MONTANA STATE UNIVERSITY

The effect of creative-divergent thinking training on creative-divergent thinking and moral reasoning
by Joseph Peter Donaghy

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University
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Abstract:
The purpose of this study was to determine by experiment if training in creative-divergent thinking had an effect on either creative-divergent thinking ability or level of moral reasoning. Forty-six sixth grade students in a small Montana community were the subjects of the study. Since random assignment to groups was not possible, a quasi-experimental research approach was used: the Nonequivalent Control Group Design. The equivalency of the treatment and non-treatment groups was established by statistically analyzing the results of pretests in the areas of creative-divergent thinking and moral reasoning.

The treatment group was trained by the investigator using New Directions in Creativity, Mark 1 (Renzulli, 1973). This approach was developed for use with middle-school students for the enhancement of creative-divergent thinking in terms of ideational fluency, flexibility, originality and elaboration. The training program consisted of three thirty minute lessons each week for a period of ten weeks.

Alternate forms of the Torrance Tests of Creative Thinking (Torrance, 1974) and the Sociomoral Reflection Measure (Gibbs and Widaman, 1982) were used to gather pretest and post-test data. The Torrance Tests of Creative Thinking were used to determine verbal and figural creative-divergent thinking ability. The Sociomoral Reflection Measure generated a sociomoral maturity score that was used to determine level of moral reasoning.

Twenty-four null hypotheses were statistically analyzed to determine the effect of the experimental training. The Student's t-test was used to test treatment effect and the Multiple Analysis of Variance was used to test interaction. The results of the experiment were mixed.

Both the treatment and non-treatment groups demonstrated significant increases in verbal creative-divergent thinking and significant decreases in figural creative-divergent thinking. Neither group demonstrated significant change in moral reasoning ability.

The investigator concluded that the training in creative-divergent thinking had no demonstrated effect on the moral reasoning of sixth grade students and the effect on creative-divergent thinking was mixed. Two implications were drawn. One implication concerned the lack of certainty of the results of creative-divergent thinking training. The second involved a more direct approach to the teaching of moral reasoning.

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by

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

Doctor of Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

August 1987

D378
D7135

APPROVAL

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ACKNOWLEDGMENTS

The writer takes this opportunity to thank the members of his examining committee for their interest and thoroughness: Dr. Lawrence Ellerbruch, Dr. Elnora Old Coyote, Dr. Stanley Easton, and Dr. Stephan Wilson. Special gratitude is due Dr. James Hauwiller, chairperson of the committee, for his patience and encouragement throughout the investigation.

The writer also wishes to thank all of the members of his family for allowing him the time and space to pursue this research.

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ABSTRACT

The purpose of this study was to determine by experiment if training in creative-divergent thinking had an effect on either creative-divergent thinking ability or level of moral reasoning. Forty-six sixth grade students in a small Montana community were the subjects of the study. Since random assignment to groups was not possible, a quasi-experimental research approach was used: the Nonequivalent Control Group Design. The equivalency of the treatment and non-treatment groups was established by statistically analyzing the results of pretests in the areas of creative-divergent thinking and moral reasoning.

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CHAPTER 1

DEVELOPMENT OF THE PROBLEM

Introduction

Individual and societal moral decision-making has been a concern of philosophers for the past two millennia. From Plato, Aristotle, and Aquinas within the classical tradition, through Kant and Hegel in the dialectic school, to the existentialist and post-existentialists such as Kierkegaard, Sartre, and Teilhard de Chardin, the question of moral reasoning as a central part of the human condition has been a major topic of concern (Mann and Kreyche, 1966).

Educators have also viewed morality, and the development of moral attitudes, as a major concern of their profession. Herbart, like Socrates, considered moral education as the prime focus and goal of the education of children. In nineteenth century England, Robert Owen made special provision for the moral instruction of children in his "infant schools." In America, Horace Mann proposed that the proper moral atmosphere of schools would help mold more truly moral adults (Hillesheim and Merrill, 1971).

In our own century, the renowned American educator and philosopher John Dewey stressed the need to develop the moral instincts of children, stating: "The child's moral character must develop in a natural, just, and social atmosphere. The school should provide this environment for

its part in the child's moral development" (Dewey, 1934: 85). In his essay Moral Principles in Education, Dewey asserted:

> The business of the educator . . . is to see to it that the greatest possible number of ideas acquired by children and youth are acquired in such a vital way that they become moving ideas, motive forces in the guidance of conduct (Boydston, 1977: 267).

For the past thirty years the most prominent figure in the study of the growth of moral reasoning in children and young adults has been Lawrence Kohlberg. The work of Kohlberg and his associates at Harvard University has helped to rekindle interest in the relationship between education and moral development. Kohlberg's main focus, which is an expansion of the theoretical work of Dewey and the empirical approach of Piaget, has been the growth of moral reasoning as it develops through a series of hierarchical stages. A major emphasis has been the need to facilitate the moral development of children through the presentation and discussion of moral dilemmas.

Education and Moral Development

Teachers are moral educators and schools are transmitters of moral values within the society. Each time a teacher praises or scolds a child, moral values are communicated. In the words of Kohlberg and Turiel:

> Teachers constantly act as moral educators. They tell children what to do, make evaluations of children's behavior, and direct children's relations in the classrooms. Teachers sometimes engage in these daily activities without being aware that they are engaging in moral education, but the children are aware of it (1971: 410).

The moral climate of the classroom and the school as a whole transmits moral values through what has been termed the "hidden curriculum."

This refers to the unconscious life of the school; it is that which we take for granted in the school experience: the supervision and evaluation of children, the structuring of activities, and the utilization of time.

The impact of the "hidden curriculum" on the lives of children has been documented by Jackson (1968). In describing this phenomenon, Jackson emphasized three characteristics of the school experience with which every child must learn to cope: crowds, praise, and power. Although we may discuss the benefits of viewing children as unique individuals, children are usually treated as part of a large group consisting of twenty or more students. Creative-divergent thinking is not usually rewarded unless it is being taught; praise is reserved for the child who is more convergent in thought and who obeys the rules of the classroom and school. Power is in the hands of the adults: principal, teacher, and lunchroom aide. All of this has an effect on the moral development of children.

Perhaps the most damaging effect of the "hidden curriculum" is that no one really thinks about it. Similarly, without thinking, the child learns to accept the various rules of the school and classroom. The rules are often proscriptive: what not to do, how not to act. According to Dewey, rules often became habits and habitual activity could not lead to truly moral conduct. Conduct must be thought about in order for it to be considered truly moral (1908: 141-143).

Educators have continued to emphasize the importance of moral training as a goal of education. In a 1973 study of its membership, researchers from Phi Delta Kappa asked respondents to rank-order

eighteen educational goals. Ranked third behind reading, writing, speaking, and listening skills, and pride in work and self-worth was the "development of good character and self-respect." Included in this latter category were moral responsibility, and ethical and moral beliefs (Purple and Ryan, 1976: 5).

In 1975, another group of researchers from Phi Delta Kappa found that eighty-eight percent of its membership agreed with the statement that, "An active program of moral education in the school would be a helpful addition to the effort of family and church to improve the moral development of children" (Purple and Ryan, 1976: 6). Thus a more active and open approach to moral education continues to be a priority of American educators.

Moral Reasoning and Creative-Divergent Thinking

Researchers have attempted to correlate a number of factors with the development of moral reasoning. These factors include age, gender, level of intelligence, religious background, and nationality. Although some relationship appears to exist between age and gender and moral development, the degree of the relationship continues to be debated. Even though a considerable amount of research exists with regard to the relationships between intelligence and moral reasoning (cf. Whiteman and Kaiser, 1964; Arbuthnot, 1973; Hoffman, 1977; Karnes and Brown, 1981), the results are far from conclusive. Kohlberg has indicated that intelligence is a necessary factor in making high level moral decisions but that it is not a sufficient explanation (Kohlberg in Lickona, 1976). If moral decision-making is at least in part a

cognitive activity, intelligence must be viewed as an important factor.

A relationship which has not been thoroughly investigated is that between creative-divergent thinking and moral reasoning. In the present study the investigator has attempted to determine the effect of creative-divergent thinking training on the level of moral reasoning in sixth grade children.

The dearth of research in this area may be due to the erroneous belief that intelligence and creative-divergent thinking are so closely linked as to be inseparable. But this linkage has been questioned. As early as 1898, Dearborn, in a study of faculty and students at Harvard University, found that the more intelligent subjects were appreciably less imaginative (Dearborn, 1898). In more recent empirical studies (Getzels and Jackson, 1962; Wallach and Kogan, 1965; Wallach and Wing, 1969), investigators have also determined that intelligence and creative-divergent thinking are separable phenomena.

MacKinnon, after studying creative architects, mathematicians, physical scientists, industrial researchers, engineers, and writers, stated:

> As for the relationship between intelligence and creativity . . . , we have found within our creative samples essentially zero relationship between the two variables, and this is not due to a narrow restriction in range of intelligence . . . . It is clear that being more intelligent does not guarantee a corresponding increase in creativeness (MacKinnon, 1962: 116).

Further support for the distinction between intelligence and creative-divergent thinking was offered by Torrance. In a 1967 tabulation of 178 correlation coefficients of intelligence and creativity

that had been reported in the literature, he found a median correlation of .20 (Torrance, 1967: 147). Breaking down the data further, Torrance found the median correlation coefficient between intelligence and verbal creativity to be .21, and between intelligence and figural creativity to be .06.

In concluding the argument for the separability of intelligence and creative-divergent thinking, support was found in the theoretical view of Arieti. In a volume devoted to the psychological process of creativity, Arieti stated that "an exceptionally high IQ is not a prerequisite for creativity." In fact, as a result of his years as a practicing psychiatrist, he believed that an individual with a very high level of intelligence may be too self-critical, too rigid, and may be too fast to adapt to the generally uncreative cultural environment (Arieti, 1976: 342). Thus intelligence at its upper extremities may have a negative impact on developing beyond the conventional level of moral reasoning.

If, as has been argued, intelligence and creative-divergent thinking are separable, then to understand more completely the correlates of moral development it would be worthwhile to investigate the relationship between creative-divergent thinking and moral reasoning because creativity may in fact have a positive effect on the development of moral reasoning.

While a more complete argument will be offered in Chapter 2, for the moment we can consider the findings of William Kay, a British researcher in the area of moral development. He has argued that it is "clear that mature morality is only possible when the agent is an

autonomous, dynamic, creative person" (Kay, 1975: 142). Kay has also asserted that "Since moral problems are also invariably characterized by the fact that they are amenable to many different solutions, creativity is ever more necessary" (1975: 147).

Statement of the Problem

The major problem of this study centered on the relationship between creative-divergent thinking and moral reasoning. The purpose of the investigation was to conduct an experimental study of the effect of training in creative-divergent thinking on the moral reasoning of sixth grade students; if creative-divergent thinking increases, would moral reasoning also increase?

Questions to be Answered

The following general questions were investigated in terms of specific null hypotheses:

1. Does training in creative-divergent thinking have an effect upon creative-divergent thinking ability?

2. Does training in creative-divergent thinking have an effect upon moral reasoning ability?

3. Will these effects, if found, be generalizable across subcategories of creative-divergent thinking?

It was the intention of the investigator to study the effect of training in creative-divergent thinking on moral reasoning ability. The investigation was not designed to delve into the area of moral behavior. Neither was it designed to consider the effect of emotions,

religious belief, intelligence, or other factors that may influence morality.

General Procedures

This study was conducted during the latter half of the 1984-85 school year. A quasi-experimental procedure called the nonequivalent control group research design was used in this investigation. This design is frequently used in educational research when the subjects of the research cannot be randomly assigned to groups. The design involved the selection, from already existing groups, of a treatment and a non-treatment group. Both groups were subject to pretesting and posttesting but only the treatment group was exposed to the treatment. The subjects of this study were all of the members of two sixth grade classes.

In order to establish equivalency of the two groups of students involved, pretesting was conducted during early February. On the first day both groups were administered the Sociomoral Reflection Measure, Form A (Gibbs and Widaman, 1982). On the following day, Figural Form A of the Torrance Tests of Creative Thinking (Torrance, 1973) was administered to both groups. On the third day, Verbal Form A of the Torrance Tests was administered to both groups. All tests were administered by the investigator. Results of the pretesting are discussed in Chapter 4.

The Sociomoral Reflection Measure is a group-administered measure of moral reasoning based on Kohlberg's individually administered Moral Judgment Interview (Kohlberg and Colby, 1983). The Torrance Tests of

Creative Thinking is a group-administered measure of verbal and figural aspects of creative-divergent thinking.

