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Effects of Divergent Thinking Training/ Instructions on Torrance Tests of Creative Thinking and Creative Performance

Young Ju Lee
University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a dissertation written by Young Ju Lee entitled "Effects of Divergent Thinking Training/Instructions on Torrance Tests of Creative Thinking and Creative Performance." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

R. Steve McCallum, Major Professor

We have read this dissertation and recommend its acceptance:

William H. Calhoun, Sherry K. Bain, Christopher H. Skinner

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Accepted for the Council:

Anne Mayhew
Vice Chancellor and Dean of
Graduate Studies

(Original signatures are on file with official student records.)

EFFECTS OF DIVERGENT THINKING TRAINING/INSTRUCTIONS ON TORRANCE TESTS OF CREATIVE THINKING AND CREATIVE PERFORMANCE

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Young Ju Lee

August, 2004

DEDICATION

This dissertation is dedicated to my parents, Cha Ung Lee and Kum Sook Hong for their unwavering support and love during my life, and sisters, Hwa-Young Lee, Young-Ae Lee, and Hye-Young Lee, for always encouraging and supporting me to reach my goals.

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ABSTRACT

Using a quasi-experimental design, with pretest and posttest measures with multiple probes, the effects of divergent thinking training (with explicit instruction) on creative worksheets, the Torrance Tests of Creative Thinking (TTCT; Torrance, 1990) and story-based problem solving tasks (Realistic Story Telling Problems Activity) were investigated. Explicit instructions for originality enhanced the originality scores on figural creative worksheets and explicit instructions for fluency enhanced the fluency scores on both figural and verbal creative worksheets for experimental group members (n = 15). In addition, experimental group members made significant gains on originality scores on the TTCT (p. < .05), Problem Solving (p. < .05*)* tasks from the Realistic Story Telling Problems, fluency scores on the TTCT (p. < .001), and Problem Identification (p. < .05) and Problem Solving (p. < .05) tasks from Realistic Story Telling Problems; control group members (n = 15) did not. Implications of the findings of this study are discussed.

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CHAPTER1

INTRODUCTION

Purpose

The first purpose of this study was to determine the extent to which explicit instruction designed to improve originality or fluency influenced originality and fluency skills on figural and verbal creativity training worksheets for ethnic Korean students. A second purpose of this study was to determine the extent to which training in divergent thinking, with explicit instruction specifically designed to improve originality or fluency, improved originality and fluency abilities as measured by the Torrance Tests of Creative Thinking (TTCT; Torrance, 1990) and the Realistic Story Telling Problems (RSTP; adapted from Real World Problems from Okuda, Runco, & Berger, 1991; Runco & Okuda, 1988) in a sample of Korean students. Korean students were identified as being of Korean descent and living in America, or students born in America of parents who immigrated from Korea.

Rationale

The primary goals of education are to increase academic knowledge, skills, and social abilities through appropriate and planned instruction. Encouraging creative expression is an equally important educational goal that has largely been ignored in traditional instructional models (Isaksen, Murdock, Firestien, & Treffinger, 1993). Creative instructional models may lead to effective school learning and unexpected accomplishments that are important resources for our society to develop (Torrance, 1970).

Creativity may be especially important for diverse populations who are acculturating into a new environment and need to quickly adapt to complex cultural changes in society (Coleman & Cross, 2001).

Divergent thinking is considered the most important component not only in creativity training programs, but also in creativity assessment (Baer, 1993; Feldhusen, Treffinger, & Bahlke, 1970; Mansfield, Busee, & Krepelka, 1978; Myers & Torrance, 1964; Renzulli, 2000). However, despite highly improved scores on divergent thinking tests following creativity training, several alternative explanations for improvement are possible. For example, simply training students to use creative problem solving skills on specific tasks, as well as other more general components of the creativity program (e.g., management of time limits) may have produced the improved results rather than the treatment itself. Furthermore, experts have criticized the use of creativity training specifically designed to improve divergent thinking, if the underlying assumption is that improved fluency skills will improve overall creativity (Baer, 1993; Mansfield, Buss, & Krepelka, 1978). Therefore, using divergent thinking measures to identify gifted and talented students and for making placement decisions (rather than to predict specific performances in certain areas) may be inappropriate. Nevertheless, divergent thinking tests such as the TTCT (Torrance, 1990) and Wallach and Kogan's Divergent Thinking Tests (Wallach & Kogan, 1965) are commonly used to evaluate creative potential (Baer, 1994; Runco, 1986a).

Many theoretical and experimental studies linked to creativity have focused

primarily on techniques and strategies to increase specific aspects of divergent thinking (fluency, originality, or flexibility) through explicit instructions, modeling, and rewards (Funderbunk, 1977; Goetz & Baer, 1973; Harrington, 1975; Milgram & Feingold, 1977; Runco, 1986a; Runco & Okuda, 1990). Other studies have focused on creativity training to increase global divergent thinking (Baer, 1988; Covington, Crutchfield, Davis, & Olton, 1974; Feldhusen, Treffinger, & Bahlke, 1970; Mayer, 1983, 1987; Myers & Torrance, 1964; Renzulli, 2000).

There is a need to identify the specific elements of training programs that impact creativity development with rigorously designed studies using good operational definitions. Consequently, in this quasi-experimental design I investigated the effects of divergent thinking training by comparing the mean scores of originality and fluency on divergent training worksheets obtained weekly from the experimental group members (who received explicit instructions to improve originality or explicit instructions to improve fluency) to means from members of the control group. I also evaluated the effects of divergent thinking training (with explicit instructions to improve originality or fluency) on story telling, defined as performances on the Realistic Story Telling Problems. Finally, I investigated the effects of divergent thinking training (with explicit instructions to improve originality or fluency) on originality and fluency scores on the TTCT for experimental and control groups.

Relevant Literature Review and Research Questions

The world is changing rapidly. Creative responding is a useful skill for living and adapting to the demands of a highly complex and changing society. The need for creative problem solving in modern society has resulted in a general awareness and interest in creativity education (Isaken, Murdock, Firestien, & Treffinger, 1993). According to Torrance (1993), students today show higher levels of creative thinking and abstract reasoning than they did 10, 20, or 30 years ago because of the increased use of creative problem solving in the curriculum. Creative thinking in schools can lead to unexpected accomplishments and has the power to change lives (e.g., producing a fluent, flexible, and original thinker and a high level of thinker in a problem situation). Therefore, it is important for students to develop creative thinking.

Does Explicit Instruction Influence Classroom-based Creativity?

The creativity literature addresses the development of specific aspects of divergent thinking abilities. Many programs, skills, and strategies have been developed to foster the specific creative components of originality, fluency, flexibility, and elaboration. For example, Guilford (1967) and Torrance (1970, 1973) found that creative thinking abilities could be developed through the use of direct instruction using enrichment programs. A few studies have investigated the effects of training divergent thinking on creative skills.

In one such study using praise or praise with tangible rewards, Goetz and Baer (1973) improved originality in students' painting and building assignments. Milgram and

Feingold (1977) used tangible and verbal reinforcement to enhance fluency on Wallach and Kogan (1965) divergent thinking test in disadvantaged children. Finally, Glover (1980) found improvements in originality, fluency, and flexibility scores in college students on TTCT using direct instruction, practice and a point system. Explicit instruction was not an element under investigation in any of these studies.

Recently, empirical studies have supported the effectiveness of explicit instructions in improving divergent thinking. These studies initially compared the performances of treatment groups which were given explicit instructions to "be creative" and control groups which were given nonexplicit instructions (Evans & Forbach, 1983; Harrington, 1975). Overall, the treatment groups performed significantly higher on divergent thinking tests when provided with explicit instructions to be creative and to use clear task strategies.

Following the lead of these individuals, researchers began examining specific variations of creativity instructions, such as instructions to be original or unique, or flexible. Runco (1986a) compared the performance of a group of intermediate school students given explicit instructions to improve originality on untimed figural and verbal tasks with their performance during a control condition using nonexplicit instructions. Explicit instructions designed to improve originality enhanced originality scores (representing the uniqueness of responses) on both figural and verbal tasks, while flexibility and fluency scores dropped.

