativity: fluency, generating a quantity of ideas; flexibility, changing one's way of thinking; and originality, generating unique

ideas. Although this practicum only targeted the 16 students in the writer's class who exhibited a deficiency in creative thinking skills, it was implemented with the entire class of 20 students as the successful completion of this practicum would positively impact the students' creative performance not only in the gifted program, but throughout all other areas of schooling.

The objectives selected for this practicum were the following:

Objective One

Over a period of 12 weeks, a minimum of 14 out of 16 students were to increase their overall creative thinking skills by at least 20%, as measured by the TTCT-F, the TTCT-V and the Inventory of Creative Behaviors (Appendix B, pp.47-53).

Objective Two

Over a period of 12 weeks, a minimum of 14 out of 16 students were to increase their creative thinking skills in the area of fluency by at least 20%, as measured by the TTCT-F and the TTCT-V.

Objective Three

Over a period of 12 weeks, a minimum of 14 out of 16 students were to increase their creative thinking skills in the area of originality by at least 20% as measured by the TTCT-F and the TTCT-V.

Objective 4

Over a period of 12 weeks, a minimum of 14 out of 16 students were to increase their creative thinking skills in the area of flexibility by at least 20% as measured by the TTCT-V.

CHAPTER II

Research and Planned Solution Strategy

"Creativity is not simply inborn. On the contrary, schooling can create creative minds – though it often doesn't" (Sternberg & Lubart, 1991, p.608). All creative people have acquired creative attitudes. Today's students, as tomorrow's creative producers, must value creativity and innovation and must be receptive to unique and perhaps wild ideas. Their minds must be set to think creatively and to play with thoughts, dissecting them and turning them around. Most of all, they should appreciate being immersed in creative activities and they should be aware that they are, in fact involved in creativity (Davis, 1989).

What is creativity? Research proposed diverse definitions and views of creativity. Creativity was defined as a process or a product. Creativity was also sometimes defined as an attribute or personality trait. Creativity was also said to have an environmental component that could affect its development (Slabbert, 1994). However, regardless of how creativity was being defined, the production of something innovative or original was associated with the definition. The product

could be an idea, a point of view, an invention, a scientific theory, a literary work, a design or the like (Torrance & Goff, 1989). One of the proposed views of creativity was that an individual is innately creative. Another view was that creativity could be enhanced or even taught. This practicum proposal assumed the view that creativity could be increased with proper training.

Goals and objectives for creativity training were set forth by the research. These goals and objectives included:

A. Raising creativity consciousness and teaching creative attitudes
B. Improving students' metacognitive understanding of creativity
C. Strengthening creative abilities through exercise
D. Teaching creative thinking techniques
E. Involving students in creative activities (Davis, 1989, p.81).

Research indicated that one of the most significant tools used in the accomplishment of the goals and objectives for creativity training was the use of imagery. Imagery was defined as the ability to form a mental picture of previously stored knowledge in response to a learning event (Jampole, Mathews & Konopak, 1994). The mind was said to examine the mental pictures as if it were manipulating actual objects.

"The soul never thinks without a mental picture" (Aristotle as cited by Daniels-McGhee & Davis, 1994, p.153). Anecdotal recollections

as Aristotle's and those of other creative personalities such as Einstein and Beethoven have shown that mental imagery and creativity are intimately related. Daniels-McGhee and Davis (1994) further described four levels of the interaction between imagery and creativity. The first level was creating out of necessity, whereby problems were solved using concrete and common representations. The second level called for improvements and changes by analyzing, comparing and categorizing, which could be arrived at by brainstorming. The third level involved the use of metaphors and creating abstract or symbolic innovations. The fourth level required a shift in paradigms and accepting new perceptions of reality.

Hess (1987) presented one way to employ imagery in the classroom by using guided fantasy to enhance creative writing. Presented with a fantasy prompt, students were allowed to visualize suggestions and then write their interpretations in the form of a story. When students were allowed to visualize, fantasize and even become the character in the story to be written they reacted in a more believable and creative way.

Jampole, Mathews & Konopak (1994) conducted a study using two groups of third and fourth grade students. One group was provided with direct creativity training with imagery as its main

component. Another group was only trained in the mechanics of reading and writing. At the end of the training sessions both groups were assessed through the use of writing samples. The results indicated that the group trained on imagery scored significantly better than the writing practice group in the areas of originality and fluency. The writing samples of the imagery trained group revealed creative as well as independent and divergent thinking.

Thalgott and Furst (1988) proposed the use imagery in the classroom to increase creativity through the use of imagination exercises. The imagination exercises began with a short relaxation period that helped children focus and concentrate. The relaxation period was followed by vivid stories that encouraged development of visualization and creativity. Motivational instructions were provided at the end of the imagery story to motivate, encourage and build children's self-esteem.

According to the reviewed literature, another tool that proved useful in fulfilling the goals for the training and teaching of creativity was the use of computers. Some teachers use computers in their classroom as a reward for good behavior or for prompt completion of work. Others use them as punishment for misbehavior or for students who have a hard time understanding basic skills and concepts.

Oftentimes these students become bored by sitting in front of a computer and grow to dislike using them since they see no avenue for creative expression.

Research indicated that effective use of computers enticed imagination and produced creative thinking. However, the computer alone did not provide the student with opportunities to be creative. The teacher had the ultimate responsibility for selecting appropriate software, instructing students in its operation and affording them time to use it (Henderson & Minner, 1991).

Henderson and Minner (1991) further established that several types of programs promoted creativity in children. Among these were word processing programs and programs that taught and promoted thinking skills. There was also programming software designed to be used by children that enhanced creative thinking.

Word processing programs motivated children to write. Children who had creative ideas may have sometimes lacked the motor or technical skills to generate a quality product. Word processing programs afforded students the ease of writing, revising, editing and correcting their writing. The printed product produced with a word processing program was always visually pleasing to the child as well as to others (Henderson & Minner, 1991).

Students in elementary school classrooms have used word processing programs to express themselves creatively in many ways. Some have written family histories. Others have kept diaries and journals. Students have also produced individual stories and have collaborated in groups toward the production of literary works. Henderson and Minner (1991) cited an elementary school setting where groups of students wrote original stories on word processing programs, while another group illustrated them and a third group made the covers. The jobs were rotated until all groups had a chance to perform every function. Through these stories the students found an outlet for creative expression.

Programming software provided one of the better ways to capture the imaginations of creative children. They have been used in many ways to allow students to express themselves creatively. Henderson and Minner (1991) described a classroom in which elementary school students wrote programs to assist them with their homework and monitor their daily grades.

Clements (1991) conducted a study in which a group of third grade students was exposed to programming software and a comparison group was not. The program used required the students to create graphics by directing the movement of a pointer on the screen.