Over a period of ten weeks, during the spring of 1985, the investigator utilized New Directions in Creativity, Mark 1 (Renzulli, 1973) to train the treatment group in creative-divergent thinking. The training took place three afternoons a week with each session lasting thirty minutes. Additional home assignments were used to reinforce the lessons.

Post-testing occurred near the end of May 1985. Results were statistically tested for treatment effects (Student's t-test) and interaction effects (MANOVA) using the Honeywell CP6 computer at Montana State University. Results are presented in Chapter 4.

Need for the Study

This investigation was useful for the following reasons:

1. A definite research gap existed with regard to the effect of creative-divergent thinking training on moral reasoning ability. After a thorough search of the literature only one study, concerning college students, was located.

2. A better understanding of the association between creative-divergent thinking and moral reasoning could have led to a more substantial inclusion of both of these in the curricular offerings for both children in classrooms and teachers-in-training.

3. The use of New Directions in Creativity (Renzulli, 1973) as the method of treatment added to the research data on this particular approach to creative-divergent thinking training.

4. This study added to the accumulating data on the Sociomoral Reflection Measure (Gibbs and Widaman, 1982) as a device for gathering moral reasoning information on a group-administered basis.

5. The study contributed to the already appreciable data base that exists for the Torrance Tests of Creative Thinking (Torrance, 1973).

Limitations

The following limitations of the study were identified:

1. The review of the literature was confined to the libraries of Montana State University, the University of Montana, Eastern Montana College, and Teachers College Columbia University. In addition, ERIC network searches were conducted in 1984 and 1986.

2. The experimental treatment involved ninety minutes a week over a ten week period.

3. The study population was limited to a single, small-town school system in western Montana.

4. The study population consisted of sixth grade students.

5. Random assignment of subjects to groups was not possible, thus a quasi-experimental research design was used.

6. The questionnaire method of collecting data on moral reasoning level is relatively new. In this method it is assumed that the respondents can accurately report in writing their evaluation of a moral dilemma. This assumption appears to be warranted based on the high concurrent validity, .85, reported between the Sociomoral Reflection Measure and the Moral Judgment Interview developed by Kohlberg (Gibbs

and Widaman, 1982). The Moral Judgment Interview is the clinical interview which is considered the hallmark tool for measuring moral reasoning ability.

7. There continues to be a lack of agreement as to what constitutes creative-divergent thinking ability. The Torrance Tests of Creativity Thinking measured four characteristics of creative-divergent thinking: fluency, flexibility, originality, and elaboration. The Torrance Tests are widely used and are considered the standard of comparison in determining creative potential (Tannenbaum, 1982: 273).

Definition of Terms

The following key terms are used in this study:

Creativity/Creative Thinking. "Creativity is a combination of the flexibility, originality, and sensitivity to ideas which enables the learner to break away from usual sequences of thought into different and productive sequences, the result of which gives satisfaction to himself and possibly others" (Jones, 1972: 7).

Divergent Thinking. That aspect of creative thought which is characterized and measured in terms of:

Fluency: the ability to produce many ideas or solutions to problems.

Flexibility: the ability to produce ideas or solutions to problems from different perspectives and a willingness to change direction.

Originality: the ability to produce unusual and unique ideas and solutions to problems.

Elaboration: the ability to expand or embellish ideas and solutions to problems (Renzulli, 1973).

Moral Development. Growth in moral thinking from the lowest, or egocentric stage, to the highest, or universal stage, involving the transformation of cognitive structures. Growth depends on both cognitive development and social interaction (Duska and Whelan, 1975: 7).

Moral Dilemma. When two norms of equal social value come into conflict, such as saving a life versus obeying the law, a person faces a moral dilemma in evaluating and choosing the proper course of action (Gibbs and Widaman, 1982: 44).

Moral Judgment. Making a moral judgment involves concentration on the reasons for making a moral choice when presented with a moral dilemma (Duska and Whelan, 1975: 43).

Morality. That which concerns the judgment of the goodness or badness of human action and character.

Moral Reasoning. The ability to utilize cognitive processes in order to "solve" a moral dilemma. For the purpose of this study, moral reasoning is viewed as separate from moral behavior.

Moral Stages. Two stages of moral reasoning at each of three levels have been identified. The three levels are Preconventional (egocentric concern), Conventional (concern for those in your society) and Post Conventional (concern on a universal basis). Research indicates that people pass through these stages in an invariant sequence (Fenton, 1978).

Norm. "A socially valued and morally prescribed action, e.g., saving a life (life norm) or obeying the law (law norm). Norms can be

thought of as sociomoral truisms, since it is ordinarily taken for granted that one should save a life or obey the law" (Gibbs and Widaman, 1982: 44).

Summary

Mention has been made of the continuing interest of educators in the area of moral development. From Socrates to Owen, from Mann to Kohlberg, educators have viewed moral development as a major goal of the educational process. It has been pointed out that schools tend to go about the development of moral reasoning in an unconscious manner, through what is called the "hidden curriculum."

A case has been tentatively made for the relationship between creative-divergent thinking and moral reasoning. The purpose of this study was to determine in an experimental design, whether training in creative-divergent thinking would have an effect on either the creative-divergent thinking ability or the level of moral reasoning in children. Other factors, such as emotion or intelligence, were not considered as integral to this study.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

In this chapter five topics, central to the questions under investigation in this research project, will be covered: (1) moral reasoning viewed from the perspectives of John Dewey, Jean Piaget, and Lawrence Kohlberg; (2) creativity as both a process and a personality trait; (3) the relationship between intelligence and creative-divergent thinking; (4) the relationship between intelligence and moral reasoning; and (5) the relationship between creative-divergent thinking and moral reasoning.

This review was based upon literature contained within the libraries of Montana State University, the University of Montana, Eastern Montana College, and Teachers College Columbia University. In addition, ERIC computer searches were conducted during the spring of 1984 and summer of 1986.

Moral Reasoning

The development of moral reasoning in children and young adults has become an increasingly important issue in American education during the past century. From John Dewey in the first half of this century to Lawrence Kohlberg in the second half, an increasing amount of research

has been conducted concerning the topic of moral development. Questions have been raised as to how, when, and under what conditions it occurs, and how and to what extent it can be facilitated. In other research, attempts have been made to correlate the development of moral reasoning with age, gender, and intelligence. Few researchers have looked into the association of moral reasoning and creative-divergent thinking which was the central topic of this study.

John Dewey

In 1909, John Dewey distinguished between "moral ideas" and "ideas about morality" (Boydston, 1977: 267). He felt that schools usually stressed the former at the expense of the latter and that little moral growth could be expected in children as a result. By concentrating on moral ideas in school, children were not allowed to become actively involved in the process of working out and developing their own ideas of moral behavior.

In the essay Moral Principles in Education (Boydston, 1977: 269-285), Dewey discussed the three resources he felt were vital in building the moral character of children. First, the school experience itself was to be viewed as part of life and not an entity separate from the real world. Second, the methodology of learning and working within the school setting was stressed; the actual studies and curriculum of the school were seen to be in need of revision. Third, the children had to become functioning, decision-making, analytical members of the school community if moral character was to develop.

In stressing that the school and school experiences should be viewed as part of the real world, Dewey wrote:

> There cannot be two sets of ethical principles, one for life in the school, and the other for life outside the school. . . . . The moral responsibility of the school, and of those who conduct it, is to society (Boydston, 1977: 269).

In Dewey's view, children had to be given the opportunity to engage in social life while at school if they were to be expected to eventually participate fully in American democracy as adults. Active, positive participation, rather than commandments concerning behavior, was considered a means of achieving this goal:

> The school cannot be a preparation for social life excepting as it reproduces, within itself, typical conditions of social life. . . . The only way to prepare for social life is to engage in social life (Boydston, 1977: 272).

The traditional stress on individual, lock-step achievement and competition was not viewed by Dewey as amenable to the growth of moral character. He believed that memory work and repetition dulled rather than enhanced moral awareness. In order to increase moral awareness in students, Dewey stressed the need to develop the areas of reciprocity, communication, cooperation, and positive personal achievement.

Because the curriculum, in Dewey's opinion, set the whole tone of the school, he felt that the curriculum should stress a growing insight into the human condition. In addition, children's need to be creative also had to be considered in curriculum planning:

> What the normal child continuously needs is not so much isolated moral lessons upon the importance of truthfulness and honesty, or the beneficent results that follow from a particular act of patriotism, as the formation of habits or social imagination and conception (Boydston, 1977: 283).

Dewey concluded this essay by stating that if a child's moral judgment is to develop, he must be given the chance to analyze and judge his world and be ready to face the consequences of his decisions.

John Dewey, like Piaget and Kohlberg, was a developmentalist. He felt that moral development occurred as the result of cooperation and participation in social life. Dewey believed that there were:

> three levels of behavior and conduct: (1) behavior which is motivated by various biological, economic, or other non-moral impulses or needs (e.g., family, life, work) and which yet has important results for morals; (2) behavior or conduct in which the individual accepts with relatively little critical reflection the standards and ways of his group as those are embodied in customs or mores; (3) conduct in which the individual thinks and judges for himself, considers whether a purpose is good or right, decides and chooses, and does not accept the standards of his group without reflection (Dewey, 1908: x).

As will be noted later, this looks much like Kohlberg's more recent formulation of the preconventional, conventional, and principled levels of moral judgment. Kohlberg, of course, acknowledges his debt to Dewey.

Jean Piaget

In his 1932 work, The Moral Judgment of the Child, Piaget set the stage for future investigations of moral development. Following in the tradition of the great French sociologist Emile Durkheim, who viewed rules as the basis of moral behavior, Piaget utilized his clinical interview method to study how children in Geneva, Switzerland, viewed the game of marbles. He was especially interested in how children perceived and practiced the rules of the game because for Piaget, as for Durkheim, the following principle obtained:

> All morality consists in a system of rules, and the essence of all morality is to be sought for in the respect which the individual acquires for these rules (Piaget, 1965: 13).

In his research, Piaget was concerned with respect for rules as it developed with age. Children below two years of age were unaware of rules and their play seemed to be a purely motoric activity. Piaget found that between the ages of two and six years children became increasingly aware of rules but that they observed the rules in an egocentric manner; they imitated what they saw older children doing without any reflection. Since rules in general came from powerful figures in the child's environment (parents, teachers, and in the case of marbles, older children), rules were viewed as unchangeable.

By the age of six years children seemed to believe that rules were "laws" and that they had always existed and could not be changed by anyone. Some children even thought that God created the rules of marbles. This heteronomous view of rules persisted until about the age of ten.

During the years from seven to ten children gradually began to realize that rules served a regulatory function in their social interactions with other children. During these years children watched other game participants closely to make sure the rules were being strictly obeyed.

The preadolescent years, from age ten to fourteen, witnessed the development of an autonomous view of rules. Rules were not approached as something that required the mutual consent of the participants in the game; the rules could even be changed if the players agreed to the changes. Part of this development from heteronomy to autonomy came from the increase in cooperative play of children and also in part from developmental advances in cognition.

Duska and Whelan (1975) noted several important points in Piaget's study of the development of respect for rules:

1. Through age seven or eight children are submissive to all rules that govern their lives.

2. The heteronomous child does not fully understand the rules in his life and cannot consistently obey them.

3. Children develop their understanding of rules through cooperative interaction with other children, this cooperation with equals leads eventually to a sense of autonomy.

4. Only the autonomous child can consistently obey rules because he is capable of understanding and respecting the basis for the rules.

In The Moral Judgment of the Child, Piaget also investigated the child's sense of justice. In addition to situations that concerned stealing and lying, the subjects were presented with pairs of stories where, for example, one child broke many cups while trying to help a parent and another child broke one cup while being disobedient. Until around the age of eight years, children seemed unable to focus on the intention of the actor in the story. Guilt was judged on the basis of the amount of damage done or what Piaget termed "objective responsibility." This was part of heteronomous thinking or moral realism.

The stage labelled "subjective responsibility" followed and was seen to be the result of the child's interaction with his peers. This stage began to emerge around the age of ten years and began to solidify near the age of twelve. During this autonomous stage the intentions of the actors in the hypothetical stories were taken into consideration and tended to modify children's responses to the questions posed by Piaget.

An interesting question presented by Piaget dealt with the punishments thought appropriate by his subjects. To the heteronomous child, punishment had to be "retributive." The anger of the all-powerful adult had to be assuaged by punishment that was swift and severe. To the child who had reached the autonomous stage, however, punishment had to serve to restore social solidarity; punishment should fit the transgression and the intent of the transgressor. This was referred to as "reciprocal punishment."