Later using untimed verbal tasks only, Runco and Okuda (1990) investigated the

effects of explicit and nonexplicit instructions designed to improve flexibility, and originality, with adolescent participants. The authors found that explicit instructions designed to improve flexibility on verbal tasks elicited higher flexibility scores (representing the number of different categories of responses), relative to the flexibility scores in the originality instructions and nonexplict instructions conditions. Originality and fluency scores (the total number of ideas produced) decreased when the participants were given explicit instructions designed to improve flexibility. Explicit instructions designed to improve originality on verbal tasks elicited higher originality scores, relative to the originality scores in the flexibility instructions and nonexplicit instructions condition. Flexibility and fluency scores decreased when the participants were given explicit instructions designed to improve originality.

There has been concern over the process used to score the verbal and figural tasks typically used in investigations of divergent thinking instruction. Originality scores and flexibility scores may be confounded by fluency (Clark & Mirels, 1970; Hocevar, 1979b). For example, in a study of 60 college students, Hocevar (1979a) found high inter-correlations among originality and fluency scores on three verbal measures of Guilford's divergent thinking test.

Time limits may also influence the effects of training on creativity scores specifically for verbal tasks. Torrance and Ball (1978) found time limit effects on the "Just Suppose" verbal task of the TTCT. Runco and Albert's results (1985) suggest that the evaluations of verbal tasks involving thinking and problem solving skills may be

determined by quantity, not quality, because longer time limits allow for more responses. Therefore, the preferred method to evaluate verbal tasks is to include time limits.

Time limits may influence performance on figural tasks to a lesser extent because the number of responses produced on the figural tasks, usually based upon the completion of abstract lines added to common shapes, is limited even with longer time limits provided. The validity of results on figural tasks, whether timed or untimed, was supported by Runco and Albert (1985), who found significant differences between verbal and figural scores across gifted and nongifted students. Originality scores were deemed valid only on the figural tasks when fluency was controlled, possibly because figural tests are unfamiliar and require more effort and time to solve. Contrary to suggestions by Clarks and Mirels (1970), the relative independence of measures on figural tasks might make them more effective for evaluating creativity training.

In summary, explicit instructions to be creative have been generally successful in improving originality scores on verbal and figural divergent thinking tasks. Explicit instructions to be original have improved originality scores but not flexibility and fluency scores; and explicit instructions to improve flexibility have improved flexibility scores on untimed verbal tasks. However, some researchers have suggested that there is a limitation to the interpretation of originality scores from untimed verbal tasks because originality scores are confound by fluency scores. No studies have investigated the effect of explicit instructions to improve fluency. In this study, the following specific questions were addressed to examine the effects of explicit instructions on classroom based creativity.

1. Does explicit instruction designed to improve originality influence the originality scores on creativity training worksheets for Korean students, relative to scores obtained using explicit instructions designed to improve fluency?
2. Does explicit instruction designed to improve fluency improve the fluency scores on creativity training worksheets for Korean students, relative to scores obtained using explicit instructions designed to improve originality?

Does Explicit Instruction Influence Standardized Test Scores?

The Torrance Tests of Creative Thinking (TTCT) is commonly used to measure creative ability and to evaluate the effects of creativity training programs (Heausler & Thompson, 1988; Torrance, 1990; Torrance & Presbury, 1984). Results of Torrance's study (1981) indicate that TTCT scores are predictive of students' later creative achievement in the real world, based upon questionnaire responses regarding high school and post-high school creative accomplishments, and other ratings of achievement. In Torrance's study, creative achievements in writing, science, medicine, and leadership were better predicted than those in the arts, music, business, or industry. Based on this view, increased scores on a divergent thinking task following training should positively affect general creative performance on varied tasks in the real world.

However, some findings involving similar tests of divergent thinking have differed from Torrance's predictions. For example, Runco (1986b) found originality and fluency scores on the Wallach and Kogan (1965) divergent thinking test were related to performance in music and art, but not to other areas including writing, crafts, science, and

public presentation. Performance on divergent thinking tests such as the TTCT may not be appropriate to predict specific creative expressions across all domains in the real world. In other words, specific divergent thinking tests may not reflect more general creative abilities and are not necessarily appropriate measures to identify children who are highly creative for placement purposes.

The TTCT has been employed to successfully document creativity training in a number of studies, reviewed by Rose and Lin in a meta-analysis (1984). However, when Baer (1993) compared divergent thinking test scores and creative performance in story telling and collage-making in an experimental design involving divergent thinking training, the scores between creative performance and TTCT were not significantly correlated for either the experimental or control group. Baer (1993) argues that increased scores on divergent thinking tests such as the TTCT, following divergent thinking training, are not surprising and these results do not necessarily indicate increased general creative abilities. He indicated that the change in scores may be due to specific elements (fluency, originality, flexibility), not to generalized improvement in general creative abilities. Another possible explanation for increases in performance is simply the practice effect from repeated training based upon use of a pre-post test design without alternate forms.

In summary, even though several studies have demonstrated significant effects using the TTCT to evaluate divergent thinking skills following creativity training, at least one researcher has noted problems, such as the low correlations between the TTCT scores

and creative performance on specific tasks. No studies were found investigating explicit instruction to improve originality or fluency, using the TTCT as a global outcome measure. In this study, the following specific questions were addressed to examine the effects of explicit instruction on standardized tests scores.

3. Does divergent thinking training (with explicit instructions designed to improve originality and fluency) improve originality scores on the TTCT for a group of Korean students, relative to scores obtained by Korean peers who do not get explicit instructions?
4. Does divergent thinking training (with explicit instructions designed to improve originality and fluency) improve fluency scores on the TTCT in a group of Korean students, relative to scores obtained by Korean peers who do not get explicit instructions?

Does Creativity Training Generalize?

There have been successful evaluations of creativity training programs that include measures other than the TTCT, such as problem solving skill training (Mansfield, Buss, & Krepelka, 1978). However, as in studies involving the TTCT, the results have been criticized for claiming to improve general creative abilities based on the increased scores of somewhat task-specific creativity measures relevant to training. In other words, performance on divergent thinking tests, such as the TTCT or Wallach and Kogan's (1965) divergent thinking test, may not be appropriate to predict creative performance in the real world. Exploring this view, Okuda, Runco, and Berger (1991) used the Real

World Problems (adapted here as RSTP), Wallach and Kogan's (1965) divergent thinking test, and a checklist of creative activities to measure creative accomplishments and found that creative performance on problem identification and problem solving in the Real World Problems are reliably more predictive of general creative performance than Wallach and Kogan's (1965) divergent thinking tests. Scores from the Real World Problems contributed significantly to prediction of creative activities in writing, music, crafts, science, public performance and the total creative activity score.

Although several studies have investigated generalizability issues related to Real World Problems results and creative achievement (Okuda, Runco, & Berger, 1991; Han & Marvin, 2002), studies incorporating the Real World Problems as an outcome measure for creativity training are difficult to find in the refereed literature. Incorporating the Real World Problems in a quasi-experimental intervention may provide better prediction of creative performance in terms of generalization to real world activities. In this study, the following specific questions were addressed to examine generalizability of creativity training.

5. Does divergent thinking training (with explicit instructions to improve originality and fluency) improve originality score on the creative performance in RSTP in a group of Korean Students, relative to scores obtained by peers who do not get creativity training?
6. Does divergent thinking training (with explicit instructions designed to improve originality and fluency) improve fluency scores on the creative performance in

RSTP in a group of Korean students, relative to scores obtained by peers who do not get creativity training?

Cross Cultural Training of Creativity

Early historical research into creativity focused on retrospective evaluation of individuals already displaying creative talents (MacKinnon, 1978). However, current research on creativity sometimes focuses on creative abilities in students from academically and culturally diverse populations, primarily on bilingual students within the educational system.