The initial graphic created became the problem goal or frame of reference. After creating the initial graphic the students were able to select part or parts of it and code them for use in creating additional shapes or figures. Through this procedure the students organized and analyzed their methods and determined the most effective way to arrive at their problem goal. The students created graphics that were complete and unique to the individual's style and they engaged in self-directed exploration and intrinsically motivated discovery. At the conclusion of the study the students' creative skills were assessed and compared to those of the comparison group. The figural and verbal creativity scores of the students exposed to the programming software surpassed those of the comparison group.

There were also several programs that promoted thinking skills. These programs took the shape of games, activities or simulations. They strengthened creativity by providing students with the opportunity to create and discern patterns, complete visual analogies, visualize in three-dimensional form and develop spatial awareness.

Research also indicated that creative problem solving was a useful instrument in the teaching of creativity. "Authentic or real world problem solving is something contemporary learning theorists and school reformers have given much attention to recently"

(Chislett, 1994, p.4). Mumford, Connelly, Baughman and Marks (1993) attributed this interest to the positive influence that creative problem solving and its impact on creativity had in later achievement. The ability to solve problems creatively was said to be of much value when individuals face the complexities, ambiguities and often conflicting demands of the social groups in which they ultimately work.

The reviewed literature differentiated between creative problem solving tasks and routine problem solving tasks. Creative problems were said to demand that individuals cope with a new situation, acquire new expertise and maintain motivation while working on a demanding task. The task could be minimally structured and could present a valid chance of initial failure. These characteristics of creative problem solving indicated that the creative thinking skills of individuals participating in creative problem solving activities could be enhanced through the acquisition of motivational and dispositional characteristics that would allow them to adapt to demanding new performance situations (Mumford, Connelly, Baughman & Marks, 1993).

Isaksen and Treffinger's Creative Problem Solving (CPS) model as cited by Chislett (1994) offered step-by-step instruction in the divergent and convergent processes of creative thinking. It was viewed

as an integrated approach for making problem solving activity genuine to the students thus enhancing creative efficiency.

Chislett (1994) outlined the six phases of CPS: mess finding, data finding, problem finding, idea finding, solution finding and acceptance finding. Mess finding was the beginning point and it involved identifying and accepting a challenge, evaluating ownership of the problem and developing an interest in finding creative ideas. In data finding, relevant information, impressions, observations and feelings were examined. During the problem finding phase possible problem statements were generated and one was selected. Idea finding consisted of brainstorming many alternatives for responding to the problem and selecting promising responses. Solution finding involved generating criteria used to evaluate ideas, and acceptance finding considered the steps for overcoming resistance and generated steps for gaining assistance and developing a plan of action.

In several projects conducted by Chislett (1993) using CPS both in regular classrooms and resource rooms, it was found that the methods and steps associated with CPS enhanced students' creative productivity. Training in creative problem solving increased the quality and quantity of children's responses to creative tasks. CPS was successful in

promoting creative thinking when compared to other problem solving methods designed to teach children and adults to think creatively.

Grossman and Wiseman (1993) suggested that creative problem solving encounters energized the participants and provided multi-sensory experiences that heightened creativity. The exciting new ideas generated were directed by the brain toward the solution of a particular problem. Problem solvers could actually imagine what the world would be like with the problem solved. They began to see, hear, smell, taste and even feel the results of a successful solution.

Creative problem solving experiences were found to lend themselves to the creation of metaphors. Metaphors fueled the creative process. They emphasized characteristics of objects, people and events using an image that highlighted those characteristics clearly and dramatically. Metaphors generated vivid images and suggested new ideas for unusual problem solutions. By creating a metaphor for a problem or situation, solutions or views that were not be initially apparent may emerge (Swartz & Parks, 1994).

Creating is one of the highest forms of thinking. Research showed that creative thinking involved an appropriate attitude, discipline and experience that could be developed. It was not a matter of being born creative, or not. Creative problem solving in the

classroom evolved into a powerful synergy when students worked together to find that ideas are shaped, modified, expanded and gradually formed into something larger that the sum of its parts (Campbell, 1993).

Creativity has been studied in a multitude of disciplines including philosophy science, religion and education. In the field of education, creativity has only recently begun to receive the attention it deserves. Research indicated that a multimodal creativity program would not only increase creativity, but the increase in creativity could positively affect a student's overall performance and self-concept (Flaherty, 1992).

Solution Strategy

Developing and implementing strategies to increase creative thinking skills in second and third grade students was the main focus of this practicum. An analysis of the data was conducted by the writer. Based on the research, the author of this practicum proposal selected the strategies to be implemented.

The author incorporated a combination of the strategies researched into this practicum. The main consensus pointed to the findings that creativity processes could be taught and that creative thinking skills could be positively influenced through the use of one

or more methods. Therefore students from the writer's targeted group were exposed to imagery, computer use and creative problem solving experiences.

The author of this practicum agreed with Jampole, Mathews and Konopak (1994) in that effective creative writing involved creating images and combining them and synthesizing them in a novel way. The writer was also in accordance with Hess (1987) in that when students believed that they were a part of the story being created they became fully involved. Allowing students to visualize suggestions and providing them with guided fantasy as a prelude to creative writing experiences could result in heightened creative output. Thalgott and Furst's (1988) theory of relaxation, imagery and motivational instructions was used to introduce the students to the visualization process.

The theories of Henderson and Minner (1991) and the findings of Clements (1991) clearly pointed to the effective use of computers as an asset in creativity training. The writer of this practicum used a variety of computer software in the implementation of this practicum. The Learning Company's Bilingual Writing Center (Appendix F, pp.61-63) was the word processing program used to foster written creative expression. Maxis' Widget Workshop (Appendix F, pp.61-63) was used

to promote thinking skills while students created and built in an open ended setting touching on the principles of physics, math, logic and sound. Edmark's Thinkin' Things Collection Two (Appendix F, pp.61-63) exposed the students to problem solving, exploring depth, perspective and art in motion, three dimensional visualization and basic programming.

This writer incorporated Isaksen and Treffinger's Creative Problem Solving model, cited by Chislett (1993), as a strategy used during the implementation of this practicum. Creative problem solving provided opportunities for metaphoric thinking. Metaphoric thinking in turn tapped the imagination and energized creativity.

The above mentioned strategies were incorporated into a 12-week project. The expectation was that the targeted group of students would demonstrate improvement in creative thinking abilities.

CHAPTER III

Method

This practicum was implemented over a period of 12 weeks. The 16 targeted students consisted of eight boys and eight girls. They met with the writer two times per week. The activities in this practicum were implemented for a total 90 minutes during each day. At that time, systematic activities designed to improve creative thinking skills took place. Students began each day by participating in a 30-minute *Serendipitous Start* (origin of the term unknown, but used by this writer and several colleagues over the years) which alternated between relaxation and imagery exercises and the use of imagery in creative writing activities. Students also participated in 30-minute creative problem solving encounters with their peers. The Creative Problem Solving Model was used in connection with seven popular fairy tales. Students also used the computer software for 30 minutes each day. The students generate individual stories as well as collaborative projects of their choice using The Bilingual Writing Center (Appendix F, pp.61-63). They also generated progressive inventions and programs using Widget and Thinkin' Things

Collection Two (Appendix F, pp.61-63). A schedule was created (Appendix G, p. 65) to ensure that all students had access to all computer software. The Inventory of Creative Behaviors (Appendix B, pp.47-53), was administered each week during the second day of implementation. A cumulative inventory was administered the last week of implementation.