The effect of children's interactions with each other on their emerging sense of justice cannot be overstressed. Piaget maintained that:

> The sense of justice, though naturally capable of being reinforced by precepts and the practical example of the adult, is largely independent of these influences and requires nothing more for its development than mutual respect and solidarity which holds among children themselves (1965: 198).

Piaget's basic finding was that as the child matures and his social world expands the basis of moral decision-making also changes. The young child begins with a moral view that constrains his actions, that is based on the rules laid down by more powerful individuals. With the passing of time and the broadening of social interactions, a morality based on cooperation emerges with a basis in social considerations.

Piaget's pioneering empirical study of moral development in children had a two-fold effect: it stimulated a great deal of further research and it provided a conceptual frame around which to build future research in moral development.

Lawrence Kohlberg

The most prolific and influential researcher in the area of moral development over the past thirty years has been Lawrence Kohlberg, currently director of the Center for Moral Education at Harvard University. His 1958 dissertation at the University of Chicago laid the groundwork for expanded research into the cognitive-developmental approach to moral reasoning. According to Kohlberg:

> The approach is called cognitive because it recognizes that moral education, like intellectual education, has its basis in stimulating the active thinking of the child about moral issues and decisions. It is called developmental because it sees the aims of moral education as movement through moral stages (1975).

In 1955 Kohlberg initiated a longitudinal study of fifty middle-class and working-class boys, ages ten, thirteen and sixteen years, in Chicago. Every three years since that time, these subjects have been studied using what is now called the Moral Judgment Interview. During the interview, the subject is asked to consider situations in which moral norms are in conflict (i.e., life versus property rights) and to propose and justify solutions to the dilemmas.

Kohlberg's work is based primarily on the theoretical approach of Dewey and the research-based approach of Piaget. Kohlberg, in fact, has stated (1971) that the origins of his position on cognitive moral development are to be found in the works of Dewey such as Ethical Principles Underlying Education (1909). In this work Dewey presented a developmental view of moral education stressing the role of thinking in the organization of one's moral outlook. Dewey also emphasized that development takes place in stages and that development, both intellectual and moral, was the major aim of education. Kohlberg, like Dewey,

feels that the aim of moral education should be the stimulation of movement toward the next higher stage of moral thought rather than indoctrination into the conventional morality of the school and nation.

Kohlberg's debt to Piaget is based on both the empirical study described in The Moral Judgment of the Child (1932) and on Piaget's more prolific work in the area of cognitive stage development. Kohlberg has summarized Piaget's findings in the latter area stating that stage development is characterized as follows (1969):

1. The notion of stages implies that there are qualitative differences in the way each child solves problems at different stages.

2. There is an invariant sequence to the stages that the child proceeds through. Except in cases of extreme distress, movement is forward not backward and stages are not skipped.

3. Each stage represents a structured whole -- the child responds to a dilemma according to his reasoning at that level. Individuals are consistent in their level of reasoning.

4. The stages are hierarchical integrations, each stage is more differentiated and more integrated than the preceding one; they are like building blocks. Each stage comprehends lower stage thought and has a preference for higher stage thought when such thought is encountered.

Like Dewey and Piaget before him, Kohlberg feels that the moral judgments that people make can be arranged in a hierarchy of levels. His research has led to a more definite hierarchy of three levels, each composed of two stages, with a stage defined as a structured whole that leads to consistent thought in the area of moral reasoning.

Moral reasoning is seen as the thought process an individual goes through in deciding what one ought to do with regard to a given moral dilemma. Kohlberg has devised a technique using moral dilemma situations,

where moral norms are in conflict, to determine an individual's predominant level of moral reasoning. The following is a brief description of this hierarchy.

Preconventional Level

At this level, which is parallel to Dewey's first level and to Piaget's heteronomous stage, the child views a moral dilemma in terms of the needs of the individuals involved. Dilemmas are resolved with reference to power, punishment, and personal pleasure.

Stage 1

This is a somewhat simple stage; decisions tend to be made on the basis of what authority says or what physical punishments may ensue. The child views the world in egocentric terms and does not consider the interests or viewpoints of other people. Most children function at this stage between the ages of four and eight years.

Stage 2

By the age of nine to eleven years the child is more capable of role-taking and thus appreciating the viewpoint of others. Moral decisions tend to be based on the needs of the child and sometimes on the needs of others. Many decisions are based on the idea of exchange in a quasi-economic sense; this has been referred to as a "market-place mentality." This characterization is based on the child's willingness to make decisions primarily in consideration of what is to be gained personally. Increasing interaction with peers facilitates the development of this stage.

Conventional Level

At this level the youth has acquired a "member-of-society" perspective. Moral judgments are based on what the family, peer group, or society expect of the "good" or "nice" individual. There is loyalty to the maintenance of the social order. Moral conflicts can be resolved at either an interpersonal or community level by appealing to what authority (peers, laws, mores) views as proper. This level is often attained between the ages of twelve and eighteen years and corresponds to Dewey's second stage.

Stage 3

Pleasing or being helpful to others is the major goal of this stage. One earns the approval of significant others by being nice or good as reflected in the beliefs of family, friends or teachers. Functioning at this stage will allow for the resolution of conflicts among people who know each other.

Stage 4

The orientation at this stage is to the rules and laws that have been established by one's particular society. An individual is expected to do his duty and show respect for duly constituted authority. Any action that is contrary to the established law appears to threaten the solidarity and cohesion of the society. Functioning at this stage will usually allow for the adequate settling of societal as well as interpersonal conflicts.

Principled Level

At this level the individual possesses what can be termed an "anthropological perspective," he sees beyond the norms and laws of his particular society and reflects on the principles upon which any good society is based. Few people in the contemporary world (perhaps ten percent) appear to advance to this level, according to the research of Kohlberg and his associates. In fact, since fewer than one percent of subjects function beyond stage five, stage six is often viewed as a theoretical construct. This level parallels Dewey's third level and Piaget's autonomous level.

Stage 5

Called the "social contract stage," this stage is a direct outgrowth of the awareness of the relativity of personal values and opinions. The individual critically examines the standards and values of his society and keeps open the possibility that unjust laws can be changed after being rationally evaluated. At most nine percent of adult Americans is able to function at this stage with any degree of regularity.

Stage 6

Attained by fewer than one percent of adult Americans, this stage can be viewed in terms of Kant's "universal imperative": one should act in a way that one would want all others to act in the same situation (Kohlberg, 1973). It also involves John Rawls' concept of "distributive justice." Rawls suggested that moral dilemmas could be best resolved by temporarily wearing a "veil of ignorance." By viewing the situation

from the perspective of each actor and not knowing which actor you are, one should be able to make an adequate moral decision (Rawls, 1973). Decisions at this stage are based on conscience working in accord with self-chosen, universal principles of reciprocity, equality of human rights, and respect for the dignity of human beings as individuals.

Although these stages have their basis in the works of Dewey and Piaget, Kohlberg has gone far beyond them in his research and theoretical formulations. Kohlberg's theory is both more complex and more specific than his predecessors and he has taken the study of moral reasoning well beyond the years of childhood and has expanded the area of research to other cultures.

The Measurement of Moral Reasoning

The current approach to measuring moral reasoning ability can be traced to Piaget's pioneering work, The Moral Judgment of the Child (1932). In this research he utilized his "clinical interview" approach in an attempt to determine how children viewed the rules of the game of marbles. This involved asking a series of open-ended questions to individual children. Although an overall scheme of questioning existed, Piaget was willing to follow where the child led.

During the 1950's Kohlberg developed an approach to measuring moral reasoning that was based primarily on Piaget's method. Kohlberg developed a series of moral dilemmas that were to be individually administered to subjects. Each dilemma had a series of both closed and open-ended questions that were to be asked during the interview. Kohlberg's instrument, the Moral Judgment Interview and Scale (Kohlberg and Colby, 1983), has been refined over the intervening years and is now considered the standard measuring device in the field of moral reasoning.

The Moral Judgment Interview and Scale is a production-task measure of an individual's stage level of moral reasoning. A minimum of twenty-one questions involving three moral dilemmas must be asked. Proper scoring of the subject's responses leads to two indices: the Moral Maturity Score and the Global Stage Score. The former score ranges from 100 points (pure stage one) to 500 points (pure stage five) and is considered a well-differentiated psychometric score. The latter score ranges from stage one through five and transitional levels (i.e., stage three and one-half); as the name indicates, it is a more global measure of moral reasoning level. There are two drawbacks to the Moral Judgment Interview and Scale: it requires workshop training to administer and score and it must be individually administered.

In an attempt to simplify the measurement of moral reasoning, Rest developed the Defining Issues Test (1974). This multiple-choice instrument has been widely used since it requires only minimal training and time to administer and score. Its major shortcoming is that it may not measure spontaneous moral reasoning but rather recognition. In Rest's words, the Defining Issues Test addresses "what people recognize and appreciate in moral arguments" not "what moral arguments they spontaneously produce" (Rest, 1975: 748).

Recently a colleague of Kohlberg has developed two group-administrable measures of moral reasoning: the Sociomoral Reflection Measure (Gibbs et al., 1982) and the Sociomoral Reflection Objective Measure (Gibbs and Widaman, 1984). These instruments seem to be closely aligned to the Moral Judgment Interview and Scale. Both of these

instruments are intended to be group-administerable and require only self-training for use.

The Sociomoral Reflection Measure like the Moral Judgment Interview and Scale is a production-task measure in which subjects must justify their prescriptive decisions with regard to moral dilemmas that are adapted from Kohlberg. Questions are preclassified by norm which allows the rater to concentrate on stage assessment alone. This instrument has been more fully discussed in Chapter 3.

The Sociomoral Reflection Objective Measure also uses Kohlberg-based moral dilemmas but concentrates on the subject's recognition in using sixteen multiple-choice question arrays. Each array consists of three sub-questions. The subject's choice of stage specific responses leads to maturity and global scores similar to those derived from the Moral Judgment Interview and Scale and the Sociomoral Reflection Measure. The Sociomoral Reflection Objective Measure is viewed by its developers as an objective index of social reasoning useful at high school age and above. It is computer scorable and requires little training to interpret.

Research Findings and Controversies

Edwin Fenton (1978: 52-59) has listed eleven major research findings with regard to the work of Kohlberg and his associates:

1. People think about moral issues in six qualitatively different stages.
2. The most reliable way to determine a stage of moral thought is through an interview.
3. A stage is an organized system of thought.

4. An individual reasons at predominantly (although not exclusively) one stage.

5. The stages are natural steps in ethical development.

6. All people move through these stages in invariant sequence (with most stopping at stage four).

7. People can understand arguments at one stage beyond their own predominant stage.

8. Higher moral stages are better at resolving dilemmas than lower ones.

9. Stage growth takes place primarily by encountering real-life or hypothetical moral dilemmas which set up cognitive conflict and disequilibrium.

10. Deliberate attempts to facilitate stage growth have been successful in schools..

11. Moral judgment is a necessary but not sufficient condition for moral action.

The above findings have not gone unchallenged. As Kohlberg's theory of cognitive-moral development gained popularity during the late 1960's and 1970's, criticism and controversy arose.

Fraenkel (1978) suggested that some of Kohlberg's claims were exaggerated. Among other things, he challenged the concept of the universality of the stages. Fraenkel felt that although research has shown the existence of these stages in nine different cultures, these are too few to claim universality in view of the number of cultures found in the world.

Fraenkel also expressed concern over the fact that some people seem to feel that higher stages are "better" than lower stages. Kohlberg does not claim that higher stages are "better" but that they are more adequate at resolving moral dilemmas.

Kurtines and Grief (1974) perceived a problem with the variability and complexity of the scoring of the Moral Judgment Interview. They considered the amount of training needed to conduct the interview and the amount of judgment required to score the results to be problematic. This criticism has been countered to some extent by the recent publication of a revised manual with simplified scoring techniques (Kohlberg and Colby, 1983).

There are many who support Kohlberg's research. In an article aimed at defending Kohlberg's approach to moral reasoning, Broughton (1978) asserted that the Moral Judgment Interview was not meant to be a psychometric instrument but rather a measure of the form of reasoning in the individual. He also pointed out that even intelligence tests, which some would consider the epitome of psychometric testing, were open to human judgment and interpretation. Broughton's main point was that the stages developed by Kohlberg are inductive generalizations based on the research evidence and not philosophic truth.