When considering the impact of ethnic group membership, the results of the majority of studies investigating creative abilities (not creativity training) indicate that students who are bilingual, particularly those who speak English along with Spanish, Polish, German, Chinese, Malay, or Italian tend to be more creative on the TTCT than people who are monolingual (Carringer, 1974; Hamers & Blanc, 1989; Jacobs & Pierce, 1966; Kessler & Quinn, 1987; Landry, 1973a, 1973b, 1974).

Although several studies have investigated the relationship between creative abilities on the TTCT and bilingualism (Carringer, 1974; Hamers & Blanc, 1989; Jacobs & Pierce, 1966; Kessler & Quinn, 1987; Landry, 1973a, 1973b, 1974; Lemmon & Goggin, 1989), no study has investigated the specific effects of divergent thinking training within specific ethnic groups. Recent statistics indicate that 5.3 million school-aged students in the United States are ethnic minorities who speak a language other than English (Children's Defense Fund, 1989). The number of ethnic minority students, including Korean in America’s School, will continue to rise. In this regard, it is important

to investigate how divergent thinking training affects individuals within various ethnic minority groups.

Statement of the Problem

For over 40 years, researchers have addressed the training of, measurement, and importance of creativity. However, most educational systems do little to foster creative thinking and to study creativity, and thus validity evidence for training and assessment has been limited in several ways. First, previous studies show that divergent thinking can be selectively increased by the use of explicit instructions (Glover, 1980; Goetz & Baer, 1973). However, no studies have investigated the comparative effects of divergent thinking training with explicit instructions specifically designed to improve originality or fluency, with outcome operationalized by originality and fluency scores on figural and verbal worksheets. Second, even though several studies show that divergent thinking tests have limited capacity to define general creative abilities (Baer, 1994; Diakidoy & Spanoudis, 2002; Runco, 1986b), few studies have actually investigated the relative effect of explicit instructions to improve originality and fluency on standardized tests, such as TTCT scores and RSTP scores. Third, although several studies have investigated the relationship between creativity and bilingualism among various ethnic groups (Carringer, 1974; Hamers & Blanc, 1989; Jacobs & Pierce, 1966; Kessler & Quinn, 1987; Landry, 1973a, 1973b, 1974; Lemmon & Goggin, 1989), no study has investigated the effects of divergent thinking training in Korean children.

CHAPTER 2

METHODS

Participants

Participants were volunteers from among forty-eight students enrolled in a Korean School in East Tennessee. Students attending the school were Korean, American, American of Korean descent and Japanese of Korean descent. The majority of students were born in America of Korean parents. The Korean School consists of eight classrooms: (a) Classroom 1 served 3 1/2 to 4 1/2- year-old children, (b) Classroom 2 served 4 1/2 to 5 1/2-year-old children, (c) Classroom 3 served 5 1/2 to 7-year-old children, (d) Classroom 4 served 7 to 8 1/2- year-old children, (e) Classroom 5 served 8 1/2 to 10- year- old children, (f) Classroom 6 served 10 to 11 1/2 year-old children, (g) Classroom 7 served children who were older than 11 1/2 year-old, and (h) Classroom 8 served foreign adults who were interested in Korean culture. Students were selected for each classroom based primarily on age, but mastery of the Korean language also influenced placement as many classes were taught in Korean. In each 15 week semester, the Korean school provides 3 hours every Friday for classes in Korean languages and Electives (e.g., Takwondo, Art, Creativity, Korean Culture). Experimental and control group members were not randomly assigned.

Participants for the creativity training group (experimental) consisted of 15 students ages 5 to 11-years old (M= 7.67, SD=1.80) enrolled in the creativity elective course and were assigned, contingent on receipt of parent permission. All 15 students

were bilingual and could speak and write in English and Korean. Twelve students, born and raised in America, were proficient in the English language. The remaining three students were born in America and raised in Korea (*n*=2), and born and raised in Korea (*n*=1), and are Korean proficient (less fluent in English). Each creativity class was composed of 45 minutes of training per week for 15 weeks.

Control group membership consisted of 15 students from 5 to 11-years old (M= 7.67, SD= 1.91) who were selected to match the experimental group based on age and grade as closely as possible. All students were bilingual. Twelve of the students were born and raised in America and are English proficient and 3 students were born and raised in Korea and are Korean proficient (less fluent in English). All participants in the control group were enrolled in other elective courses such as Takwondo, Art, and Korean Culture. Following approval by the Institutional Review Board of the University of Tennessee, parent permission was obtained for students in both groups to participate.

Instruments

Torrance Tests of Creative Thinking (TTCT)

The TTCT is the most commonly used test in educational and psychological settings and in research to measure creative potential (Heausler & Thompson, 1988; Torrance, 1990; Torrance & Presbury, 1984). Cramond (1994) reports that creativity measures like the TTCT adequately assess divergent thinking ability and are a good predictor of creativity abilities, although some critics disagree (Baer, 1993).

The TTCT includes two categories: Figural and Verbal. In this study, the TTCT

Figural test is used in an effort to reduce cultural and linguistic influences and because it includes picture-based tests to which kindergarteners can respond. In addition, there is some indication that originality scores may not be easily confounded by fluency on figural tasks (Clark & Mirels, 1970; Runco & Alberta, 1985). The TTCT Figural test can be administered to children and adults in group or individual form. Each administration requires approximately 30 minutes. There are two alternate forms: Figural Form A and Figural Form B and each form consist of three subtests. In each subtest, examinees are provided abstract lines or common shapes and asked to complete pictures and provide titles for their pictures. For example, examinees are asked to draw pictures and provide titles based on two parallel lines or circles.

The test results in six scores: Originality, Fluency, Elaboration, Abstractness of Titles, and Resistance to Premature Closure, and an overall Creativity Index. "Originality" refers to the uniqueness or novelty of the response on the basis of normative data. "Fluency" refers to the total number of responses generated. "Elaboration" consists of the presentation of detail in the picture. "Abstractness of Titles" refers to the ability of the title to capture the essential elements of the picture rather than a mere description of elements in the picture. "Resistance to Premature Closure" refers to the extent to which pictures are developed by using a straight or a simple curved line, rather than using irregular, indirect, or incomplete lines (Torrance, Ball, & Safter, 1992).

For the TTCT Figural test, the reliability ranged from .78 to 1.00, at different grade levels. Construct validity (r =.51) is moderately high by the comparison with the

TTCT Verbal test (Torrance, 2000). The norms are somewhat limited because of the size of the sample and there is limited discriminant validity (Hocevar, 1979a & 1979b; Hocevar & Michael, 1979; Torrance, 1990). Although the TTCT is often used for clinical purposes including the selection of gifted and talented students, it is most highly recommended for use in research (Torrance & Ball, 1984).

Realistic Story Telling Problems (RSTP)

As a performance based assessment, the RSTP are adapted from techniques used by Okuda, Runco, and Berger (1991) and Runco and Okuda (1988). The test consists of two tasks: Problem Identification (PI) and Problem Solving (PS). In the study conducted by Okuda et al. (1991), the measure of RSTP yielded stronger evidence of reliability (from .76 to .92) and predictive validity (from $p < .001$ to $p > .05$, with creative extracurricular activities of writing, music, crafts, science, and public performance) than Wallach and Kogan's Divergent Thinking Tests (Okuda et al., 1991). The adaptation for the present study includes real world situations and problems relevant for Korean ethnic children. For the Problem Identification task, participants were given instructions to identify as many problems as possible at school or home, using oral or written responses. For the Problem Solving task, participants were presented with two open-ended examples of problem situations at school or home and were asked to provide as many solutions as possible, by oral or written expression. All stories by participants were taped and transcribed by the experimenter. The following instructions were provided for the first Problem Identification task involving school:

> I would like you to think of many different problems in school that are important to you. You may write down or verbally express problems about school, teachers, rules, or classmates. Take your time and think of as many problems as you can.

The following instructions were provided for the first Problem Solving task involving school:

> This is the time that you have waited for all day. You were so excited about the art class. Your friend Tom sits next to you in class. Tom likes to talk to you a lot and often bothers you while you are doing your work. The art teacher scolds you for talking. You cannot finish your art work because Tom bothers you. You want to finish your work and do not want to receive any more warnings from your teacher. What are you going to do? Remember to give as many answers as you can.