Several sources were used to gather the materials for classroom instruction. The materials were teacher-adapted from resource books and other instructional publications. The 12-week agenda followed for improving creative thinking skills was as follows:

Week One

Day One: The students began the day with a *Serendipitous Start* in which imagery, visualization and relaxation were introduced. Students were then be familiarized with Creative Problem Solving and its steps and techniques. Problem solving groups were established and an initial meeting was conducted. Students were introduced to the computer software to be used and the software use schedule (Appendix G, p.65) was discussed.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared.

Students were involved in a sample Creative Problem Solving encounter. All students explored all the computer software. Students decided on collaborative projects to be generated using computer software.

Week Two

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The first Creative Problem Solving encounter, based on the fairy tale *Cinderella,* commenced. Students used computer software according to the schedule (Appendix G, p.65).

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The first Creative Problem Solving encounter continued. Students used computer software according to the schedule (Appendix G, p.65).

Week Three

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The first Creative Problem Solving encounter concluded and the results were presented. Students used computer software according to the schedule (Appendix G, p.65).

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The second Creative Problem Solving encounter, based on the fairy tale *Thumbelina,* commenced. Students used computer software according to the schedule (Appendix G, p.65).

Week Four

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The second Creative Problem Solving encounter continued. Students used computer software according to the schedule (Appendix G, p.65).

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were be shared. The second Creative Problem Solving encounter concluded and the results were presented. Students used computer software according to the schedule (Appendix G, p.65).

Week Five

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The third Creative Problem Solving encounter, based on the fairy tale *Rumpelstiltskin*

commenced. Students used the computer software according to the schedule (Appendix G, p.65).

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The third Creative Problem Solving encounter continued. Students used computer software according to the schedule (Appendix G, p.65). By the end of this week all students had an opportunity to use all the computer software. Individual students and groups of students presented creative writing products generated as well as inventions and programs created using Widget Workshop and Thinkin' Things Collection Two (Appendix F, pp.61-63).

Week Six

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The third Creative Problem Solving encounter concluded and the results were be presented. Students used computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a

visualization prompt. Creative writing products were shared. The fourth Creative Problem Solving encounter, based on the fairy tale *The Sleeping Beauty* commenced. Students used computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Week Seven

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The fourth Creative Problem Solving encounter continued. Students used computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The fourth Creative Problem Solving encounter concluded and the results were presented. Students used computer software according to the schedule (Appendix G, p.65). The students presented any products generated using the computer software.

Week Eight

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The fifth Creative

Problem Solving encounter, based on the fairy tale *Rapunzel* commenced. Students used the computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The fifth Creative Problem Solving encounter concluded and the results were presented. The students used computer software according to the schedule (Appendix G, p.65). The students presented any products generated using the computer software.

Week Nine

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The sixth Creative Problem Solving encounter, based on the fairy tale *Beauty and the Beast* commenced. Students used computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The

sixth Creative Problem Solving encounter continued. Students used computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Week Ten

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The sixth Creative Problem Solving encounter concluded and the results were presented. Students used computer software according to the schedule (Appendix G, p.65). The students presented products generated using the computer software.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The last Creative Problem Solving encounter, based on the fairy tale *The Shoemaker and the Elves* commenced. The students used computer software according to the schedule (Appendix G, p.65). Students presented products generated using the computer software.

Week Eleven

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The last Creative Problem Solving encounter continued. Students used computer

software according to the schedule (Appendix G, p.65). The students presented final products generated using the computer software.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation, imagery and creative writing using a visualization prompt. Creative writing products were shared. The last Creative Problem Solving encounter concluded and the results were presented. The students used computer software according to the schedule (Appendix G, p.65). Students presented final products generated using the computer software.

Week Twelve

Day One: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The TTCT-F and the cumulative Inventory of Creative Behaviors (Appendix B, pp.47-53) was administered.

Day Two: The students began the day with a *Serendipitous Start* consisting of relaxation and an oral fantasy story. The TTCT-V was administered.

CHAPTER IV

Results

The results of this practicum were immensely rewarding and encouraging. All the results and information was charted and analyzed for additional assistance (Appendices H-R, pp.67-87). The pretest results demonstrated that all of the targeted students received overall scores that were below the mean in the TTCT-F (Appendix C, p.55) and also received overall scores that were below the mean in the TTCT-V (Appendix D, p.57). The students' scores averaged 89 in the TTCT-F and 85 in the TTCT-V. A score of 100 in each of the tests was determined to be an average score. After the 12-week implementation the posttests reflected that overall scores in the TTCT-F averaged 118 (Appendix H, p.67), and overall scores in the TTCT-V averaged 111 (Appendix I, p.69).

The students also received below average scores on the Inventory of Creative Behaviors (Appendix B, p.47-53). The students' scores in the Inventory of Creative Behaviors (Appendix B, pp.47-53) averaged 18 (Appendix E, p.59). Scores between 21 and 37 were considered to be average scores. After the 12-week implementation,

the final Inventory of Creative Behaviors (Appendix B, pp.47-53) reflected that the students' scores averaged 29 (Appendix J, p.71).

The TTCT-F measured creative thinking skills in the areas of fluency, originality and elaboration. A standard score of 100 in each area was determined to be an average score. The students' scores were found to be deficient in the areas of fluency and originality (Appendix C, p.55). In the area of fluency, the students' standard scores averaged 84. In the area of originality, the students' standard scores averaged 89. After the 12-week implementation, the students' standard scores in the area of fluency averaged 105 (Appendix H, p.67), and in the area of originality, the students' standard scores averaged 108 (Appendix H, p.67).

The TTCT-V measured creative thinking in the areas of fluency, flexibility and originality. A standard score of 100 in each area was determined by be an average score. The students' scores were found to be deficient in each area of the TTCT-V. In the area of fluency, the students' standard score averaged 85. In the area of flexibility, the students' standard score averaged 84. In the area of originality, the students' standard score averaged 86. After the 12-week implementation, the students' standard scores averaged 108 in the area

of fluency, 110 in the area of flexibility and 116 in the area of originality (Appendix I, p.69).