In a recent study conducted by Nisan and Kohlberg (1982) the findings of earlier cross-cultural studies, which had been carried out by Kohlberg and other of his associates, were reaffirmed. The researchers found that in their study of rural and urban subjects in Turkey there was support for the contention that the stages are universal in character and follow an invariant sequence of development.

Walker (1982), in a study which attempted to induce regression and stage skipping in fifth through seventh grade students, found that he was unable to succeed at either of these tasks, thus supporting the concept of invariant sequence.

In a study of the stepwise and irreversible sequence of moral development, Holstein (1976) examined changes in fifty-two teenagers and their parents over a three year period. She determined that stepwise growth by level, not stage, does occur. It was also reported that subjects at stage five at the beginning of the study tended to revert to stage four at the end of the study.

A recent monograph (Colby, et al., 1983) reported the findings of a twenty year study of Kohlberg's original group of subjects from his 1958 dissertation. The Moral Judgment Interview showed a high degree of internal consistency and was felt to be a reliable and valid measure of Kohlberg's moral stages. It was also found that the subjects, reinterviewed every three to four years, proceeded through the developmental stages in the hypothesized sequence, with no skipping of stages. In addition, the subjects used a coherent structural orientation in the way they thought about moral dilemmas. This longitudinal study was supportive of all of the basic assumptions of Kohlberg's theory of moral development.

Another controversy which arose recently concerns the apparently different approach taken by males and females when confronted with a moral dilemma. According to Gilligan (1982), the care orientation of females with regard to moral reasoning is confounded by the justice orientation of Kohlberg. The claim is that female self-concept is tied to a sense of connectedness to other people while male self-concept is tied to a sense of being separate from others. Thus when women are confronted with a moral decision they tend to weigh responsibility to others more heavily than the need for justice. Such decision-making

would tend to prevent women from rising to Kohlberg's higher levels of moral reasoning. The existence of a built-in sex bias was supported in a recent study by Blake and Cohen (1984). In analyzing several studies of the moral reasoning of males and females they found that a dichotomy does appear to exist.

In summary, we can see that the issue of moral development has been a major concern of twentieth century educators. The review of Dewey, Piaget, and Kohlberg indicated a consensus concerning the developmental aspects of moral reasoning. Current research seems to support the view of moral development as an invariant sequence of hierarchical stages.

Creativity

The second variable to be considered by the investigator was creative-divergent thinking. Creativity has been defined and redefined many times from various points of view. Some definitions center on the process involved in creativity while others emphasize personality traits that are associated with recognized creative individuals. In this section several of these definitions will be considered, as well as methods of identifying creativity, and ways of nurturing creativity.

Definitions of Creativity

MacKinnon (1970) called creativity a "multi-faceted phenomenon" and considered the creative process to be a complex set of cognitive, emotional, and motivational factors that were present to some extent in all people. He felt that the process consisted of five sequential

steps: preparation, concentrated effort, withdrawal from the problem, insight, and verification. Preparation occurred when an individual's experiences, and cognitive and technical skills were brought to bear upon a problem. This was followed by a period of concentrated effort in an attempt to solve the problem. If a solution was not found quickly, tensions and frustrations would arise. These feelings led to a period of withdrawal from the problem, or, as it is sometimes called, incubation. Through unconscious effort, the next step, insight, often followed when a possible path to a solution became apparent. The final step involved the verification and application of the solution.

The analysis of the creative process described by MacKinnon was similar to that described by Stein (1974) who felt that the process of scientific creativity consisted of four steps: preparation, hypothesis formation, testing of hypothesis, and communication of results.

Both MacKinnon and Stein were quite close to what is considered the traditional view of the creative process, that of Wallas (1926). His was also a four step process: (1) preparation, which consisted of gathering information and probing the problem in an intense manner; (2) incubation, which occurred when the problem receded into the unconscious but progress towards a solution continued; (3) illumination, when a possible solution was discovered; and finally, (4) verification, the testing of the proposed solution.

Dellas and Guier (1970), in an extensive review of the research on the identification of creativity, concluded that the roots of creativity were to be found in the personality and motivational aspects of an individual's character. In their analysis, the personality traits of

recognized creative adults and young people were congruent. However, these traits were not as sharply delineated in the school-age group.

The review of research cited above supports the findings of MacKinnon (1970) who described the following traits among recognized creative adults: independence of thought and action, openness to experience, curiosity, wide range of information, intuitiveness, and courage of the mind and spirit to question that which society accepts. These personality traits would seem to encourage and strengthen an individual's movement toward principled moral reasoning.

Perhaps the foremost name in the area of creativity research in the middle part of this century is that of E. Paul Torrance. In 1962 Torrance listed eighty-four "experimentally derived personality correlates of highly creative adults." The top five characteristics were: acceptance of disorder, adventuresomeness, strong affection, altruism, and awareness of others.

Another researcher, Hare, also contributed to the picture of the creative personality when he described the creative person as one who was:

> essentially a non-conformist with the capacity to pursue nonconforming and creative ideas in the face of societal pressures to see things as others have seen them and leave things as others have found them (1982: 157).

Virtually all of the personality descriptors of the creative individual cited above, and especially Hare's definition, seem to point to the possible utility of creative thought in the area of moral reasoning. The essence of a moral dilemma situation is that there is no easy or simple solution. A person who is able to deal with ambiguity and not

be discouraged, who is able to use intuition as well as logic, and who has the courage to question accepted ways of behavior may possibly think and act in a more morally mature manner than his less creative peers.

The definition of creativity with which the researcher is most comfortable also seems to indicate a possible relationship between the emergence of autonomous moral reasoning and creative thought:

> Creativity is a combination of the flexibility, originality, and sensitivity to ideas which enables the learner to break away from usual sequences of thought into different and productive sequences, the result of which gives satisfaction to himself and possibly to others (Jones, 1972: 7).

Identification of Creativity

There are two main approaches to the identification of creative potential in children: the matching of individual children to traits that are associated with creative people and the standardized testing of creative-divergent thinking ability.

Often teachers are asked to consider their students and rate them in terms of a given list of character traits of creative people. A widely used example of such an approach is the Renzulli-Hartman Scale for Rating Behavioral Characteristics of Superior Students (Barbe and Renzulli, 1981). Ten behavior characteristics of creative individuals, derived from the research literature, are listed and the child under consideration is rated with regard to evidence of similar behaviors which he exhibits on a scale of: seldom, occasionally, considerably, or almost always. The characteristics listed on this scale are:

1. Displays a great deal of curiosity about many things; is constantly asking questions about anything and everything.

2. Generates a large number of ideas or solutions to problems and questions; often offers unusual, unique, clever responses.

3. Is uninhibited in expressions of opinion; is sometimes radical and spirited in disagreement; is tenacious.

4. Is a high risk taker; is adventurous and speculative.

5. Displays a good deal of intellectual playfulness; fantasizes, imagines ("I wonder what would happen if . . ."); manipulates ideas (i.e., changes, elaborates upon them); is often concerned with adapting, improving, and modifying institutions, objects and systems.

6. Displays a keen sense of humor and sees humor in situations that may not appear to be humorous to others.

7. Is unusually aware of his impulses and more open to the irrational in himself (freer expression of feminine interests for boys, greater than usual amount of independence for girls); shows emotional sensitivity.

8. Is sensitive to beauty; attends to aesthetic characteristics of things.

9. Is nonconforming; accepts disorder; is not interested in details; is individualistic; does not fear being different.

10. Criticizes constructively; is unwilling to accept authoritarian pronouncements without critical examination (Barbe and Renzulli, 1981: 159-160).

Occasionally, children are asked to rate their peers with regard to creative-divergent thinking and behavior in school or non-school settings. Children in the first few grades of elementary school might be asked to answer questions similar to the following:

Pretend that your class found a puppy in the playground.

1. What three students would think up lots of names for the puppy?

2. What three students would make-up the most unusual names?

3. What three students would come up with the best names? (Roger Taylor, 55-56)

Older students might be asked:

1. What three students in your class are the most curious?
2. What three students like to take chances?
3. What three students are most likely to question authority? (Roger Taylor, 56)

While rating scales seems to be gaining in popularity, standardized tests remain the major method used for assessing creative potential. Prominent persons in the area of standardized testing of creativity are J. P. Guilford and E. P. Torrance. These two researchers were primarily responsible for the development of the Creativity Tests for Children (Guilford, 1971) and the Torrance Tests of Creative Thinking (Torrance, 1974).

Both of these tests rest on the divergent production section of Guilford's Structure of the Intellect approach to defining intelligence. Guilford (1967) believed that intelligence draws on many independent mental abilities; nearly one hundred and twenty have been identified so far. He approximated that nearly twenty percent of mental ability was in fact creative ability. Divergent production was viewed by Guilford (1959) as one of the basic processes in creative thinking and was broken down into the four areas of fluency (many ideas and solutions to a problem), flexibility (ideas and solutions from many categories), originality (ideas and solutions which were unique or novel), and elaboration (details added). Divergent production ability was needed for a task when multiple responses were necessary to a problem with no generally acceptable solution, whereas convergent production was useful when only one response was appropriate and acceptable.

The Creativity Tests for Children (Guilford, 1971) consists of eleven subtests which require children to: name a story, think of unusual uses for common objects, develop synonyms, write sentences each using two nouns from a list of nouns, think up occupations that are associated with a horse or a bottle, think of items that could be made from certain shapes, find hidden letters, discern figural commonalities in alphabet letters, make objects out of several geometric shapes, and add decorations to simple pictures.

The Torrance Tests of Creative Thinking (Torrance, 1974), although based on the work of Guilford in the area of divergent thinking, have gone well beyond the Creativity Tests for Children in norming and in the collection of data on reliability and validity. As the Torrance Tests of Creative Thinking have been selected for use in this study, they are discussed at greater length in Chapter 3.

Nurturing Creative-Divergent Thinking

Before discussing ways of nurturing creative-divergent thinking in children, we should be aware of factors that diminish the creative impulse. Torrance (1964) discussed several factors which researchers view as inhibiting creativity. First is the success orientation of both society and school. Emphasis on accomplishing as others have accomplished tends to lead to a decrease in risk-taking on the part of students. Second is peer-orientation which seems to be a common phenomenon beginning in the upper elementary years and continuing through high school. This places pressure on the child to conform to group norms rather than to think independently or be different in any way.

A third factor is the overt or covert sanction against asking questions in the classroom. This tends to put a lid on self-initiated explorations on the part of the student and reinforces passive acceptance in learning. This also supports the generally held belief that divergent thinking, thinking that is different from the average, is abnormal and should be discouraged. Finally there is the belief that work and play are different and should be kept separate. Since school is the work of children, the atmosphere should be worklike and not playful. An atmosphere that discourages playfulness also discourages creativity.

In the same study, Torrance (1964: 98-108) offered a number of ways to facilitate creativity in the classroom:

1. Reward various kinds of talents and creative achievements.
2. Help children recognize the value of their creative talents.
3. Teach children to use creative problem-solving processes.
4. Develop creative acceptance of realistic limitations in a problem situation.
5. Avoid equating divergency with mental illness and delinquency.
6. Modify the misplaced emphasis that is placed on sex-roles.
7. Help highly creative children become less objectionable.
8. Develop school pride in creative achievement.
9. Reduce the isolation of highly creative children.
10. Provide sponsors or patrons for certain highly creative children.
11. Develop values and purpose in the creative child.

In a review of his twenty-two year research into the effect of teachers on the creative achievement of students, Torrance found that creative adults most frequently remembered:

> being made to feel comfortable with their creativity and feeling of uniqueness, being given activities that provided practice in creative skills, sharing the joys of creative attainments, [teachers] providing experiences that enlarged and enriched future career images, and being acknowledged for making creative contributions (1981).

In line with these findings, consider what Anderson (1965) called the "Personally Open System" of education. Such a system is stimulating and accepting of the uniqueness in individuals. In the school setting this approach can be facilitated by utilizing, among other things, seminars, class discussion, term papers, student projects, or any means that allows the student a choice of topic and its development. According to Anderson, such methods permit and stimulate originality, experimentation, initiative and offer a promising environment for the development of creativity.

In discussing the nurturance of creativity in children one should keep in mind Smith's insight:

> It is important to understand that creativity is akin to love: the capacity for it is present in all people at birth. The environment into which it is placed determines to a great degree whether or not it develops to its fullest potential (Smith, 1966: 6-7).

The method of creative-divergent thinking training that was used in the present research, New Directions in Creativity, Mark 1 (Renzulli, 1973), was based to a large degree on the research studies of both Guilford and Torrance. This approach is explained in Chapter 3.