In the second Problem Identification task, students were asked to find problems about home situations.

> I would like you to think of many different problems at home that are important to you. You may write down problems about your parents, brothers or sisters, chores, or rules. Take time and think of as many problems as you can.

In the second Problem Solving task, students were asked to give solutions to problems about home situations

> This is the day that you have waited for all week. You were so excited about your best friend Min's birthday. Your friend invited you and other friends to her

birthday party. You want to present something but you do not have any money to buy anything. What are you going to do? Remember to give as many answers as you can.

The scoring procedures for the RSTP were the same as those used for the creativity training worksheets described later (i.e., originality and fluency).

Procedures

Following pretesting with the TTCT Figural and RSTP, participants in the experimental group received creativity training with explicit instructions designed specifically to improve originality or fluency for 10 weeks. The type of instruction was randomly chosen. Originality or fluency explicit instructions were given five different weeks, respectively. The explicit instructions for this study were adapted from Harrington (1975), Runco (1986a), and Runco and Okuda (1990).

In this study, explicit instructions were designed specifically to improve originality or fluency. Explicit instructions designed to improve originality emphasized original and worthwhile ideas, while instructions designed to improve fluency emphasized the production of a large number of ideas, regardless of their originality. During creativity training sessions, the explicit instructions were provided for use in conjunction with creativity training worksheets. In creativity training worksheets, students were instructed to draw or write about things that words (e.g., cold, hot) or shapes (e.g., circles) make you think. The instructions for enhancing originality were as follows:

> "I would like you to give as many unusual ideas as you can. In other words, try to think in a way that others would be unlikely to think. Remember, think of ways that are different from other people. Focus on unusual ideas."

The instructions for enhancing fluency were as follows:

> "I would like you to give as many different ideas as you can. In other words, try to give a variety of ideas and write or draw as many different things as you can. Remember, think of as many different ideas as you can. Focus on many different ideas."

The instructions were provided primarily in English but translations in Korean were provided when necessary to help students understand what they were expected to do.

For training activities, the experimenter adapted divergent thinking activities using Renzulli's (2000) New Directions in Creativity (NDC) with explicit instructions designed to improve originality or fluency for 45 minutes each instruction day (Friday). The NDC program was designed to develop the following creative thinking abilities: fluency, flexibility, originality, and elaboration. Activities are designed to elicit creative responses to either verbal or picture cues. The training program adapted for this study consisted of ten types of creativity activities entitled: Thinking about Things, Making Faces, What Do You See, Letter Look-Alikes, Room to Fill, Feelings, Recycling, For Children Only, Make Things, and the Magic Door. Three worksheets were developed for each type of activity. The four figural worksheets with explicit instructions (matched worksheets for originality explicit instructions and fluency explicit instructions) and the

six verbal worksheets with explicit instructions (matched worksheets for originality explicit instructions and fluency explicit instructions) were randomly assigned across weeks.

Examples of the creative training activities are as follows. In “Thinking about Things” students were first instructed to think about things that the word “cold” made them think of; next, think of things that “hot” made them think of; Finally, think of things that the word “sunny” made them think of. In the “Making faces” activity students were asked to draw and write about various moods. In “What Do You See” students were given a sheet of paper with three different shapes of drawings and asked to make a picture by adding lines. In the “Letter Look-Alikes” activity students were asked to make things from the letter P, B and L. In “Room to Fill” students were asked to write or draw from their imaginations and think of as many things that can be put in a kitchen, a shed, and a room. The activity called “Feelings” required students to think about things that made them happy, sad, and angry. In “Recycling” students were asked to think of how they could use several items, such as bottle caps and old socks, to make something new. In “For Children Only” students were asked to think of a new show for children only, children only places, and a new toy for children only. In “Make Things” students were asked to make something new with parts of several objects. Finally, “Magic Door” required students to draw or write about a magic land, a magic school, and a magic house behind the magic door.

The training sessions included five steps. First, participants engaged in several

minutes of introductory activities (e.g., brainstorming- encouraging imagination to increase their responses) for each exercise. In the second step, idea-generating techniques were explained and examples of each activity were described. In the third step, participants were given the first creative activity sheet of NDC with explicit instructions designed to improve originality or fluency for 3 minutes. In the fourth step, participants completed the second and third creative activity worksheets with the same instructions as given on the previous worksheet. The final step allowed students to show their work to the class. These creativity worksheets were collected and used to examine the effects of explicit instructions on originality and fluency responses. Of the three worksheets administered, only the second was scored.

After 10 weeks of training, originality and fluency performance on the creative training worksheets were scored. The control group received instruction in Korean culture, Takewondo, or Art, but not divergent thinking. The completed worksheets were scored on two variables: the number of unique responses produced by the child (originality) on each worksheet, and the total number of responses produced by the child (fluency) on the worksheet. To determine whether a response was original or unique, a multi-step process was used. First, all responses produced by all the students for each task were listed. Next, a percentile rank for each type of response was determined. On the basis of these calculations, a standard distribution was generated. For example, when students were asked to think about things that “hot” makes you think of, those responses mentioned most frequently (the responses that fell 1SD below the mean) were given an originality

score of 0 (e.g., sun, fire), those appearing less frequently (between 1SD above and 2SD below the mean) were scored as 1 (e.g., ice, oven), and those mentioned rarely (between 2SD above and 3SD below the mean) received a score of 2 (e.g., iron, desert). Scores were totaled. This total raw score was used as the originality score. Fluency was scored based on the total number of distinct responses; if the same response was listed twice, it was counted only once.

For pretesting and posttesting, the TTCT Figural Forms A and B, respectively, were administered to treatment and control groups using standard test instructions. The TTCT and the RSTP were administered in the classroom the week before training and the week following final training, with no time limit. All pre and post tests were conducted, coded, and scored by an examiner blind to the purpose of the study and were administered in group sessions. Pre and posttests were administered to the control group at the same time as the experimental group in a separate classroom. To avoid order effects in the administration procedures, all measures and creativity training were administered in random order.

Procedural Integrity

A procedural checklist for the creativity training was developed to ensure standardized administration of the training program and to maintain treatment fidelity. The procedural checklist appears in Appendix A. This checklist was completed for three creativity training sessions by the primary researcher and a second adult who was available to attend the session. Based on these checklists, the average procedural integrity

was 100% for all sessions.

Interscorer Agreement

Data on interscorer agreement were collected during the study. The second scorer and the primary researcher independently scored three of the following tests for all 30 participants: (a) Originality scores of the TTCT Figural -A, (b) Fluency scores of the TTCT Figural -A, (c) Originality scores of the TTCT Figural -B, (d) Fluency scores of the TTCT Figural -B, (e) Originality scores of the Problem Identification task from the RSTP activity, (f) Fluency scores of the Problem Identification task from the RSTP activity, (g) Originality scores of the Problem Solving task from the RSTP activity, and (h) Fluency scores of the Problem Solving task from the RSTP activity. Interscorer agreement of .89, 1.00, .90, .95, .91, .96, .89, and .93 for total scores were obtained on the tasks, respectively. Moreover, a second scorer and the primary researcher independently scored three of the creativity training worksheets for 15 participants: Originality and Fluency. Interscorer agreement of .85 and .97 were obtained. The following formula was used: [number of agreements/ (number of agreements + number of disagreements)] X 100.

Research Questions

1. Does explicit instruction designed to improve originality influence the originality scores on creativity training worksheets for Korean students, relative to scores obtained using explicit instructions designed to improve fluency?
2. Does explicit instruction designed to improve fluency improve the fluency scores on creativity training worksheets for Korean students, relative to scores obtained

using explicit instructions designed to improve originality?