The first objective stated that a minimum of 14 out of 16 students were to increase their overall creative thinking skills by at least 20%, as measured by the TTCT-F, the TTCT-V and the Inventory of Creative Behaviors (Appendix B, pp.47-53). After the 12-week implementation, 14 out of 16 students did in fact increase their overall creative thinking skills by at least 20% as measured by the TTCT-F (Appendix K, p.73). Fourteen out of 16 students increased their overall creative thinking skills by at least 20% as measured by the TTCT-V (Appendix L, p.75), and 16 out of 16 students increased their overall creative thinking skills by at least 20% (Appendix M, p.77) as measured by the Inventory of Creative Behaviors (Appendix B, pp.47-53). The first objective was a success, and although two of the targeted students did not show the expected increase, and two of the targeted students' standard scores remained below average, in both the TTCT-F and the TTCT-V, all of the students' scores reflected a tremendous increase with a percentage of increase averaging 34% in the TTCT-F (Appendix K, p.73), and a percentage of increase averaging 32% in the TTCT-V (Appendix L, p.75). In the Inventory of Creative Behaviors (Appendix B, pp.47-53), although four students' scores remained below average,

these students' scores demonstrated an increase well beyond the expected outcome, and the average percentage of increase was 62% (Appendix M, p.77).

The second objective stated that a minimum of 14 out of 16 students were to increase their creative thinking skills in the area of fluency by at least 20%, as measured by the TTCT-F and the TTCT-V. After the 12-week implementation, 11 out of 16 students increased their creative thinking skills in the area of fluency by at least 20% as measured by the TTCT-F (Appendix N, p.79), and 12 out of 16 students increased their creative thinking skills in the area of fluency by at least 20% as measured by the TTCT-V (Appendix O, p.81). The second objective was not entirely successful. Although not enough students achieved the expected increase, and 7 of the students' scores remained below average, all of the targeted students did in fact significantly increase their scores in the area of fluency. Average increase in the area of fluency was 27% as measured by the TTCT-F (Appendix N, p.79), and 28% as measured by the TTCT-V (Appendix O, p.81). The results were good, but perhaps the students may have benefited from a longer implementation period, as well as from additional brainstorming activities.

The third objective stated that a minimum of 14 out of 16 students were to increase their creative thinking skills in the area of originality by at least 20% as measured by the TTCT-F and the TTCT-V. After the 12-week implementation 9 out of 16 students increased their creative thinking skills in the area of originality by at least 20% as measured by the TTCT-F (Appendix P, p.83), and 15 out of 16 students increased their creative thinking skills in the area of originality by at least 20% as measured by the TTCT-V (Appendix Q, p.85). The third objective was partially successful. Although not enough students increased their scores in the area of originality and six students' scores remained below average as measured by the TTCT-F, all of the targeted students did in fact evidence an increase in their originality scores as measured by the TTCT-F, with an average increase of 23% (Appendix P, p.83). More than the expected number of students achieved a 20% or larger increase in their originality scores as measured by the TTCT-V and all of the students' originality scores rose to above average. The average increase in originality scores as measured by the TTCT-V was 35% (Appendix Q, p.85). The results were very good and the difference in the number of students attaining the expected increase between the two tests may have been the outcome of the high verbal stimulation received by the students during the implementation phase.

The fourth objective stated that 14 out of 16 students were to increase their creative thinking skills in the area of flexibility by at least 20% as measured by the TTCT-V. After the 12-week implementation, 14 out of 16 students increased their creative thinking skills by at least 20% in the area of flexibility as measured by the TTCT-V (Appendix R, p.87). These results were excellent, and although two of the students' scores did not increase to the expected level, and one student's score remained below average, a significant increase in the flexibility scores was noted for all targeted students, with an average increase of 30% (Appendix R, p.87).

It is relevant to mention, that although it was not this writer's direct intention to raise the students' scores to above the average, but simply to produce a determined increase in the scores, increases to above average were noted in all areas. In the TTCT-F, 14 students' overall creativity scores, and nine students' fluency and originality scores rose to above the average (Appendix H, p.67). In the TTCT-V, 14 students' overall creativity scores, nine students fluency scores, 13 students' flexibility scores, and all 16 students' originality scores rose to above the average (Appendix I, p.69).

CHAPTER V

Recommendations

The knowledge gained from this practicum will be shared with colleagues, administrators, district personnel and other interested parties. The writer has demonstrated that by using the techniques and activities indicated in this practicum, students can develop the right frame of mind and skills necessary for becoming creative thinkers. All that is needed is the proper training and methods for making these experiences meaningful and rewarding, as well as imparting a heightened awareness of the creative process.

There are a variety of avenues through which the information from this practicum can be communicated. First, the findings of the practicum project will be discussed with the administrators of the targeted school. Second, the writer will schedule an information session at the school in order to share findings with colleagues. The information session will not be limited to teachers of the gifted, but rather extended to all interested teachers, since it is this writer's position that these techniques can be incorporated in regular classroom settings and will benefit all students. Third, a copy of the practicum will be placed in the media center for staff members to review at their leisure. Fourth, the results of this practicum will be shared with

district personnel at the Division of Advanced Academics and the Office of Instructional Leadership. Fifth, the results of this practicum and the techniques used will be shared with other teachers of the gifted at districtwide and/or regional networking sessions. Finally, the techniques used in this practicum will be incorporated as part of the regular curriculum in the writer's classes thus continuing to produce tomorrow's creative thinkers.

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Appendixes

Appendix A

1994-95 School Profile

1994-95 School Profile

SCHOOL CHARACTERISTICS, 1994-95

MAGNET PROGRAMS: N/A
SCHOOL/PARK SITE: NO

DATE SCHOOL ESTABLISHED: 1998
NUMBER OF ACRES: 10.00

ADULT SCHOOL: NO
COMMUNITY SCHOOL: NO

PERCENT OF UTILIZATION PERMANENT FACILITY: 159
ASSIGNED PROGRAM CAPACITY: 1031

SCHOOL CARE: BEFORE/AFTER

NO. OF PORTABLE CLASSROOMS: 9
SATELLITE SCHOOLS: NO

STAFF CHARACTERISTICS, 1994-95

	WHITE NON-HISPANIC		BLACK NON-HISPANIC		HISPANIC		ASIAN/AMERICAN INDIAN		TOTAL	MALE		FEMALE	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	NO.	%	NO.	%
PRINCIPAL					1	100			1	1	100		
ASSISTANT PRINCIPAL	1	100							1			1	100
COMMUNITY SCHOOL COORDINATOR													
CLASSROOM TEACHERS	7	10	16	23	46	66	1	1	70	7	10	63	90
EXCEPTIONAL STUDENT TEACHERS			1	50	1	50			2	1	50	1	50
GUIDANCE COUNSELORS					2	100			2			2	100
LIBRARIANS			1	50	1	50			2	1	50	1	50
TEACHER AIDES			1	9	10	91			11	1	9	10	91
CLERICAL/SECRETARIES	1	20			4	80			5			5	100
CUSTODIANS/SERVICE WORKERS	1	10			9	90			10	6	60	4	40
OTHER													
TOTAL FULL-TIME STAFF	10	10	19	18	74	71	1	1	106	17	16	87	84
TOTAL PART-TIME STAFF	4	7	1	2	52	91			57	8	14	49	86