Intelligence and Creative-Divergent Thinking

As was mentioned in Chapter 1, a possible reason for the limited amount of research into the relationship between creative-divergent thinking and moral reasoning may have to do with the investigations of intelligence and moral reasoning. Since intelligence and creative-divergent thinking are sometimes held to be inseparable, the studies that have been conducted concerning intelligence and moral reasoning may appear to make studies of the other relationship superfluous. In this section, three research studies involved with the relationship between intelligence and creativity are reviewed.

Getzels and Jackson (1962) studied two groups of gifted students: those in the top twenty percent of intelligence, but below the top twenty percent in creativity, and those in the top twenty percent of creativity, but below the top twenty percent in intelligence. The fifty-four students who made up the two groups were drawn from a group of four hundred gifted students. Intelligence was based primarily on the Stanford-Binet Scale while creativity was based on five measures of divergent thinking.

The researchers determined that, in fact, creativity and intelligence were separable phenomena. Differences were found between the two groups of students in the areas of achievement motivation, teacher perception, career aspirations, fantasy, and values. Getzels and Jackson concluded that differences did exist between the highly creative and the highly intelligent student.

In another study of the relationship between intelligence and creativity, Wallach and Kogan (1965) chose to limit their definition of creativity to the areas of fluency and originality of ideas and to a playful and permissive attitude toward tasks on the part of the subjects, one hundred and fifty-one fifth grade students from suburban New England. They found that their ten measures of creativity had a rather low correlation with each other (.4) but had an even lower correlation (.1) with measures of intelligence. They concluded that there appeared to be little or no relationship between number and uniqueness of ideas on the one hand and intelligence on the other. The conclusion reached by Wallach and Kogan was the same as that of Getzels and Jackson: creativity and intelligence were separable.

Wallach and Wing (1969) studied creativity and intelligence in five hundred college freshmen. Intelligence was defined as Scholastic Aptitude Test scores (mean verbal 616, mean math 644) while creativity was measured by tests of ideational fluency and uniqueness. Correlations between intelligence and ideational fluency were low, ranging from -.02 to -.07. Correlations between intelligence and uniqueness of ideas were also low, ranging from .03 to .05. None of these correlations were significantly different from zero. This study also supported making a distinction between intelligence and creativity.

Certainly a relationship exists between intelligence and creative-divergent thinking. One cannot create without at least some appreciable amount of intelligence, nor can one utilize intelligence fully without some creative capacity. The research seems to show that a close relationship exists between creativity and intelligence in the mid-range of

intellectual ability but that as intelligence increases beyond the mid-range the relationship weakens (Renzulli, 1978).

Intelligence and Moral Reasoning

A number of researchers in recent years have investigated the relationship between intelligence and moral reasoning; the results of this research have been mixed. Whiteman and Kasier, in a study of the moral judgments of seven through twelve year old children, found that the research data "indicated clearly that maturity of moral judgment is a function of increases in mental age rather than of advances in chronological age alone" (1964: 847).

A decade later Arbuthnot, based on his reading of the existing literature, hypothesized that the maturity of children's moral judgments would be significantly correlated with various tests of analytic and abstract reasoning. To test his hypothesis, Arbuthnot chose his subjects from lower middle-class junior and senior high school students. Utilizing several intelligence measures, such as the California Test of Mental Maturity and the Otis and Lorge-Thorndike Scales, he found not very high correlations ranging from .34 to .55 between intelligence and moral judgments based on Kohlberg's moral dilemmas. Arbuthnot felt that this showed a "consistent pattern of small to moderate correlations . . . " (Arbuthnot, 1973: 945), but correlations nonetheless.

In a recent study of the moral development of nine to fifteen year old gifted children, Karnes and Brown (1981) used Stanford-Binet and WISC-R scores in comparison to moral development scores derived from Rest's Defining Issues Test (1972) which is based on Kohlberg's stages.

A relatively strong correlation of .7 was found between intelligence and moral development.

However, other investigators have found the relationship between intelligence and moral reasoning less convincing. Hoffman's (1977) subjects consisted of seven and eight year old and eleven and twelve year old middle-class Jewish children. Administering four Piaget-based moral tasks he found little correlation with Stanford-Binet scores. Hoffman concluded that age was a more powerful factor than intelligence in the development of moral reasoning.

A recent investigation by Sager (1983) attempted to examine the relationship between academic giftedness and the development of moral reasoning. According to the researcher, there was no overall association between high intelligence and the development of moral reasoning in her study population of third and fourth grade students.

Bull (1969) reported on a lengthy study in which it was concluded that, among seven to seventeen year old British children, intelligence itself did not assure mature levels of insight or action with regard to moral issues.

Colby, Kohlberg, Gibbs, and Lieberman (1983) in their report of a twenty year study of moral development recorded rather limited correlations between moral maturity scores and I.Q. of from .17 to .27 in childhood and adolescence. Beyond the age of twenty-four, however, correlations became somewhat stronger ranging from .37 to .60. Perhaps it is the interaction of intelligence and experience which accounts for this increased relationship.

The ambivalent nature of the research findings was expressed in an otherwise carefully written book by Arbuthnot and Faust (1981). At one point they stated that "the evidence is clear that moral judgment maturity scores are related to intelligence" (p. 86) yet later they spoke of a "moderate correlation" between these variables (p. 113).

The general belief is that intelligence does have some association with level of moral reasoning but the degree of this relationship continues to be debated. In Kohlberg's opinion, intelligence is a necessary but not sufficient explanation of high moral reasoning (Kohlberg in Lickona, 1976).

Creative-Divergent Thinking and Moral Reasoning

Several correlational studies of creativity and moral reasoning have been conducted during the past decade. In addition, one research study looked into the effect of creative-divergent thinking training on moral reasoning ability.

In a study of one hundred and forty-six female college sophomores, Doherty and Corsini (1976) hypothesized a relationship between level of creativity and level of moral reasoning. They used measures of fluency and uniqueness of thinking to gauge level of creativity and four of Kohlberg's dilemmas to determine level of moral reasoning. Their findings indicated that creativity scores had a "significant positive association" with moral maturity scores ($r = .39$, $p < .001$). Doherty and Corsini also saw evidence of a threshold effect of creativity on moral reasoning. Below the median creativity level, creativity had a zero-order correlation with moral maturity ($r = .05$). At the higher level

of creative thinking, the correlation was both positive and significant ($r = .48$, $p < .001$). Although the reported correlations are positive they are not particularly strong. These researchers felt that for high creatives "there seems to be a qualitative jump in moral problem solving ability" (Doherty and Corsini, 1976: 282).

A Canadian researcher, Tan-Willman, conducted two studies and found somewhat conflicting results. In a 1980 study of the effect of creativity training on moral reasoning in teacher education students, she found a positive relationship. One hundred and nine prospective teachers with a median age of twenty-three years were exposed to various aspects of creativity training during the course of an educational psychology class. Pretesting and post-testing of creativity were based on Torrance's "Unusual Uses Test" and "Ask-and-Guess Test" and resulted in separate and combined scores for fluency, flexibility, and originality. Rest's Defining Issues Test was used to measure moral reasoning level. Correlations between the various creativity scores and moral reasoning level ranged from .24 to .41. Tan-Willman stated that ". . . it would appear that training for creative thinking is likely to influence moral reasoning and possibly vice versa" (Tan-Willman, 1980: 262). Although the results of this experiment indicated a positive relationship between creativity and moral reasoning, the correlations were not very high.

In 1981 Tan-Willman approached her research from a slightly different angle by investigating creative thinking and moral reasoning in academically gifted secondary school students. The verbal form of the Torrance Tests of Creative Thinking was used to measure fluency,

flexibility, and originality. Rest's Defining Issues Test was used to measure level of moral reasoning. One hundred and fifteen male and female, middle and upper middle class students, sixteen and seventeen years of age, at the University of Toronto Schools were the subjects of the investigation. In this correlational study, both the male and female students superseded the norms for college and graduate students on the creativity measure. However, their moral reasoning appeared to be "underdeveloped" when viewed in relation to their academic ability, intelligence, creativity, and social status. They were found to be functioning predominantly at the conventional level of moral reasoning.

Wragg (1981) reported that the relationship between dimensions of moral character and creativity appeared to be selective. In a study of college-age subjects, he found that the divergent thinking areas of flexibility and originality appeared to be negatively correlated with ethical values related to the common good but positively correlated with ethical values related to one's autonomous conscience. Wragg felt that creativity did appear to be related to dimensions of moral maturity.

Other researchers have not been supportive of the relationship between creative-divergent thinking and moral reasoning. Makaremi (1982) found no significant relationship between moral judgment level and creativity as expressed in measures of fluency, flexibility, and originality. The subjects of his study were one hundred and thirty-nine male and female college students with a mean age of 20.4 years who were administered the Torrance Tests of Creative Thinking, verbal form, and Rest's Defining Issues Test. Makaremi found only limited

correlations of .04, .17, and .11 between flexibility, fluency, and originality, respectively, and moral judgment (Makaremi, 1982: 67).

In concluding this section it is worthwhile to consider the thoughts of Getzels and Jackson with regard to the parallels between the creative individual and the moral individual:

> The highly moral individual seems to share with the highly creative individual the general posture of the outsider, the rejected and rejecting spectator as against the welcome and committed participant. . . . Both seem to operate on the fringe rather than at the center of fashionable activity. Both seem to have repudiated -- either by choice or by force -- certain of our most fashionable cultural norms, especially the superficial aspects of success and popularity. At least in this sense, both groups stand in opposition to the expected and the immediately approved (Getzels and Jackson, 1962: 158).

Summary

The concept of moral reasoning has been considered from the viewpoints of three individuals: John Dewey, Jean Piaget, and Lawrence Kohlberg. It was Dewey's opinion that the development of moral reasoning was a major aim of education and a major responsibility of the school. Piaget's pioneering empirical study of children's moral reasoning set the stage for further research in the area of moral development. In more recent work, Kohlberg and his associates have consolidated and expanded the findings of Dewey and Piaget. The results of a recent longitudinal study of moral development supported earlier findings that moral reasoning passes through invariant, hierarchical stages (Colby, et al., 1983).

Creative-divergent thinking was viewed as both a thinking process and as an aggregate of personality traits. Methods of identifying

creative potential in children, such as check-lists and standardized tests, were described. Ways of nurturing creative-divergent thinking in the classroom were also discussed.

Three investigations into the relationship between intelligence and creative-divergent thinking were reviewed. In each of these studies it was concluded that creativity and intelligence were separable phenomena.

Other research was also discussed: studies of the relationship between intelligence and moral reasoning and studies of the relationship between creativity and moral reasoning. These correlational studies, though usually indicating some relationship, provided only a limited understanding of those relationships.

It was the purpose of the investigator in the present research to determine in an experimental setting the effect of creative-divergent thinking training on the creative-divergent thinking ability and level of moral reasoning in middle-school children.

CHAPTER 3

PROCEDURES

Introduction

In a review of the literature, very little information was revealed with regard to the relationship between creative-divergent thinking and moral reasoning. Among the few studies that have been conducted, all but one were correlational in design and the findings were contradictory. The present study was designed to determine, through experimental investigation, the relationship between training in creative-divergent thinking and the moral reasoning ability of sixth grade students.

In this chapter the procedures which were followed during the investigation are presented. Included is a description of the setting, selection of subjects, description of the treatment, methods of data collection, hypotheses, data organization and analysis, management of variables, precautions for accuracy, and a summary.

The Setting

For the purpose of this study, the population consisted of a total of forty-six students in two self-contained sixth grade classes from School District #44, Belgrade, Montana. Belgrade Middle School was chosen as the site for this study because it had neither a program for creative-divergent thinking nor a talented and gifted program which

might have been a source of such training. In addition, there were no special provisions for training in moral reasoning in the school system. Most importantly, both the middle school administration and faculty were receptive to innovations in educational procedures; teachers and administrators consented to assist in selecting treatment and non-treatment groups for the purpose of testing the effect of creative-divergent thinking training.

The personnel of School District #44 serve the town of Belgrade and its surrounding rural area. Belgrade is a small but growing town that functions primarily as a supply center for farms and ranches in the area. It has grown rapidly over the past fifteen years, from 1,300 residents in 1970 to 2,342 residents in 1984 (Thorsen, Personal Interview, 1984). Many of Belgrade's residents work in Bozeman, the state's sixth largest city, ten miles away.

Selection of Subjects

The student population of Belgrade schools has increased from 679 during the 1970/71 school year to 1,376 in 1984/85. The district currently consists of two elementary buildings serving 597 children in grades K-4, a middle school serving 422 children in grades 5-8, and a high school serving 357 students (Bottomly, Personal Interview, 1984).