3. Does divergent thinking training (with explicit instructions designed to improve originality or fluency) improve originality scores on the TTCT for a group of Korean students, relative to scores obtained by Korean peers who do not get explicit instructions?
4. Does divergent thinking training (with explicit instructions designed to improve originality or fluency) improve fluency scores on the TTCT in a group of Korean students, relative to scores obtained by Korean peers who do not get explicit instructions?
5. Does divergent thinking training (with explicit instructions to improve originality or fluency) improve originality score on the creative performance in RSTP in a group of Korean Students, relative to scores obtained by peers who do not get creativity training?
6. Does divergent thinking training (with explicit instructions designed to improve originality or fluency) improve fluency scores on the creative performance in RSTP in a group of Korean students, relative to scores obtained by peers who do not get creativity training?

CHAPTER 3

RESULTS

Results of this study are presented in two sections. The first section describes the extent to which explicit instructions designed to improve originality or fluency influence scores on the respective creativity training worksheets (originality vs. fluency). The second section describes the extent to which divergent thinking training with explicit instructions designed to improve originality or fluency produced higher originality and fluency scores on the TTCT and the Problem Identification and Problem Solving tasks from the RSTP activity, relative to scores obtained by peers who did not receive creativity training.

Effects of Explicit Instruction on Creative Worksheets Performance

Table 1 presents means and standard deviations for originality and fluency scores on the figural and verbal creative worksheets collapsed across weekly sessions for the experimental group members. Paired *t*-test comparisons of the originality and fluency scores of the figural and verbal creativity training worksheets are shown for each instructional condition. (All tables and figures are in Appendix B). On the figural worksheets, the mean originality score (M=3.73) resulting from explicit originality instruction is significantly higher than the mean originality score (M=1.23) produced by explicit fluency instruction ($t = 5.28$, $p < .001$). Likewise, the mean fluency score (M = 3.37) resulting from explicit fluency instruction was significantly higher than the mean fluency score (M = 2.60) produced by explicit originality instruction on the figural

worksheets *(t* = - 4.96, *p* < .001*).*

On the verbal worksheets, the originality mean score (M = 3.37) produced following explicit originality instruction was not significantly different from the mean (M = 4.44) produced by explicit fluency instruction (*t* = .84, *p* > .05); however, the fluency mean score (M = 7.51) produced with instructions designed to improve fluency was significantly higher than the mean (M = 4.80) produced with instruction to improve originality (*t* = 3.09, *p* < .01).

Figure 1 displays graphically the means of originality and fluency scores for figural and verbal creative worksheets, by weekly session, indicating score fluctuations as a function of explicit instructions. That is, originality scores on figural worksheets increased when students were given explicit instructions designed to improve originality (relative to originality scores under the explicit fluency instruction condition). Similarly, fluency scores on figural worksheets improved when students were given instructions designed to enhance fluency (relative to fluency scores under the explicit originality instruction condition). Results indicated that explicit instruction differentially influenced scores on originality and fluency measures for figural worksheets.

In general, originality and fluency scores on verbal worksheets increased over time, with one exception for fluency at Week 8. The results may indicate a modest practice effect on the verbal worksheets. However, there was no apparent practice effect on the figural worksheets. Although the verbal worksheet scores reflect improvement consistent with general creativity training, the differential impact of explicit instruction

for originality was not apparent. Fluency scores on verbal worksheets did reflect the differential effects of explicit instruction for fluency.

Effects of Explicit Instruction on the TTCT

Means and standard deviations for the TTCT pretest and posttest scores are presented in Table 2. Independent-sample *t*- tests were conducted to compare pretest means between groups on the TTCT originality and fluency scores. The difference between the experimental group and control group for pretest scores was not statistically significant, indicating that the groups were equal at the outset. However, based on *t*-tests, the experimental group had a significantly higher mean score than the control group on TTCT fluency at the completion of treatment.

These scores were evaluated also by a repeated measures analyses of variance (ANOVA) using originality and fluency pretest and posttest scores from the TTCT subtests as the within-subjects factor and the two groups (experimental and control group) as the between-subjects factor. Only interaction effects are of interest, and these are presented in Table 3. Both TTCT interaction effects were significant. The *F* values shown in Table 3 display the effects for each variable. The specific interaction effects reflect significant differences for the TTCT originality mean scores ($p < .05$) and fluency mean scores ($p < .001$). These interaction effects are presented graphically in Figure 2 and represent the pre-to-post mean gain scores from Table 2.

Effects of Explicit Instruction on the RSTP

Means and standard deviations for the RSTP (Problem Identification and Problem Solving) pretest and posttest scores are presented in Table 2. Independent-sample *t*- tests between groups on the Problem Identification originality and fluency scores and Problem Solving originality and fluency scores were not statistically significant on any of the measures at pretest, indicating that the groups were equal at the outset. However, based on *t*- tests, the experimental group had significantly higher mean scores than the control group on the Problem Identification fluency score and Problem Solving originality and fluency scores following intervention.

To further evaluate differences, four repeated measures analyses of variance (ANOVA) were performed using originality and fluency pretest and posttest scores from the Problem Identification and Problem Solving tasks as within-subject factors and the two groups (experimental and control group) as between-subjects factors. Only interaction effects are of interest, and these are presented in Table 3. Problem Identification fluency, Problem Solving originality, and Problem Solving fluency interaction effects were significant. *F* values are shown in Table 3. The specific interaction effects reflect significant mean differences between scores for Problem Identification fluency ($p < .05$), Problem Solving originality ($p < .05$), and Problem Solving fluency ($F = 4.90$, $p < .05$). These interaction effects are presented graphically in figures 3 and 4.

Relationships Between TTCT and RSTP

To investigate the relationship among the measures used to evaluate the generalizability of treatment effects, scores on the TTCT Figural and RSTP were compared (see Table 4). The originality and fluency scores of Problem Identification and Problem Solving from the RSTP produced correlations from .11 to .85. Within respective RSTP subtests, correlation between originality and fluency were very high. Problem Identification Originality and Problem Identification Fluency correlated at .85, Problem Solving Originality and Problem Solving Fluency at .81. Similarly, the originality and fluency scores of TTCT were strongly and significantly related ($r = .86$, $p < .01$). However, the scores of TTCT subtests and the RSTP subtests were only moderately correlated and did not reach significance (from $r = .11$ to $r = .33$). These findings are similar to earlier studies reporting that fluency and originality scores within the RSTP task tend to be highly interrelated (Okuda, Runco, & Berger, 1991). Lower correlations between the TTCT and RSTP indicate the two tests measure different domains of creativity. In other words, creative performances on TTCT and RSTP tasks seem somewhat domain specific.

CHAPTER 4

DISCUSSION

This study was designed to investigate the effects of divergent thinking training with explicit instruction to improve originality or fluency for a group of Korean students. Originality and fluency scores on figural and verbal creativity worksheets under each explicit instructional condition were evaluated. Originality and fluency scores from the TTCT and the RSTP tasks were compared before the first divergent thinking training and after final divergent thinking training for experimental and control groups. In the following discussion, the findings from this study are compared to the findings from previous studies. Finally, limitations and suggestions for future research are explored.

The Effects of Explicit Instruction on Creative Worksheets

Most research studies in this area have used divergent thinking tests such as the TTCT and the Wallach and Kogan (1965) divergent thinking test as outcome measures following training (Baer, 1993; Rose & Lin, 1984). In addition, previous studies have investigated only the explicit effects of instruction to increase originality and flexibility. None to date have compared the differential effects of originality and fluency with efforts to measure immediate effects on creative worksheets. This study evaluated the effects of explicit training for originality and fluency on figural and verbal creativity training worksheets in addition to pretest-posttest scores from the TTCT and RSTP.

Perhaps the most significant finding from this investigation is that originality and fluency scores were enhanced by giving explicit instructions designed to increase

originality and fluency, respectively. More specifically, originality scores were improved by explicit instructions designed to improve originality (vs. fluency) in the figural worksheets and fluency scores were improved by explicit instructions designed to improve fluency (vs. originality) in both the figural and verbal worksheets.

Although improved originality and fluency scores on figural worksheets can be attributed to practice effects, the pattern of scores across instructional conditions suggests that the increase was not a function of practice. Originality and fluency scores also increased on verbal worksheets over time. Although it is not clear to what extent increased scores were due to practice or to training effects, if a practice effect produced the increases one might expect a linear increase on figural and verbal worksheet scores across weeks, which was not evident.