PERCENT OF BEGINNING TEACHERS: 8.3

REGULAR PROGRAM PUPIL/TEACHER RATIO: 22 :1

AVERAGE YEARS TEACHING IN FLORIDA: 6

PERCENT OF TEACHERS NEW TO THIS SCHOOL THIS YEAR: 13.9

AVERAGE SALARY FOR INSTRUCTIONAL STAFF: 32,675.99

TEACHER OF THE YEAR, 1993-94:
MARILOU DAILEY

INSTRUCTIONAL STAFF LEVEL OF EDUCATION	NUMBER	%
MASTERS DEGREE	21	27
SPECIALISTS DEGREE	9	11
DOCTORAL DEGREE		

TEACHER SALARY RANGE	NUMBER
UNDER 26,500	3
$26,500-29,999	35
$30,000-33,999	12
$34,000-37,999	5
$38,000-41,999	5
$42,000-AND OVER	12

INSTRUCTIONAL STAFF ATTENDANCE, 1993-94

DAYS ABSENT	NUMBER OF STAFF
NONE	2
0.5-5.0	27
5.5-10.0	20
10.5-15.0	11
15.5-20.0	3
20.5 AND OVER	3

PERCENTAGE OF INSTRUCTIONAL STAFF ATTENDANCE, 1993-94: 95.6

STUDENT AND EDUCATIONAL PROGRAM INFORMATION

STUDENT MEMBERSHIP, 1994-95

GRADE	WHITE NON-HISPANIC NO.	%	BLACK NON-HISPANIC NO.	%	HISPANIC NO.	%	ASIAN/AMERICAN INDIAN NO.	%	TOTAL NO.	% NOT PROMOTED 1993-94	DROPOUT/ TRUANT RATE 1993-94	AVERAGE CLASS SIZE 1994-95
PK					20	100			20			
K	10	3			297	96	1	.0	308	0.0	0.9	24.2
1	12	5	1	.0	226	95			239	0.0	2.2	26.4
2	17	6	1	.0	281	94			299	0.0	2.2	27.2
3	14	5	1	.0	251	94	1	.0	267	2.9	1.5	29.6
4	10	4	7	1	259	96			271	1.5	2.8	29.7
5	9	4			224	96	1	.0	234	1.3	3.8	30.7
TOTAL	72	4	5	.0	1558	95	3	.0	1638	1.1	2.2	

TOTAL FULL-TIME EQUIVALENT STUDENTS 0 AVERAGE COST, 1993-94

	NUMBER	%	AVG. COST PER FTE
BASIC EDUCATION	1263.96	81	$ 3192.68
EXCEPTIONAL STUDENT	28.27	1	6241.88
AT-RISK	270.60	17	3222.32
VOCATIONAL EDUCATION			

TOTAL EXPENDITURES: $ 5,033,886

1994-95

% OF STUDENTS WITH: LIMITED ENGLISH PROFICIENCY	35.3
FREE/REDUCED LUNCH	65.4
NO. OF STUDENTS SERVED BY CHAPTER 1:	0

1993-94

	NO. OF
STUDENTS WITH INDOOR SUSPENSIONS	1
STUDENTS WITH OUTDOOR SUSPENSIONS	3
REFERRALS TO DROPOUT PREVENTION PROGRAMS	56

EXCEPTIONAL STUDENT EDUCATION, 1994-95

PRIMARY EXCEPTIONALITY	NUMBER	%
EDUCABLE MENTALLY HANDICAPPED		
TRAINABLE MENTALLY HANDICAPPED		
PHYSICALLY HANDICAPPED	3	0.2
SPEECH THERAPY	31	1.9
LANGUAGE THERAPY	6	0.4
HEARING IMPAIRED		
VISUALLY IMPAIRED		
EMOTIONALLY HANDICAPPED		
SPECIFIC LEARNING DISABILITY	43	2.6
PROFOUNDLY MENTALLY HANDICAPPED		
DUAL SENSORY IMPAIRED		
AUTISTIC		
SEVERELY EMOTIONALLY HANDICAPPED		
TRAUMATIC BRAIN INJURED		
DEVELOPMENTALLY DELAYED		
ESTABLISHED CONDITIONS		
GIFTED	4	0.2
TOTAL	87	5.3

STUDENT ATTENDANCE, 1993-94

DAYS ABSENT	NO. OF STUDENTS
NONE	103
0.5-5.0	556
5.5-10.0	348
10.5-15.0	257
15.5-20.0	123
20.5 AND OVER	148
% OF ATTENDANCE:	94.72

STUDENT MOVEMENT, 1993-94

CATEGORY	NUMBER
NEW TO DCPS	294
TRANSFERS IN:	
WITHIN DCPS	153
PUBLIC OUTSIDE DCPS	25
NON-PUBLIC SCHOOL	52
OTHER	61
TRANSFERS OUT:	
WITHIN DCPS	189
PUBLIC OUTSIDE DCPS	44
NON-PUBLIC SCHOOL	2
OTHER	19
DID NOT ENTER	26
MOBILITY INDEX	30

1994-95

	NO. OF
INSTRUCTIONAL MICROS	82
USABLE LIBRARY BOOKS	13207
STUDENTS TRANSPORTED	588

BILINGUAL PROGRAM ENROLLMENT, 1994-95

ESOL	579
SPANISH-S	1554
SPANISH SL	69

PHYSICAL FITNESS TEST RESULTS, 1993-94

AWARDS	RED	BLUE	GOLD	TOTAL	NO. TESTED
NUMBER	116	7	2	125	444
PERCENT	26	2	0	28	99

Appendix B

Inventory of Creative Behaviors

Inventory of Creative Behaviors

3=High, 2=Average, 1=Low

	Initial	Week 1
Generates a quantity of ideas	_____	_____
Generates unusual ideas	_____	_____
Is receptive to new ideas	_____	_____
Is expressive in oral communication	_____	_____
Is expressive in written communication	_____	_____
Uses vivid vocabulary	_____	_____
Extends stories	_____	_____
Is expressive in drawing	_____	_____
Extends designs	_____	_____
Creates original designs	_____	_____
Uses creative movement during presentations	_____	_____
Has a sense of humor	_____	_____
Imagines and fantasizes	_____	_____
Interprets beyond the obvious	_____	_____
Uses materials in non-conventional ways	_____	_____
Total	_____	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