The subjects for this study were all of the students in two self-contained sixth grade classes at the Belgrade Middle School. The students were assigned to their classes by their fifth grade teachers and principal during the summer of 1984. Factors which were taken into account for these assignments included the separation of troublemakers

as well as the congruence of personality among and between students and sixth grade teachers. Academic ability and disability were not factors in class assignment. The treatment group consisted of thirteen males and eleven females, while the non-treatment group consisted of thirteen males and nine females.

The Treatment

The creative-divergent thinking training used in this research utilized materials from New Directions in Creativity, Mark 1 (Renzulli, 1973). The training involved twenty-four half-hour lessons and take-home activities aimed at increasing the student's creative-divergent thinking ability.

New Directions in Creativity was first published in 1973 and was designed to help develop the creative-divergent thinking abilities of primary and middle-school students. The program consists of five reproducible manuals: Mark A and B for the early primary grades and Mark 1, 2, and 3 for grades four through eight. The treatment for this study included the twenty-four lessons contained in Mark 1, which Renzulli considers appropriate for grades four through eight (Renzulli, 1973: 5).

The training program was intended to enhance the creative-divergent thinking ability of students in elementary school. Renzulli defined divergent thinking as "breaking away from conventional restrictions on thinking and letting one's mind flow across the broad range of ideas and possible solutions to a problem" (Renzulli, 1973). In the program,

attempts were made to develop four specific areas of divergent thinking: fluency, flexibility, elaboration, and originality.

Mark 1 of New Directions in Creativity consisted of fifteen semantic exercises, four symbolic exercises, and five figural exercises. Renzulli developed these exercises based on Guilford's Structure of the Intellect approach to defining intelligence.

Semantic training activities consisted of verbal thinking and verbal communications skills. For example, in Activity 1, "Thinking About Things," the student thinks of and lists all of the things he can that are made of metal. In Activity 15, "Comparisons," the student develops unique and colorful completions to sentences such as, "The ticking of the clock seemed as loud as _____."

Symbolic exercises refer to signs that have no inherent meaning: letters, objects, figures, and shapes. An example of a symbolic exercise is Activity 2, "Fun With Words." This activity consists of thinking of words that begin or end with certain letters, or begin and end with certain letters: w____, ____m, g____l.

Figural exercises revolved around developing ability with images and their manipulation. In Activity 12, "Figural Completion," for example, the student makes drawings of as many real things as possible from a group of nine ovals-within-rectangles.

Renzulli suggested several strategies that could be used in the classroom in order to help develop creative-divergent thinking:

1. Make it clear to the students that there are no "right" answers to the exercises.
2. Use "brainstorming" techniques so that many responses are developed.

3. Do not evaluate responses. Do encourage numerous and unique responses.

4. At times utilize game-like group competition.

5. Encourage cooperation and working together on some of the activities.

6. Establish a warm and open atmosphere in which students feel trust and are willing to explore.

7. Allow and encourage laughter and humor, playfulness and spontaneity.

8. The adult should participate in the activities by contributing his own unusual responses.

9. Gently probe for additional responses (Renzulli, 1973: 7-12).

New Directions in Creativity is based on the belief that all children are potentially creative and that training in divergent thinking will increase the likelihood that they will think creatively.

The investigator was experienced in using the New Directions in Creativity program. In a prior teaching position the investigator found this approach to be both worthwhile and interesting for students. In that situation activities from the program were used in thirty minute segments, three times a week for twelve weeks. Post-test results showed evidence of increases in the areas of fluency, flexibility, and originality.

For this investigation, thirty minute lessons were conducted three times a week over a ten week period beginning March 11th and ending May 17th, 1985. Correspondence with Renzulli, the developer of the program, indicated that such a training schedule should have shown statistically significant increases in creative-divergent thinking in the treatment group (Personal Communication, 1984).

Methods of Collecting Data

In this research, the investigator was concerned with the effect of training in creative-divergent thinking on the creative-divergent thinking and moral reasoning ability of children. Data were gathered using a pretest and post-test on two instruments: the Sociomoral Reflection Measure (Gibbs and Widaman, 1982) and the Torrance Tests of Creative Thinking (Torrance, 1976). Pretesting took place during the week of February 11th, 1985, post-testing occurred during the week of May 20th, 1985. Both instruments were designed specifically for group administration and were administered by the investigator. Scoring of the instruments was performed by two individuals familiar with the scoring procedures, in order to help insure the reliability of the scores.

The Sociomoral Reflection Measure

The Sociomoral Reflection Measure, developed by John Gibbs and Keith Widaman at Ohio State University, was based on the work of Lawrence Kohlberg and his associates at the Center for Moral Education at Harvard University. This instrument was a direct outgrowth of Kohlberg's Moral Judgment Interview (Kohlberg and Colby, 1983) which has been in use for the past thirty years and is used only in a one-on-one interview situation. Gibbs and Widaman felt that after analysis of Moral Judgment Interview responses over so many years, there were few new or unique responses remaining to be found. It was their opinion that it would be more appropriate to use group-administerable

instruments to gather moral reasoning data on large numbers of subjects (Gibbs, Widaman and Colby, 1982).

The Sociomoral Reflection Measure consisted of two forms. Form A was used as the pretest and Form B as the post-test. Each form contained two moral dilemmas and a series of questions relating to them. The subjects responded in writing and each form required approximately one hour to complete. Minor adjustments to these forms were made by the investigator to facilitate their use with sixth grade students. In consultation with one of the authors of the instrument, it was decided to substitute the term "rare disease" for the word "cancer" in one dilemma and to allow for more writing room on the questionnaire itself (Widaman, Personal Communication, 2/2/85).

The first dilemma of each form brought into conflict the following five moral norms: affiliation (marriage and friendship), life (saving a life/continuing to live), law (and property), legal justice, and conscience. The second dilemma of each form brought into conflict the three moral norms of family affiliation, contract, and property.

Use of the Sociomoral Reflection Measure yielded scores reflecting the subject's "modal stage" and also his "sociomoral reflection maturity score." The modal stage was that stage in Kohlberg's sequence, one through four, which the subject most often used in justifying his responses to the dilemmas. The instrument gauged only the first four of Kohlberg's six stages, since its developers felt that stages five and six could only be properly measured in an individual interview. In any event, stage four is seldom reached until late adolescence which was beyond the age range of the subjects of this study.

The "sociomoral reflection maturity score" was an attempt at greater differentiation of moral reasoning and was based on a scale of from 100 to 400 points. A score of 200 would have indicated a "pure" stage two level of moral reasoning, while a score of 350 would have indicated a transitional stage half way between stages three and four (Gibbs, Arnold, and Burkhart, 1984). Widaman, a co-author of the instrument, stated that the sociomoral reflection maturity score was treated as interval level data for purposes of statistical analysis; it was considered analogous to intelligence test scores which are also treated as interval level data in most studies (Personal Communication, 2/2/85).

Data regarding validity and reliability indicated that the Sociomoral Reflection Measure was high on both criteria. The authors of the instrument stated that it possessed "substantial concurrent validity with the Moral Judgment Interview;" the correlation between the two instruments is .85 (Gibbs, Widaman, Colby, 1982: 905). The Moral Judgment Interview was developed by Kohlberg and his associates as an individual interview method and is considered the standard measuring instrument in the field of moral reasoning. Construct validity of the Sociomoral Reflection Measure was established using data on age, gender, and socio-economic status.

Interrater reliability among self-trained raters on the Sociomoral Reflection Measure ranged from .51 to .91 with an average of .80. Interrater reliability between the authors of the instrument and self-trained raters ranged from .67 to .94, with an average of .75 (Gibbs, Widaman, and Colby, 1982: 903). According to the authors of the

instrument "test-retest and parallel form reliabilities were generally high, averaging in the .70s" (Gibbs, Widaman, and Colby, 1982: 905). Although a reliability of this magnitude accounts for only fifty percent of the variance, it is high for this type of measure. The Sociomoral Reflection Measure was constructed using samples from eight to sixty-six years of age (Gibbs, Widaman, and Colby, 1982: 896).

The Sociomoral Reflection Measure, like the Moral Judgment Interview, assesses reflective or justificatory moral reasoning. The terminology "sociomoral reflection" is used to indicate an emphasis on social interactions as the basis for defining the morally right or good. "Reflection" refers to the need for thoughtful consideration of the reasons behind decisions (Gibbs, Widaman, and Colby, 1982: 897).

An example of a dilemma on Form A of the Sociomoral Reflection Measure concerns a seriously ill woman, her husband, and a druggist who has developed a cure for her deadly disease. The basis of the dilemma involved whether the husband should steal the curative drug, since he was poor and the druggist had greatly inflated the price of the drug. Ten multiple choice questions elicited the subject's judgment of what should be done within certain given parameters: the husband did not love the wife, the dying person was a friend or stranger, the importance of obeying the law, punishment for following one's conscience, and so on. These were followed by ten open-ended questions used in an attempt to determine the reasoning behind the choices.

Scoring consisted of comparing responses to specific questionnaire items to model responses in the reference manual. Justificatory responses elicited by the questionnaire were matched to the closest

"criterion" justification in the appropriate section of the manual. Criterion justifications are essential forms of stage-significant socio-moral reflection. These criterion justifications were based on over thirty years of research and responses on Kohlberg's Moral Judgment Interview. Each norm measured on the questionnaire had a corresponding section in the scoring manual.

The Torrance Tests of Creative Thinking

The Torrance Tests of Creative Thinking (Torrance, 1974) were developed out of the Minnesota Studies of Creative Behavior which were begun by E. P. Torrance at the University of Minnesota in 1958; the tests were first published in 1966. The popularity of this instrument can be noted in the fact that it ranks among the top twenty most reviewed instruments in the Mental Measurements Yearbook (Buros, 1975).

The Torrance Tests of Creative Thinking consisted of a figural test and a verbal test, each in two forms. Both the figural and verbal tests may be group-administered from elementary school through graduate school (Torrance, 1974).

The figural test, called "Thinking Creatively With Pictures," was composed of three activities: completing objects or figures when presented with a given shape; adding lines to incomplete figures; and adding lines to sets of circles or parallel lines in order to make pictures or objects.

The verbal test, called "Thinking Cratively With Words," included seven activities: asking questions in response to a picture; guessing causes and consequences with reference to a stimulus picture; suggesting

improvements for a product; listing unusual uses and asking questions about an item; and listing consequences when faced with an unlikely situation.

The Torrance Tests of Creative Thinking yielded results that indicated the subject's ability in the divergent thinking areas of fluency, flexibility, originality, and elaboration. Testing time was approximately thirty minutes for the figural form and forty-five minutes for the verbal form. The Torrance Tests were interpreted using a manual that had been developed for self-training. All test protocols were scored by two raters.

Two types of scores were derived from the Torrance Tests for each of the seven subtests, a raw score and a T-score. Torrance suggested transforming the raw scores into T-scores so that comparisons could be made. The mean T-score was fifty, and ten points plus or minus constituted a standard deviation. The two tables found in the Appendix, adapted from Torrance (1974: 54-55), indicate the range of raw scores and the normed T-scores for fifth grade and college students on Form A of the Torrance Tests.

Data with regard to the validity and reliability of this instrument have been accumulating for many years. A good deal of information was contained in the Norms Technical Manual (Torrance, 1974) which accompanied the test.

Coefficients of predictive validity ranged from .46 to .62, while construct validity coefficients ranged from .88 to .96 for fluency scores. The Pearson product-moment coefficients of correlation between scores on Forms A and B for fourth, fifth, and sixth grade students

were .93 for verbal fluency, .84 for verbal flexibility, .88 for verbal originality, .71 for figural fluency, .73 for figural flexibility, .85 for figural originality, and .83 for figural elaboration. Coefficients of correlation between experienced scorers and untrained scorers ranged from .86 to .99, and teachers without any training at all, who simply followed the scoring manual, showed mean reliability coefficients ranging from .88 to .99 (Torrance, 1974).

There exists a good deal of controversy with regard to the measurement of creative ability. The Torrance Tests of Creative Thinking were used in an attempt to measure four aspects of creative-divergent thinking ability: fluency, flexibility, originality, and elaboration. Torrance does not claim that this is a measure of some general factor of creativity if, in fact, such a thing exists.

The Torrance Tests of Creative Thinking have been used in over one thousand published studies. The tests have been translated into more than thirty languages, and have been standardized for research and classrooom use in France, Italy, Czechoslovakia, and Taiwan. During the 1981/82 school year, over 150,000 children and adults throughout the world were administered these tests (Sato, 1984). The wide use of these tests has made them the standard of comparison for other tests of creative-divergent thinking. Thus, the use of the Torrance Tests of Creative Thinking was felt to be appropriate for use in this study.