Increases in originality and fluency that occurred as a function of training suggest that students attended to "environmental cues," specifically the explicit instructions, and engaged in the relevant type of thinking strategy when completing the open-ended tasks. As Harrington (1975) suggested, a strategic component of divergent thinking is perception of task demands. In other words, individuals adopt different task strategies (e.g., unique responses when given originality-explicit instruction, and more responses regardless of uniqueness when given fluency-explicit instruction) to complete tasks, depending on the type of instruction. Overall, findings are consistent with those of Runco (1986a), Runco and Okuda (1990) and Runco, Okuda, and Thurston (1991), and support the value of explicit instructions, in improving specific divergent thinking skills.

Does Creativity Training Generalize?

Much previous research focusing on the effects of explicit instructions on divergent thinking tasks failed to specifically address generalization across domains (Evans & Forbach, 1985; Harrington, 1975; Runco, 1986a; Runco & Okuda, 1990). My study was designed to specifically address generalization effects. The effects of explicit instruction designed to improve originality and fluency generalized from weekly worksheet tasks to the TTCT and RSTP. Specifically, the creativity training with explicit instruction resulted in significant improvement in originality and fluency measured by the TTCT Figural test, and in originality and fluency measured by the RSTP scores (with the exception of Problem Identification Originality). When a comparison is made of the mean originality and fluency scores of the pretest to the posttest on the TTCT and RSTP, an increase for the training group is quite clear, but there is no apparent increase in the control group.

Based on previous findings, it might be anticipated that problem identification and problem solving tasks from the RSTP would be more predictive of creative performances or problem solving in real life, perhaps because they contain problems that students commonly encounter in their home and school settings (Okuda, Runco, & Berger, 1991; Runco & Okuda, 1988). Theoretically, problem finding and problem solving skills are conceptually related to the skills required for real world creative abilities such as discovery-oriented behavior or problem solving skills of the creative process. Thus, the enhancement of problem identification skills in fluency and problem solving

skills/strategies in both fluency and originality suggests that the effects of explicit training on creative performance can be generalized to the natural (real world) environment.

It should be noted that the TTCT subtests were presented in figural format and are similar to figural worksheets used as training tasks. Nevertheless, positive results across the TTCT and RSTP support the notion that creative training can elicit transfer effects, at least across limited domains.

Implications of Results for Ethnic Korean Students

In this case, Korean ethnic individuals, specifically, benefited from the creativity training with explicit instructions. Previous studies of creativity among ethnic groups have been limited to bilingualism as it relates to divergent thinking skills (Carringer, 1974; Hamers & Blanc, 1989; Jacobs & Pierce, 1966; Kessler & Quinn, 1987; Landry, 1973a, 1973b, 1974). No studies have investigated the effects of creativity training among Korean students. The results in the present investigation suggest that creativity training is effective for Korean ethnic children, immediately improving relevant skills on worksheets and increasing creative abilities across the TTCT and RSTP.

Limitations of the Study and Suggestions for Future Study

There are several limitations associated with this study, including the sample characteristics and the research design. The participants in this study comprise a sample of convenience, rather than a randomly selected sample. Given the relatively small sample of Korean ethnic participants and their cultural background, generalization to the

larger Korean population is limited. Thus, additional research on the effects of divergent thinking training using larger samples of Korean ethnic participants should be undertaken. The fact that participants from the Korean school in this study were from different public elementary schools and have different levels of language proficiency may, however, increase generalizability across groups of children from varied locations and with different levels of language proficiency. Training studies using individuals from other ethnic and racial backgrounds are needed to establish generalization across groups.

Improvements to the research design are also suggested. For instance, random assignment to treatment and control group conditions would contribute to design rigor, particularly if a sample were available with treatment (explicit instructions to improve originality or to improve fluency) delivered simultaneously to the two groups. Effects of creativity training in the present study were assessed immediately following the final training session. Maintenance effects should be evaluated via follow-up assessment. In addition, use of more varied tasks to measure creativity, such as performance-based creativity products and creative behavior would provide further evidence of the generalization.

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APPENDICES

APPENDIX A

PROCEDURAL CHECKLIST

Following is the procedural checklist for the creativity training.

1. First worksheet provided
2. Explicit instruction, with use of an audiotape
3. Three minutes provided to complete worksheet
4. Worksheet collected
5. Second worksheet provided
6. Explicit worksheet, with use of an audiotape
7. Three minutes provided to complete worksheet
8. Worksheet collected
9. Third worksheet provided
10. Explicit worksheet, with use of an audiotape
11. Three minutes provided to complete worksheet
12. Worksheet collected

APPENDIX B

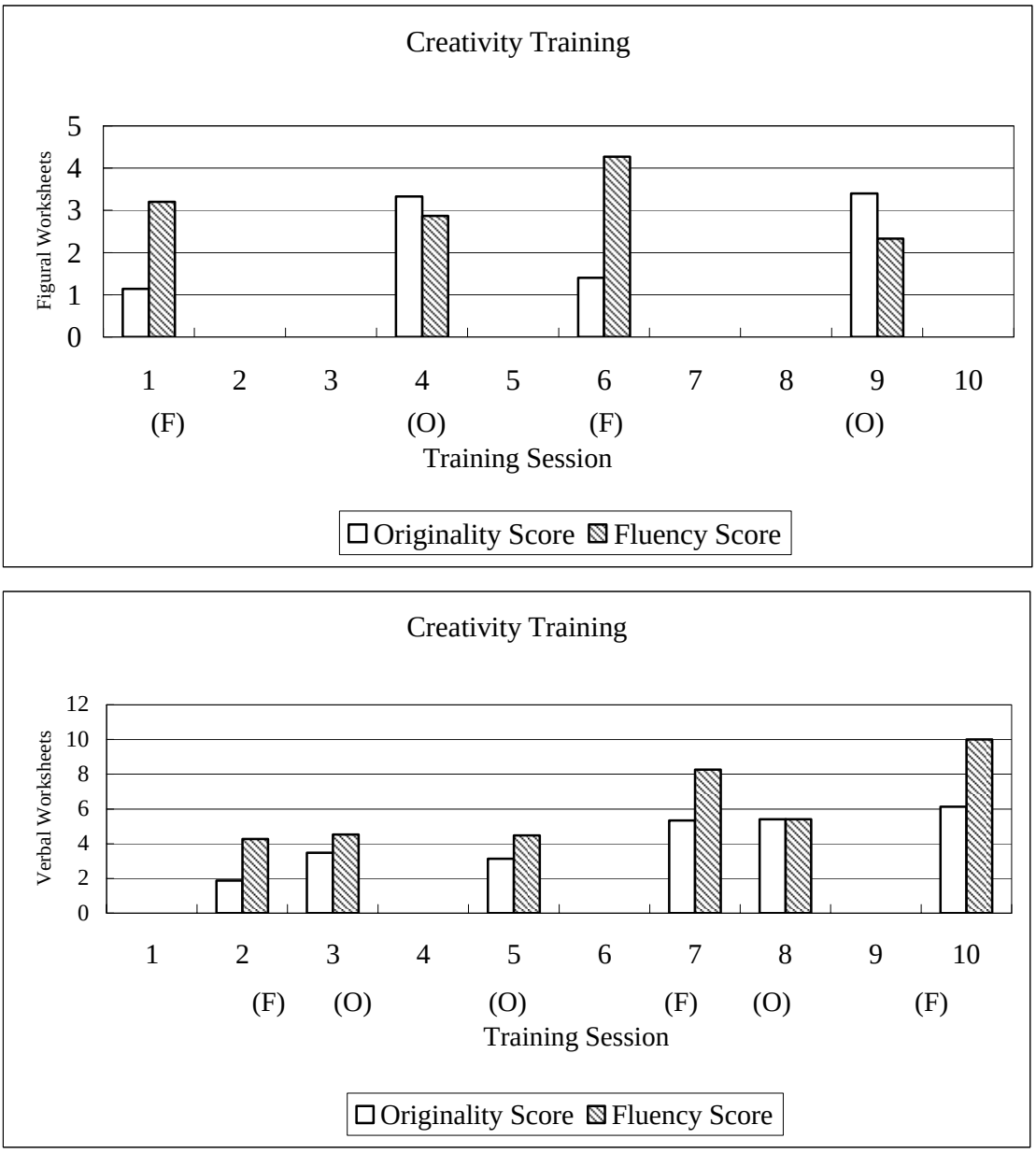
TABLES AND FIGURES

Table 1.