3=High, 2=Average, 1=Low

	Week 2	Week 3
Generates a quantity of ideas	_____	_____
Generates unusual ideas	_____	_____
Is receptive to new ideas	_____	_____
Is expressive in oral communication	_____	_____
Is expressive in written communication	_____	_____
Uses vivid vocabulary	_____	_____
Extends stories	_____	_____
Is expressive in drawing	_____	_____
Extends designs	_____	_____
Creates original designs	_____	_____
Uses creative movement during presentations	_____	_____
Has a sense of humor	_____	_____
Imagines and fantasizes	_____	_____
Interprets beyond the obvious	_____	_____
Uses materials in non-conventional ways	_____	_____
Total	_____	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

3=High, 2=Average, 1=Low

	Week 4	Week 5
Generates a quantity of ideas	_____	_____
Generates unusual ideas	_____	_____
Is receptive to new ideas	_____	_____
Is expressive in oral communication	_____	_____
Is expressive in written communication	_____	_____
Uses vivid vocabulary	_____	_____
Extends stories	_____	_____
Is expressive in drawing	_____	_____
Extends designs	_____	_____
Creates original designs	_____	_____
Uses creative movement during presentations	_____	_____
Has a sense of humor	_____	_____
Imagines and fantasizes	_____	_____
Interprets beyond the obvious	_____	_____
Uses materials in non-conventional ways	_____	_____
Total	_____	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

3=High, 2=Average, 1=Low

	Week 6	Week 7
Generates a quantity of ideas	_____	_____
Generates unusual ideas	_____	_____
Is receptive to new ideas	_____	_____
Is expressive in oral communication	_____	_____
Is expressive in written communication	_____	_____
Uses vivid vocabulary	_____	_____
Extends stories	_____	_____
Is expressive in drawing	_____	_____
Extends designs	_____	_____
Creates original designs	_____	_____
Uses creative movement during presentations	_____	_____
Has a sense of humor	_____	_____
Imagines and fantasizes	_____	_____
Interprets beyond the obvious	_____	_____
Uses materials in non-conventional ways	_____	_____
Total	_____	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

3=High, 2=Average, 1=Low

	Week 8	Week 9
Generates a quantity of ideas	_____	_____
Generates unusual ideas	_____	_____
Is receptive to new ideas	_____	_____
Is expressive in oral communication	_____	_____
Is expressive in written communication	_____	_____
Uses vivid vocabulary	_____	_____
Extends stories	_____	_____
Is expressive in drawing	_____	_____
Extends designs	_____	_____
Creates original designs	_____	_____
Uses creative movement during presentations	_____	_____
Has a sense of humor	_____	_____
Imagines and fantasizes	_____	_____
Interprets beyond the obvious	_____	_____
Uses materials in non-conventional ways	_____	_____
Total	_____	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

3=High, 2=Average, 1=Low

	Week 10	Week 11
Generates a quantity of ideas	_____	_____
Generates unusual ideas	_____	_____
Is receptive to new ideas	_____	_____
Is expressive in oral communication	_____	_____
Is expressive in written communication	_____	_____
Uses vivid vocabulary	_____	_____
Extends stories	_____	_____
Is expressive in drawing	_____	_____
Extends designs	_____	_____
Creates original designs	_____	_____
Uses creative movement during presentations	_____	_____
Has a sense of humor	_____	_____
Imagines and fantasizes	_____	_____
Interprets beyond the obvious	_____	_____
Uses materials in non-conventional ways	_____	_____
Total	_____	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

3=High, 2=Average, 1=Low

	Final
Generates a quantity of ideas	_____
Generates unusual ideas	_____
Is receptive to new ideas	_____
Is expressive in oral communication	_____
Is expressive in written communication	_____
Uses vivid vocabulary	_____
Extends stories	_____
Is expressive in drawing	_____
Extends designs	_____
Creates original designs	_____
Uses creative movement during presentations	_____
Has a sense of humor	_____
Imagines and fantasizes	_____
Interprets beyond the obvious	_____
Uses materials in non-conventional ways	_____
Total	_____

Interpretation of Scores

High	=	45-38
Average	=	37-23
Low	=	22-15

Appendix C

Torrance Test of Creative Thinking, Figural Scores

Torrance Test of Creative Thinking, Figural Scores*

Student	Fluency	Originality	Elaboration	Average Standard Score	National Percentile Rank
1	121	130	143	127	96
2	106	110	150	121	91
3	91	100	160	119	89
4	101	107	150	112	80
5	80	89	137	99	46
6	96	89	136	99	46
7	88	97	130	98	43
8	96	93	110	96	38
9	88	97	135	95	35
10	96	104	130	95	35
11	98	78	132	94	32
12	91	93	132	94	32
13	87	98	137	93	30
14	71	82	127	91	25
15	96	97	127	87	17
16	71	86	106	87	17
17	85	86	132	87	17
18	80	86	114	81	9
19	64	78	109	71	2
20	49	65	81	61	1

*All scores except the national percentile rank are standard scores.

Appendix D

Torrance Test of Creative Thinking, Verbal Scores

Torrance Test of Creative Thinking, Verbal Scores*

Student	Fluency	Flexibility	Originality	Average Standard Score	National Percentile Rank
1	132	142	136	137	98
2	118	130	126	125	91
3	131	100	112	114	78
4	108	117	114	113	77
5	101	98	98	99	48
6	96	98	99	98	48
7	96	91	95	94	40
8	93	87	96	92	36
9	96	74	103	91	36
10	91	87	96	91	34
11	87	93	88	89	30
12	84	89	88	87	26
13	82	81	89	84	21
14	86	81	85	84	21
15	77	83	82	81	17
16	76	83	81	80	16
17	76	77	77	77	12
18	78	74	71	74	9
19	71	74	74	73	8
20	68	71	59	66	5

*All scores except the national percentile rank are standard scores.

Appendix E

Inventory of Creative Behaviors, Scores

Inventory of Creative Behavior, Scores

Student	Score
1	45
2	43
3	42
4	39
5	22
6	20
7	20
8	19
9	19
10	18
11	18
12	18
13	18
14	17
15	16
16	16
17	16
18	15
19	15
20	15

Appendix F

GTEP Software Evaluation Forms

NOVA SOUTHEASTERN UNIVERSITY
GTEP Software Evaluation Form

GTEP STUDENT: Rosa M. Harkow **EVALUATION DATE:** 2-23-96

TITLE: The Bilingual Writing Center **PUBLISHER:** The Learning Company

CHECK ALL THAT APPLY

___Academic Game	___Test/Diagnostic
___Drill and Practice	___Tutorial
___Simulation	___Administrative_____
___Educational Game	Other Word Processing

LEVEL: ___Preschool___K-3___4-6___6-8 x 9-12___Adult

PURPOSE: ___Remediation ___Developmental x Enrichment

Computer: Macintosh *PC/Apple/Mac* **on CD ROM** No **on INTERNET/WEB** No

Number of Drives Needed: 1 *Y/N* **Printer** Yes **Other:** n/a *specify*

CONTENT

1.	Program has educational value	Yes
2.	Grammar is accurate and free of syntax errors	Yes
3.	Language is stereotype-free (race, ethnic, sex, etc.)	Yes
4.	Content is adaptable to varied instructional strategies	Yes