Statement of Hypotheses

The twenty-four null hypotheses contained in this study deal with three basic issues: the effect of creative-divergent thinking training

on creative-divergent thinking ability, the effect of the training on moral reasoning level, and the generalizability of the effects. The hypotheses are organized around the statistical concepts of treatment effect and interaction.

The following null hypotheses were tested for significance at the .05 level.

Effect of Training on Creative-Divergent Thinking Ability

1. There is no treatment effect on verbal fluency, from pretest to post-test.
2. There is no treatment effect on verbal flexibility, from pre-test to post-test.
3. There is no treatment effect on verbal originality, from pre-test to post-test.
4. There is no treatment effect on figural fluency, from pretest to post-test.
5. There is no treatment effect on figural flexibility, from pre-test to post-test.
6. There is no treatment effect on figural originality, from pretest to post-test.
7. There is no treatment effect on figural elaboration, from pretest to post-test.
8. There is no treatment effect on verbal fluency when the treatment group is compared to the non-treatment group at post-testing.
9. There is no treatment effect on verbal flexibility when the treatment group is compared to the non-treatment group at post-testing.
10. There is no treatment effect on verbal originality when the treatment group is compared to the non-treatment group at post-testing.
11. There is no treatment effect on figural fluency when the treat-group is compared to the non-treatment group at post-testing.

12. There is no treatment effect on figural flexibility when the treatment group is compared to the non-treatment group at post-testing.

13. There is no treatment effect on figural originality when the treatment group is compared to the non-treatment group at post-testing.

14. There is no treatment effect on figural elaboration when the treatment group is compared to the non-treatment group at post-testing.

15. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on verbal fluency scores.

16. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on verbal flexibility scores.

17. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on verbal originality scores.

18. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on figural fluency scores.

19. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on figural flexibility scores.

20. There is no intereaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on figural originality scores.

21. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on figural elaboration scores.

Effect of Training on Moral Reasoning Ability

22. There is no treatment effect on moral reasoning ability from pretest to post-test.

23. There is no treatment effect on moral reasoning ability when the treatment group is compared to the non-treatment group at post-testing.

24. There is no interaction effect between testing and treatment groups when the two way analysis of pretest to post-test and treatment to non-treatment group is made on moral reasoning scores.

The above hypotheses were presented in the null form in order to facilitate statistical interpretation. It was the expectation of the investigator that there would be a positive impact of the experimental treatment on both creative-divergent thinking ability and level of moral reasoning.

Organization and Analysis of Data

The data are organized in relation to two main areas of investigation: the effect of creative-divergent thinking training on creative-divergent thinking ability and the effect of creative-divergent thinking training on level of moral reasoning. A total of twenty-four null hypotheses was tested for either treatment effect or interaction effect.

The data which consist of pretest and post-test results of the Sociomoral Reflection Measure and the Torrance Tests of Creative Thinking were analyzed using the Student's t-test and a repeated measures MANOVA.

In order to determine if any observed treatment effects were consistent for subgroupings, scores were tested for interaction using the

MANOVA statistical procedure. Because the scores which were used in these analyses were derived from pretests and post-tests of the same subjects, it was necessary to use the repeated measures MANOVA. The repeated measures strategy took into account the fact that these mean scores were not independent of one another.

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSSX User's Guide, 1983) as implemented on the Honeywell Level 66 Mainframe using the CP6 operating system at Montana State University.

Management of Variables

The total population of two existing sixth grade classes was the subject of this investigation. Since the school year had begun the students could not be assigned to their classes in a random fashion and a true experimental research design could not be used. The investigator thus chose to utilize a quasi-experimental design. The design chosen, the non-equivalent control group design, is the most widely used in the field of educational research (Borg and Gall, 1979: 559) and is recommended by Campbell and Stanley (1963).

The nonequivalent control group design is used with pre-existing groups that have been formed on a basis other than random assignment. Both groups are pretested, a treatment is administered to one group and withheld from the other, and both groups are post-tested.

As in all research designs, threats exist to the internal and external validity of this design. Campbell and Stanley (1963: 47-50) have discussed these threats in relation to the nonequivalent control

group design. By minimizing these threats, as described below, the investigator attempted to approach some certainty in assessing the effectiveness of the experimental treatment.

Campbell and Stanley noted that by comparing the pretest scores of the two groups, the effect of bias in the selection process could be ruled out as a threat to internal validity. Since the groups demonstrated similar performance on the pretest, selection was ruled out as an explanation of differences in post-test performance.

Both the effects of pretesting and maturation on the experiment can be ruled out using this design because these factors affect both groups equally. A similar argument is made for minimizing the effects of history, instrumentation, and mortality.

Since the students at Belgrade Middle School were not placed in classes according to academic criteria, and were of close chronological age, the effect of statistical regression as a threat to internal validity was reduced. Extremely high or low achievement test scores were not a basis for class assignment and, thus, the treatment and non-treatment groups should have been and were at similar points in creative-divergent thinking and moral reasoning as determined by the pretests that were administered (see Table 2).

The threat of the interaction of selection and maturation to the internal validity of this design cannot always be controlled. However, due to the traditional age placement of students, this threat seems to have been diminished.

An attempt was made to minimize the effect of the interaction of selection and history. This was done by administering all tests at the

same time of day and by controlling the length of time of the treatment.

The threat to the external validity of the nonequivalent control group design of the interaction of testing and an unknown variable presented a problem. Pretesting may have sensitized the groups to the issue under investigation and thus affected post-test scores. However, the use of alternate forms for both tests was meant to reduce this threat.

The reactive effect, subjects knowing that they are part of an experiment, seemed to be better controlled by this design than by a true experimental design where subjects are pulled out of existing classes and placed in experimental groups.

Although experiments that involve human subjects are open to a variety of threats to internal and external validity, the nonequivalent control group design does an acceptable job in minimizing these threats (Campbell and Stanley, 1963).

Because it was not possible to randomly assign the subjects of this research into groups, a quasi-experimental design was used. Equivalency of the two groups was established by means of analyzing the results of the pretests of moral reasoning and creative-divergent thinking. Pretesting was administered during the early part of February 1985. The Student's t-test was used to compare the sociomoral reflection maturity scores of the two groups as derived from the Sociomoral Reflection Measure. The Student's t-test was also used to compare the raw scores of both groups on the seven subtests of the Torrance Tests of Creative Thinking. A null hypothesis which stated, "There is no

difference between the groups," was tested. The results indicated that the two groups were not significantly different in moral reasoning or creative-divergent thinking.

Precautions Taken for Accuracy

All test protocols were hand-scored by the investigator and all computations were performed on a calculator. In order to insure the accuracy of the results all protocols were checked by a second scorer. The Honeywell Level 66 Mainframe Computer at Montana State University was utilized for statistical calculations derived from the Statistical Package for the Social Sciences (SPSSX User's Guide, 1983).

Summary

This study was designed primarily to determine if training in creative-divergent thinking had any effect on children's growth in moral reasoning. The setting of the study was a small but growing community of nearly 2,500 residents which is the center of a farming and ranching area in southwestern Montana.

The subjects of the study were forty-six sixth grade students in two self-contained classrooms. In order to enhance creative-divergent thinking skills, the treatment groups was trained by the investigator over a ten week period during the spring of 1985 using Renzulli's New Directions in Creativity, Mark 1 (1973).

Data collected consisted of pretests and post-tests for the treatment and non-treatment groups on the Sociomoral Reflection Measure and the Torrance Tests of Creative Thinking. Both tests were designed for

group administration and each had an alternate form. Test administration was performed by the investigator.

The Sociomoral Reflection Measure was based on the Moral Judgment Interview developed by Kohlberg and his associates over the past thirty years. The Sociomoral Reflection Measure yielded modal stage scores as well as a more differentiated sociomoral reflection maturity score.

The Torrance Tests of Creative Thinking were an outgrowth of nearly thirty years of study of creative thinking by E. P. Torrance. The test yielded figural and verbal creativity scores in the divergent thinking areas of fluency, flexibility, originality, and elaboration.

Pretest and post-test scores on the measures of moral reasoning and creative-divergent thinking mentioned above were the bases for data analyses and organization. The hypotheses tested involved the effect of creative-divergent thinking training on level of creative-divergent thinking ability and moral reasoning ability in middle-school children.

The quasi-experimental research design known as the nonequivalent control group design was used in this study. This design is often used in educational research when random assignment of subjects is not possible. The design involved pretesting of groups, exposing only the treatment group to the treatment, and post-testing both groups. Ways that this design is used to control threats to its validity were discussed, as were the precautions taken for accuracy.

CHAPTER 4

STATISTICAL ANALYSIS OF DATA

Introduction

This experimental study was conducted to determine if training in creative-divergent thinking had an effect upon the creative-divergent thinking ability of sixth grade students and, if this were the case, whether this training would also have a concomitant effect on their moral reasoning ability. In order to test this idea, two sixth grade classes were chosen to serve as treatment and non-treatment groups within a nonequivalent control group design.

Prior to the beginning of training in creative-divergent thinking, the two groups were compared for equivalency on demographic data and on pretests of moral reasoning and creative-divergent thinking using the Sociomoral Reflection Measure (Gibbs and Widaman, 1982) and the Torrance Tests of Creative Thinking, Verbal and Figural Forms (Torrance, 1974). At the end of the ten week training period the two groups were post-tested, using alternate forms of these instruments, in order to determine if the training had produced any changes in students' scores.

In this chapter are presented the statistical data and analyses to show how equivalency of groups was established, a discussion of change scores of the treatment and non-treatment groups, and the results of the analyses of data to test the twenty-four hypotheses presented in Chapter 3. Twenty-one of these hypotheses dealt with the effect of the

training procedure on creative-divergent thinking ability and three hypotheses were concerned with the effect of training on moral reasoning ability.

Establishment of Comparable Groups

In order to establish the equivalency of the treatment and the non-treatment groups, comparisons of demographic data as well as comparisons of pretest data were investigated. In Table 1 are demographic data and in Table 2 the results of the statistical analysis of the pretest comparison for the Torrance Tests of Creative Thinking (TTCT) and the Sociomoral Reflection Measure (SRM). For pretest data the .05 level of significance was chosen as the critical level and the Student's t-test was the statistical tool chosen for the comparison of group means.

Demographic Data

Forty-six students in two self-contained sixth grade classrooms were the subjects of the study. No attrition occurred during the course of the investigation. The average age and the gender membership of the two groups are listed in Table 1. No statistical comparisons were made but the two groups appear quite close with regard to these variables.

The information in Table 1 indicates that the number of males in each group was equivalent and that there were two more females in the treatment groups than in the non-treatment group. The treatment group was on the average slightly older than the non-treatment group (.2 years).

Table 1. Comparison of Demographic Data

	Treatment		Non-treatment	
	Number	Avg. Age	Number	Avg. Age
Male	13	12.2 yrs.	13	12.0 yrs.
Female	11	12.2 yrs.	9	12.0 yrs.
Total N	24		22	

Pretesting for Equivalency

Both the treatment and non-treatment groups were pretested during February 1985 on the Torrance Tests of Creative Thinking, Figural and Verbal Forms A and the Sociomoral Reflection Measure, Form A, in order to establish the equivalency of the groups on those variables which were under investigation. Table 2 presents the statistical information obtained from the pretesting of creative-divergent thinking ability and moral reasoning ability. The variables tested were designated as:

1. Torrance Tests of Creative Thinking

   VFLUE - verbal fluency

   VFLEX - verbal flexibility

   VORIG - verbal originality

   FFLUE - figural fluency

   FFLEX - figural flexibility

   FORIG - figural originality

   FELAB - figural elaboration

2. Sociomoral Reflection Measure

   SRMS - Sociomoral reflection maturity score

Table 2. T-Test Comparisons of Pretest Mean Scores for Treatment and Non-Treatment Groups on TTCT and SRM

	Treatment Mean	Treatment S.D.	Non-treatment Mean	Non-treatment S.D.	t	P
VFLUE	64.50	27.39	64.41	31.35	.0149E-1	.9917
VFLEX	31.87	11.90	30.08	10.34	.5130	.6105
VORIG	30.42	16.93	28.59	13.32	.4039	.6882
	(N = 24)		(N = 22)			
FFLUE	24.74	7.02	26.68	7.37	- .905	.3704
FFLEX	18.91	5.27	20.09	6.66	- .658	.5135
FORIG	36.39	12.84	40.36	12.07	-1.068	.2914
FELAB	79.95	32.37	73.68	31.60	.8396	.4058
	(N = 23)		(N = 22)			
SRMS	201.08	31.12	209.57	31.35	- .910	.3701
	(N = 22)		(N = 21)			

Results in Table 2 indicate that no significant differences were found between the two groups as a result of the analyses of pretest scores. The groups were able to be viewed as not statistically different with regard to creative-divergent thinking ability and moral reasoning ability. Since the results of pretesting showed no significant difference between the treatment and non-treatment groups, a decision was made to advance the research project.