Mean, Standard Deviations, and t - Test Scores for Figural and Verbal Worksheets under Originality and Fluency Instructions for the Creative Worksheets.

	Explicit Instruction	Scores	N	M	SD	*t*
Figural Work Sheets	Originality	Originality	15	3.73	1.00	5.28**
	Fluency	Originality	15	1.23	.84	
	Originality	Fluency	15	2.60	1.04	-4.96**
	Fluency	Fluency	15	3.37	1.45	
Verbal Work Sheets	Originality	Originality	15	3.37	1.45	.84
	Fluency	Originality	15	4.44	1.91	
	Originality	Fluency	15	4.80	3.51	3.09*
	Fluency	Fluency	15	7.51	4.27	

* $p < .05$. ** $p < .01$.



Note: O= Session using originality explicit instruction

F= Session using fluency explicit instruction

Figure 1. Means of Originality and Fluency for Figural and Verbal Creative Worksheets

Table 2.

Means and Standard Deviations of the Torrance Tests of Creative Thinking and Realistic Story Telling Problems Pretest and Posttest Scores for the Experimental Group and Control Group.

		Experimental group			Control group			
		N	M	SD	N	M	SD	*t*
Pre	TTCT- A(O)	15	11.53	5.15	15	14.67	6.69	-1.29
Test	TTCT- A (F)	15	20.47	7.77	15	24.60	9.70	-1.44
	Problem Identification(O)	15	2.93	1.33	15	3.07	3.47	- .14
	Problem Identification (F)	15	3.27	1.75	15	3.80	2.34	- .71
	Problem Solving(O)	15	2.40	2.26	15	2.20	2.31	.24
	Problem Solving(F)	15	4.67	2.64	15	4.27	2.69	.41
Post	TTCT- B(O)	15	18.33	5.37	15	14.93	6.39	1.44
Test	TTCT- B(F)	15	27.73	8.49	15	20.73	8.78	2.22*
	Problem Identification(O)	15	7.73	6.14	15	4.60	3.81	1.68
	Problem Identification(F)	15	9.53	5.87	15	5.33	3.24	2.43*
	Problem Solving(O)	15	5.67	2.82	15	2.67	2.41	3.13*
	Problem Solving(F)	15	7.13	2.26	15	4.33	2.13	3.49*

Note: O= Originality scores, F= Fluency score

* $p < .05$.

Table 3.

The Interaction Effects of Training on Originality and Fluency Scores on Torrance Tests of Creative Thinking Figural, Problem Identification, and Problem Solving from the Realistic Story Telling Problems.

Source	Measure	Sum of Squares	df	Mean Square	*F*
Pre-Post Test	TTCT(O)	160.07	1	160.07	11.36*
X Group	TTCT(F)	464.82	1	464.82	23.23**
	PI(O)	40.02	1	40.02	3.71
	PI(F)	84.02	1	84.02	8.42*
	PS(O)	29.40	1	29.40	7.39*
	PS(F)	21.60	1	21.60	4.90*

Note: PI= Problem Identification, PS= Problem Solving, O= Originality, F= Fluency

* $p < .05$. ** $p < .001$.

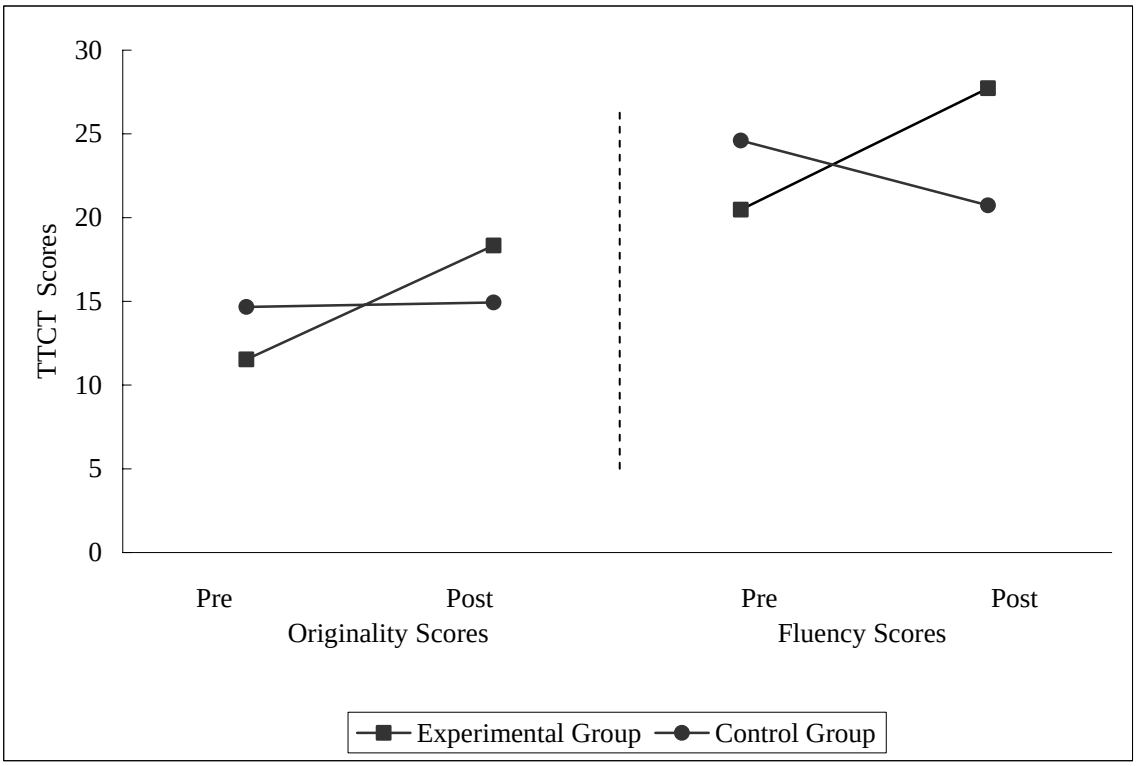


Figure 2. Pretest-Possttest Originality and Fluency Score on the Torrance Tests of Creative Thinking (TTCT) Figural for Experimental Group and Control Group

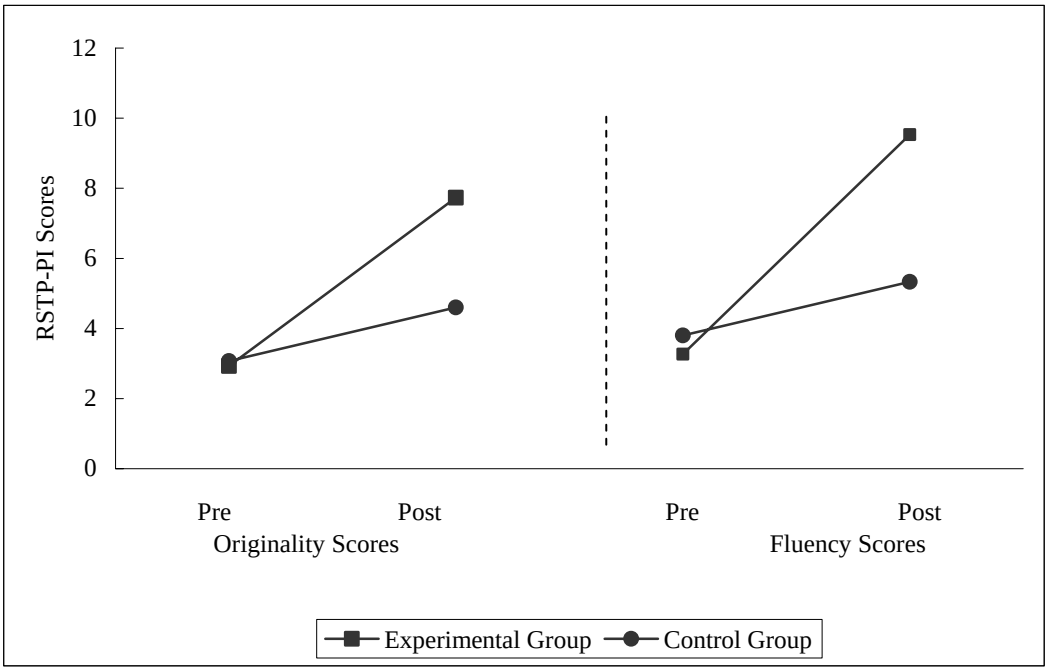


Figure 3. Pretest – Posttest Originality and Fluency Score on the Problem Identification (PI) from the Realistic Story Telling Problems (RSTP) for Experimental Group and Control Group