QUALITY

5.	Purpose of the program is well defined	Yes
6.	Defined purpose is achieved	Yes
7.	Presentation of content is clear and logical	Yes
8.	Level of difficulty is appropriate for target audience	Yes
9.	Sequence is organized in developmental steps	No
10.	Graphics, color, and sound are appropriate for instruction	Yes
11.	User controls the sequence of presentation	Yes
12.	Entry level prerequisites are specified	Yes
13.	Program is user-friendly	Yes
14.	Program is interactive	No
15.	Corrective feedback is provided	Yes
16.	Screen design is reliable and student-proof	Yes
18.	Adequate error trapping is evident	No
19.	Easy escape from program is provided	Yes
20.	Record keeping/printouts of student progress is available	No

DOCUMENTATION

21.	Manuals are available and user-friendly	Yes
22.	Clear operating instructions and trouble shooting are included	Yes
23.	Table of Contents, Index, and Glossary of Terms are provided	Yes

OVERALL RATING

x EXCELLENT ___VERY GOOD ___GOOD ___FAIR ___POOR

NOVA SOUTHEASTERN UNIVERSITY
GTEP Software Evaluation Form

GTEP STUDENT: Rosa M. Harkow **EVALUATION DATE:** 2-23-96

TITLE: Widget Workshop **PUBLISHER:** Maxis

CHECK ALL THAT APPLY

___Academic Game	___Test/Diagnostic
___Drill and Practice	___Tutorial
_x_Simulation	___Administrative_____
___Educational Game	Other_____

LEVEL: ___Preschool___K-3___4-6___6-8_x_9-12___Adult

PURPOSE: ___Remediation ___Developmental _x_Enrichment

Computer: Macintosh **on CD ROM** No **on INTERNET/WEB** No
PC/Apple/Mac

Number of Drives Needed: 1 *Y/N* **Printer** Yes **Other:** n/a *specify*

CONTENT

1.	Program has educational value	Yes
2.	Grammar is accurate and free of syntax errors	Yes
3.	Language is stereotype-free (race, ethnic, sex, etc.)	Yes
4.	Content is adaptable to varied instructional strategies	Yes

QUALITY

5.	Purpose of the program is well defined	Yes
6.	Defined purpose is achieved	Yes
7.	Presentation of content is clear and logical	Yes
8.	Level of difficulty is appropriate for target audience	Yes
9.	Sequence is organized in developmental steps	Yes
10.	Graphics, color, and sound are appropriate for instruction	Yes
11.	User controls the sequence of presentation	Yes
12.	Entry level prerequisites are specified	Yes
13.	Program is user-friendly	Yes
14.	Program is interactive	Yes
15.	Corrective feedback is provided	Yes
16.	Screen design is reliable and student-proof	Yes
18.	Adequate error trapping is evident	Yes
19.	Easy escape from program is provided	Yes
20.	Record keeping/printouts of student progress is available	Yes

DOCUMENTATION

21.	Manuals are available and user-friendly	Yes
22.	Clear operating instructions and trouble shooting are included	Yes
23.	Table of Contents, Index, and Glossary of Terms are provided	Yes

OVERALL RATING

_x_EXCELLENT ___VERY GOOD ___GOOD ___FAIR ___POOR

NOVA SOUTHEASTERN UNIVERSITY
GTEP Software Evaluation Form

GTEP STUDENT: Rosa M. Harkow **EVALUATION DATE:** 2-23-96

TITLE: Thinkin' Things Collection Two **PUBLISHER:** Edmark

CHECK ALL THAT APPLY

___Academic Game	___Test/Diagnostic
___Drill and Practice	___Tutorial
___Simulation	___Administrative_____
_x_Educational Game	Other_____

LEVEL: ___Preschool___K-3___4-6___6-8_x_9-12___Adult

PURPOSE: ___Remediation ___Developmental _x_Enrichment

Computer: Macintosh *PC/Apple/Mac* **on CD ROM** No **on INTERNET/WEB** No

Number of Drives Needed: 1 *Y/N* **Printer** No **Other:** n/a *specify*

CONTENT

1.	Program has educational value	Yes
2.	Grammar is accurate and free of syntax errors	Yes
3.	Language is stereotype-free (race, ethnic, sex, etc.)	Yes
4.	Content is adaptable to varied instructional strategies	Yes

QUALITY

5.	Purpose of the program is well defined	Yes
6.	Defined purpose is achieved	Yes
7.	Presentation of content is clear and logical	Yes
8.	Level of difficulty is appropriate for target audience	Yes
9.	Sequence is organized in developmental steps	Yes
10.	Graphics, color, and sound are appropriate for instruction	Yes
11.	User controls the sequence of presentation	Yes
12.	Entry level prerequisites are specified	Yes
13.	Program is user-friendly	Yes
14.	Program is interactive	Yes
15.	Corrective feedback is provided	Yes
16.	Screen design is reliable and student-proof	Yes
18.	Adequate error trapping is evident	Yes
19.	Easy escape from program is provided	Yes
20.	Record keeping/printouts of student progress is available	Yes

DOCUMENTATION

21.	Manuals are available and user-friendly	Yes
22.	Clear operating instructions and trouble shooting are included	Yes
23.	Table of Contents, Index, and Glossary of Terms are provided	Yes

OVERALL RATING

_x_EXCELLENT ___VERY GOOD ___GOOD ___FAIR ___POOR

Appendix G

Schedule for Computer Software Use

Schedule of Computer Software Use

The Bilingual Writing Center (TBWC)
Widget Workshop (WW)
Thinkin' Things Collection Two (TT-2)

Number=Week Letter=Day; 2-A=Week 2, Day 1

Student Number	Software Programs		
	TBWC	WW	TT-2
1, 4, 7, 10,	2-1	2-2	3-1
14, 17, 20	3-2	4-1	4-2
	5-1	5-2	6-1
	6-2	7-1	7-2
	8-1	8-2	9-1
	9-2	10-1	10-2
	11-1	11-2	
	WW	TT-2	TBWC
2, 5, 8, 11,	2-1	2-2	3-1
13, 16, 19	3-2	4-1	4-2
	5-1	5-2	6-1
	6-2	7-1	7-2
	8-1	8-2	9-1
	9-2	10-1	10-2
	11-1	11-2	
	TT-2	TBWC	WW
3, 6, 9, 12,	2-1	2-2	3-1
15, 18	3-2	4-1	4-2
	5-1	5-2	6-1
	6-2	7-1	7-2
	8-1	8-2	9-1
	9-2	10-1	10-2
	11-1	11-2	

Appendix H

Torrance Tests of Creative Thinking, Posttest Figural Scores

Torrance Test of Creative Thinking, Posttest Figural Scores*

Student	Fluency	Originality	Elaboration	Average Standard Score	National Percentile Rank
1	120	116	160	135	99
2	110	122	158	135	99
3	108	113	160	132	99
4	101	110	160	121	91
			Targeted Students		
5	98	93	158	115	85
6	118	132	152	130	98
7	128	132	160	126	95
8	121	104	147	122	92
9	110	116	160	128	97
10	106	116	160	119	89
11	120	107	143	116	86
12	98	97	160	120	90
13	98	107	158	124	94
14	93	119	152	117	87
15	113	119	158	128	97
16	77	89	143	94	32
17	113	97	160	112	80
18	96	122	143	123	93
19	104	97	150	118	89
20	80	86	147	98	43
			Average of Scores		
	105	108	153	118	

*All scores except the national percentile rank are standard scores.

Appendix I

Torrance Test of Creative Thinking, PosttestVerbal Scores

Torrance Test of Creative Thinking, Posttest Verbal Scores*

Student	Fluency	Flexibility	Originality	Average Standard Score	National Percentile Rank
1	135	141	144	140	98
2	120	120	130	123	90
3	138	127	144	136	97
4	125	139	135	133	96
			Targeted Students		
5	127	119	132	126	92
6	127	136	133	133	96
7	107	119	113	113	77
8	128	117	133	126	92
9	119	111	125	118	84
10	104	109	115	109	70
11	94	109	106	103	58
12	95	102	109	102	56
13	102	105	114	107	66
14	119	105	127	117	83
15	98	111	104	104	60
16	123	125	122	123	90
17	100	102	106	103	58
18	102	100	106	103	58
19	92	93	102	96	44
20	93	100	103	99	50
Average of Scores					
	108	110	116	111	

*All scores except the national percentile rank are standard scores.

Appendix J

Inventory of Creative Behaviors, Final Scores

Inventory of Creative Behavior, Scores

Student	Score
1	45
2	45
3	45
4	45
Targeted Students	
5	40
6	38
7	38
8	35
9	34
10	33
11	30
12	30
13	28
14	25
15	25
16	23
17	22
18	21
19	20
20	20
Average of Scores	29

Appendix K

Comparison of Overall Figural Scores

Comparison of Overall Figural Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	99	115	16	16%
6	99	130	31	31%
7	98	126	28	29%
8	96	122	26	27%
9	95	128	33	35%
10	95	119	24	25%
11	94	116	22	23%
12	94	120	26	28%
13	93	124	31	33%
14	91	117	26	29%
15	87	128	41	47%
16	87	94	7	8%
17	87	112	25	29%
18	81	123	42	52%
19	71	118	47	66%
20	61	98	37	61%
Average Percentage of Increase				34%

Appendix L

Comparison of Overall Verbal Scores

Comparison of Overall Verbal Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	99	126	27	27%
6	99	133	34	34%
7	94	113	19	20%
8	92	126	34	37%
9	91	118	27	30%
10	91	109	18	20%
11	89	103	14	16%
12	87	102	15	17%
13	84	107	23	27%
14	84	117	33	39%
15	81	104	23	28%
16	80	123	43	54%
17	77	103	26	34%
18	74	103	29	39%
19	73	96	23	32%
20	66	99	33	50%
Average Percentage of Increase				**32%**

Appendix M

Comparison of Inventory of Creative Behavior Scores

Comparison of Inventory of Creative Behavior Scores

Student	Initial Inventory	Final Inventory	Raw Increase	Percentage of Increase
		Targeted Students		
5	22	40	18	82%
6	20	38	18	90%
7	20	38	18	90%
8	19	35	16	84%
9	19	34	15	79%
10	18	33	15	83%
11	18	30	12	67%
12	18	30	12	67%
13	18	28	10	56%
14	17	25	8	47%
15	16	25	9	56%
16	16	23	7	44%
17	16	22	6	38%
18	15	21	6	40%
19	15	20	5	33%
20	15	20	5	33%
Average Percentage of Increase				**62%**

Appendix N

Comparison of Figural Fluency Scores

Comparison of Figural Fluency Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	80	98	18	23%
6	96	118	22	23%
7	88	128	40	45%
8	96	121	25	26%
9	88	110	22	25%
10	96	106	10	10%
11	98	120	22	22%
12	91	98	7	8%
13	87	98	11	13%
14	71	93	22	31%
15	96	113	17	18%
16	71	77	6	8%
17	85	113	28	33%
18	80	96	16	20%
19	64	104	40	63%
20	49	80	31	63%
Average Percentage of Increase				27%

Appendix O

Comparison of Verbal Fluency Scores

Comparison of Verbal Fluency Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	101	127	26	26%
6	96	127	31	32%
7	96	107	11	11%
8	93	128	35	38%
9	96	119	23	24%
10	91	104	13	14%
11	87	94	7	8%
12	84	95	11	13%
13	82	102	20	24%
14	86	119	33	38%
15	77	98	21	27%
16	76	123	47	62%
17	76	100	24	32%
18	78	102	24	31%
19	71	92	21	30%
20	68	93	25	37%
Average Percentage of Increase				**28%**

Appendix P

Comparison of Figural Originality Scores

Comparison of Figural Originality Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	89	93	4	4%
6	89	132	43	48%
7	97	132	35	36%
8	93	104	11	12%
9	97	116	19	20%
10	104	116	12	12%
11	78	107	29	37%
12	93	97	4	4%
13	98	107	9	9%
14	82	119	37	45%
15	97	119	22	23%
16	86	89	3	3%
17	86	97	11	13%
18	86	122	36	42%
19	78	97	19	24%
20	65	86	21	32%
Average Percentage of Increase				23%

Appendix O

Comparison of Verbal Originality Scores

Comparison of Verbal Originality Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	98	132	34	35%
6	99	133	34	34%
7	95	113	18	19%
8	96	133	37	39%
9	103	125	22	21%
10	96	115	19	20%
11	88	106	18	20%
12	88	109	21	24%
13	89	114	25	28%
14	85	127	42	49%
15	82	104	22	27%
16	81	122	41	51%
17	77	106	29	38%
18	71	106	35	49%
19	74	102	28	38%
20	59	103	44	75%
Average Percentage of Increase				36%

Appendix R

Comparison of Verbal Flexibility Scores

Comparison of Verbal Flexibility Scores

Student	Pretest	Posteest	Raw Increase	Percentage of Increase
		Targeted Students		
5	98	119	21	21%
6	98	136	38	39%
7	91	119	28	31%
8	87	117	30	34%
9	74	111	37	50%
10	87	109	22	25%
11	93	109	16	17%
12	89	102	13	15%
13	81	105	24	30%
14	81	105	24	30%
15	83	111	28	34%
16	83	125	42	51%
17	77	102	25	32%
18	74	100	26	35%
19	74	93	19	26%
20	71	100	29	41%
Average Percentage of Increase				32%

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