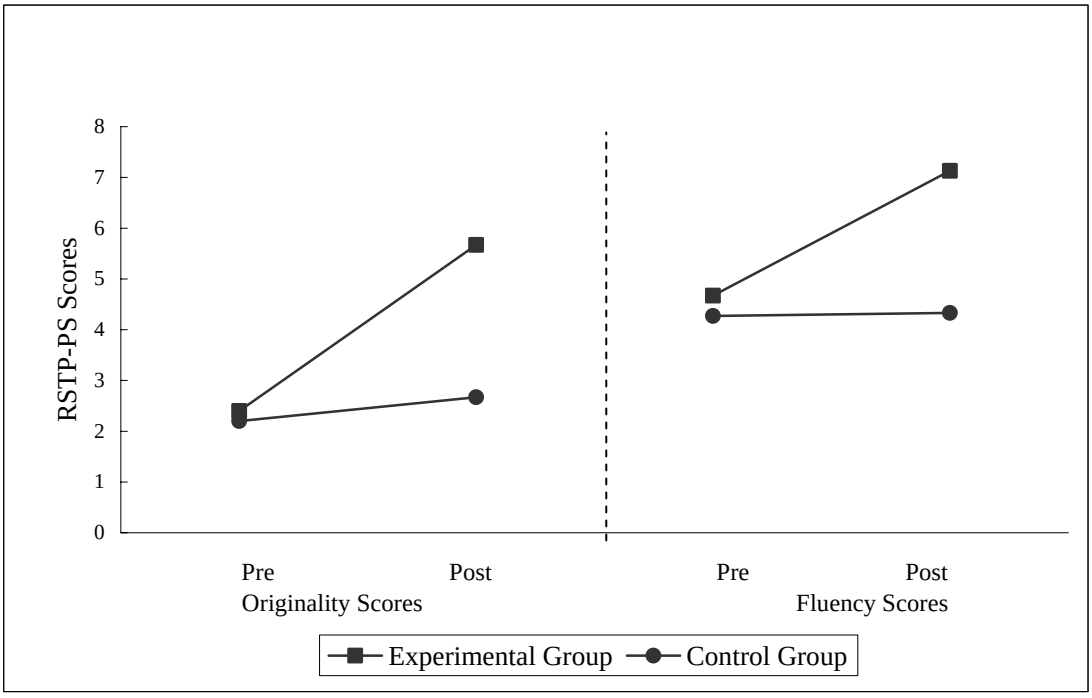


Figure 4. Pretest - Posttest Originality and Fluency Score on the Problem Solving (PS) from the Realistic Story Telling Problems (RSTP) for Experimental Group and Control Group.

Table 4.

Pearson Correlations between Torrance Tests of Creative Thinking versus Realistic Story Telling Problems (Pre-test).

	TTCT(O)	TTCT(F)	PI(O)	PI(F)	PS(O)
TTCT(F)	.86**				
PI(O)	.23	.11			
PI(F)	.33	.30	.85**		
PS(O)	.23	.11	.32	.41*	
PS(F)	.25	.24	.39*	.43*	.81**

O = Originality, F = Fluency, PI= Problem Identification, PS= Problem Solving

* $p < .05$. ** $p < .01$.

APPENDIX C

PARENT CONSENT FORM

Dear Parent(s) or Guardian (s):

I am a graduate student in the Department of Educational Psychology at University of Tennessee, Knoxville. I work under the supervision of Professor R. Steve McCallum. I am writing to ask permission for your child's participation in a study I am conducting on creativity training or creativity testing.

The study is designed to examine the effects of divergent thinking training on Torrance Test of Creative Thinking and Performances in story problem. It is hoped that the study will contribute to understanding how to promote effective creativity training and appropriate evaluations for creativity training.

With your permission, your child will take creativity training or creativity testing. I will ask students to write, draw and make things. The creativity tests (Torrance Test of Creativity Thinking and story problem) will take about 45 minutes to complete. The test will be given twice (approximately 10 week apart). The test will be given in class when it is mutually agreed time, so as not to interfere with your child's progress in school. The creativity training will be given every Friday in the "creativity elective class" in the Knoxville Korea School.

Throughout this study, the confidentiality of your child's responses is guaranteed. Names will be removed from the materials once the data are recorded. Each student will be assigned a code number for data analysis and no one other than myself and my faculty advisor will have access to student's names. Results of the tests will be stored in a locked filing cabinet and will not be shared with the students, parents, teachers, or any school personnel.

Your child will be asked for his or her assent to participate. He or she may withdraw form this study at any time by simply telling you, the researchers, or his or her teacher. You may also withdraw permission for your child's participation at any time by contacting the researcher through the phone number or e-mail address below. There is no penalty for non-participation. Also, your decision will not change relationship with the researcher and teachers. We are not aware of any significant risks involved in your child's participation in this study.

Upon completion of this study, we will report the general results to parents. These results will be based on combined data of the Standardized Creativity Test (Torrance Test of Creative Thinking) and the performances of story problem for all students who participate.

If you have any questions at any time about this study or the procedures, please contact Young Ju Lee (Phone: 865-5086 or e-mail : ylee2@utk.edu). This study has been approved by the Institutional Review Panel of University of Tennessee.

Please sign below and return this form to your child's school if you understand the conditions of this study and agree to allow your child to participate in creativity class or creativity testing if he/she wishes.

Children Name_____ Grade:_____

Signature for Creativity Class_____

Signature for Creativity Testing _____

APPENDIX D

CHILD CONSENT FORM

I understand that I am being asked to take part in a project where I will participate in creativity training and testing. The creativity training and/or creativity test will ask to write, draw or make things about what I think of.

I will take the creativity training and/or creativity test two times in class (about 10 week apart) with the rest of my classmates. Each creativity test (TTCT and Story Problems) will take 60 minutes.

I will not get a grade on these tests. The results of the tests will be secret. No one- not my parents, teachers, or even the principal will know how I did on the tests.

I understand that I do not have to take these training and/or tests if I do not want to. I also understand that I can quit or take a break at any time during the creativity class. All I have to do is tell my parent (guardian), teacher or one of the adults giving the tests.

I understand that my decision will not change relationship with Young Ju Lee, teacher or my parent (guardian).

I understand that if I have any questions, I can call Young Ju Lee (865-946-5086). Or, I can ask my teacher or parents to help me get in touch with Young Ju Lee.

I will sign below if I agree to be in this project and if I understand all the things listed on this page. (If a child is unable to sign his/her name, verbal consent will be documented by the researcher.)

Participant _____

Date _____

VITA

Young Ju Lee Kim was born in Taegu, South Korea on May 19, 1973. She was raised in Pusan, South Korea. She graduated with a Bachelor of Science from the Kyungsung University with a major in Home Management. Subsequently, she attended the Kyungsung University and graduated with a Master of Science degree in Home Management. She started to specialize in Child Development. Finally, the Doctor of Philosophy degree was awarded from the University of Tennessee-Knoxville with a major in Education/School Psychology.