The pretest scores were later used for comparison purposes, in particular to compute group change scores from pretest to post-test. Change scores were calculated as the difference between an individual's pretest score on the particular subsection of the Torrance Tests, or the sociomoral reflection maturity score of the Sociomoral Reflection Measure, and the post-test score on an alternate form of the instrument. Mean change scores for each group were calculated and compared. In

some cases group scores did not increase so that change scores sometimes resulted in positive values and sometimes in negative values.

Intragroup Pretest to Post-Test Difference

As noted in the preceding section, pretesting of subjects was carried out in February 1985 using the Sociomoral Reflection Measure and the Torrance Tests of Creative Thinking. At the conclusion of the ten week training period, which consisted of thirty half-hour late afternoon lessons in creative-divergent thinking, both the treatment and non-treatment groups were again tested using alternate forms of the Sociomoral Reflection Measure and the Torrance Tests of Creative Thinking. The testing was conducted using the procedure described in Chapter 3. Post-tests were administered at the end of May 1985. Each group's mean pretest score was compared with its own mean post-test score for the various subsections of both test instruments. This comparison was made to determine if significant change had occurred in either creative-divergent thinking or moral reasoning by the end of the treatment period.

The information presented in Tables 3 through 5 shows the results of these tests. In each table data are provided on the number of students in each group, the pretest and post-test mean raw scores for each group, and the standard deviation for each test. In addition a mean difference between pretest and post-test scores with its standard deviation, the t-value, and a p-value are given. An asterisk indicates a value beyond the .05 level of significance.

Table 3. T-Test Comparisons of Pretest to Post-Test for Treatment and Non-Treatment Groups on Verbal Creative-Divergent Thinking (TTCT)

	Treatment		Non-Treatment	
	Pre (N = 24)	Post (N = 24)	Pre (N = 22)	Post (N = 21)
VFLUE				
Mean	64.50	80.04	63.04	83.04
S.D.	27.389	42.54	31.45	32.79
M.D.	15.54		20.0	
S.D.	36.17		22.84	
t	2.10		4.01	
p	0.46*		.001*	
VFLEX				
Mean	31.87	32.25	29.42	35.38
S.D.	11.90	13.68	9.95	12.82
M.D.	.37		5.95	
S.D.	11.78		10.40	
t	.16		2.62	
p	.877		0.16*	
VORIG				
Mean	30.41	37.45	28.00	41.42
S.D.	16.93	19.66	13.34	22.07
M.D.	7.04		13.42	
S.D.	15.66		18.46	
t	2.20		3.33	
p	.038*		.003*	

Pre = Pretest
Post = Post Test
M.D. = Mean Score Difference

* = Significant at .05

In Table 3 t-test comparisons of pretest to post-test for the treatment and non-treatment groups on verbal creative-divergent thinking are presented. The treatment group increased its pretest mean score for verbal fluency from 64.50 to 80.04 on the post-test. This resulted in a t-value of 2.10 which was significant. The non-treatment group increased its score from 63.04 to 83.04 which resulted in a t-value of 4.01 which was also significant.

Results in Table 3 indicate that the treatment group increased its mean score in verbal flexibility from 31.87 to 32.25 which was not a significant difference. The mean score of the non-treatment group increased from 29.42 to 35.38. This increase resulted in a t-value of 2.62 which was significant.

Results in Table 3 also indicate that the treatment group increased its mean score in verbal originality from 30.41 on the pretest to 37.45 on the post-test. This resulted in a t-value of 2.20 which was significant. The mean score of the non-treatment group increased from 28.00 to 41.42 which resulted in a t-value of 3.33 which was also significant.

The results presented in Table 3 indicate that the verbal creative-divergent thinking of both groups increased when pretest mean scores were compared to post-test mean scores. Both groups' mean scores increased significantly in verbal fluency and originality. In addition, the non-treatment group increased significantly in verbal flexibility.

In Table 4 t-test comparisons of pretest to post-test for treatment and non-treatment groups on figural creative-divergent thinking are presented. The treatment group's mean score for figural fluency decreased from 24.73 to 18.39. This produced a t-value of -3.25 which

was significant. The non-treatment group also decreased in this area. Its mean score dropped from 26.68 to 22.00. This decrease resulted in a t-value of -2.87 which was significant.

For figural flexibility the treatment group's pretest mean score of 18.91 decreased to a mean score of 15.26 on the post-test. This resulted in a t-value of -2.96 which was significant. The non-treatment group declined from 20.09 to 17.45. The resulting t-value of -1.62 was not significant.

For figural originality the treatment group decreased from a mean of 36.39 to a mean of 33.82. This decrease was not statistically significant. The non-treatment group's mean score decreased from 40.36 to 31.50. The resulting t-value of -3.21 was significant.

Finally, for figural elaboration, the treatment group's mean pretest score of 79.95 decreased to 77.56 on the post-test. This was not a significant change. The non-treatment group's mean score for figural elaboration increased from 73.68 to 77.81 but the change was not significant.

The results in Table 4 indicate that the figural creative-divergent thinking of both groups demonstrated significant decreases in figural fluency. In addition the treatment group decreased significantly in figural flexibility while the non-treatment group decreased significantly in figural originality. Neither group showed significant change in figural elaboration.

Table 4. T-Test Comparisons of Pretest to Post-Test for Treatment and Non-Treatment Groups on Figural Creative-Divergent Thinking (TTCT).

	Treatment		Non-Treatment	
	Pre (N = 23)	Post (N = 23)	Pre (N = 22)	Post (N = 22)
FFLUE				
Mean	24.73	18.38	26.68	22.00
S.D.	7.02	5.45	7.37	7.04
M.D.	- 6.34		- 4.68	
S.D.	9.36		7.66	
t	- 3.25		- 2.87	
p	.004*		.009*	
FFLEX				
Mean	18.91	15.26	20.09	17.45
S.D.	5.27	3.51	6.66	4.49
M.D.	- 3.65		- 2.63	
S.D.	5.91		7.65	
t	- 2.96		- 1.62	
p	.007*		.120	
FORIG				
Mean	36.39	33.82	40.36	31.50
S.D.	12.84	11.81	12.06	13.29
M.D.	- 2.56		- 8.86	
S.D.	17.27		12.95	
t	- .71		- 3.21	
p	.484		.004*	
FELAB				
Mean	79.95	77.56	73.68	77.81
S.D.	32.37	31.57	31.60	31.85
M.D.	- 2.39		4.13	
S.D.	29.57		30.92	
t	- .59		1.78	
p	.564		.090	

Pre = Pretest
Post = Post Test
M.D. = Mean Score Difference

* = Significant at .05

In Table 5 t-test comparisons of pretest to post-test for the treatment and non-treatment groups on sociomoral reasoning are presented. The sociomoral reasoning for the treatment group increased from a pretest mean score of 201.06 to 208.91 on the post test. This change was not statistically significant. The non-treatment group decreased in mean score from 209.57 on the pretest to 200.42 on the post-test. This change was not significant.

Table 5. T-Test Comparisons of Pretest to Post-Test for Treatment and Non-Treatment Groups on Sociomoral Reasoning Maturity Score (SRM).

	Treatment (N = 23)		Non-Treatment (N = 21)	
	Pre	Post	Pre	Post
SRMS				
Mean	201.08	208.91	209.57	200.42
S.D.	31.12	39.77	31.35	29.61
M.D.	7.82		- 9,14	
S.D.	40.76		27.98	
t	.92		- 1.50	
p	.367		.150	

Pre = Pretest
Post = Post Test
M.D. = Mean Score Difference

The results in Table 5 indicate that neither group demonstrated a significant change in moral reasoning as measured by the Sociomoral Reflection Measure.

Comparison of Groups' Pretest Means to Normed Means

Normed test means are provided for the Torrance Tests of Creative Thinking, Verbal and Figural Forms A. The following comparison is made

in order to provide information relating the study groups' scores to the established norms for sixth grade subjects. No statistical analysis was performed.

Table 6. Comparison of Study Groups' Means to Normed Means on TTCT Form A.

	Treatment		Non-Treatment		Normed	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
VFLUE	64.5	27.3	64.4	31.3	68.3	29.3
VFLEX	31.9	11.9	30.1	10.3	30.1	6.8
VORIG	30.4	16.9	28.6	13.3	36.7	21.0
FFLUE	24.7	7.0	26.7	7.4	20.2	6.7
FFLEX	18.9	5.3	20.1	6.7	15.8	4.9
FORIG	36.4	12.8	40.4	12.1	29.0	11.1
FELAB	79.9	32.4	73.7	31.6	75.8	32.6

As can be seen in Table 6 both the treatment and non-treatment groups somewhat exceeded the normed scores for sixth grade subjects for verbal flexibility, figural fluency, figural flexibility, and figural originality. For figural elaboration the treatment group was slightly above and the non-treatment group slightly below the normed scores. For verbal fluency and originality the normed group slightly exceeded the study groups.

Acceptance or Rejection of Hypotheses

In Chapter 3 twenty-four null hypotheses were formulated around three central concerns: the effect of creative-divergent thinking training on creative-divergent thinking ability, the effect of creative-divergent thinking training on moral reasoning ability, and the generalizability of these effects, if found, across subcategories of

creative-divergent thinking. The results of the statistical analysis of each hypothesis follows.

For clarity the following section is divided into two parts: hypotheses that deal with treatment effect and hypotheses that deal with interaction. For hypotheses one through fourteen, as well as hypotheses twenty-two and twenty-three, which are concerned with treatment effect, the Student's t-test was the statistical tool chosen. For hypotheses fifteen through twenty-one and hypothesis twenty-four, which deal with interaction, a repeated measures MANOVA was the statistical tool chosen because it allowed for taking into account that these mean scores were not independent of one another.

Hypotheses Dealing With Treatment Effect

Hypothesis 1

In Hypothesis 1 it was stated that there would be no treatment effect on verbal fluency from pretest to post-test. In Table 7 t-test comparisons of pretest to post-test for all subjects on verbal creative-divergent thinking are presented. The mean pretest score for all subjects increased from 63.82 to 81.44. This resulted in a t-value of 3.88 which was significant. Hypothesis 1 can be rejected. There was a treatment effect on verbal fluency favoring the post-test.

Hypothesis 2

In Hypothesis 2 it was stated that there would be no treatment effect on verbal flexibility from pretest to post-test. Results in Table 7 indicate that the mean pretest score for all subjects increased from 30.73 to 33.71. This resulted in a t-value of 1.75 which was not

significant. Hypothesis 2 cannot be rejected. There was no demonstrated treatment effect on verbal flexibility.

Hypothesis 3

In Hypothesis 3 it was stated that there would be no treatment effect on verbal originality from pretest to post-test. Results in Table 7 indicate that the mean pretest score for all subjects increased from 29.28 to 39.31. This resulted in a t-value of 3.92 which was significant. Hypothesis 3 can be rejected. There was a treatment effect on verbal originality.

Hypothesis 4

In Hypothesis 4 it was stated that there would be no treatment effect on figural fluency from pretest to post-test. In Table 8 t-test comparisons of pretest to post-test for all subjects on figural creative-divergent thinking are presented. The mean pretest score for all subjects decreased from 25.68 to 20.15. This resulted in a t-value of -4.36 which was significant. Hypothesis 4 can be rejected. There was a treatment effect on figural fluency.

Hypothesis 5

In Hypothesis 5 it was stated that there would be no treatment effect on figural flexibility from pretest to post-test. Results in Table 8 indicate that the mean pretest score for all subjects decreased from 19.48 to 16.33. This resulted in a t-value of -3.14 which was significant. Hypothesis 5 can be rejected. There was a treatment effect on figural flexibility.

Table 7. T-Test Comparisons of Pretest to Post-Test for All Subjects on Verbal Creative-Divergent Thinking (TTCT).

	Pretest		Post-Test
VFLUE			
Mean	63.82		81.44
S.D.	29.02		37.91
M.D.		17.62	
S.D.		30.43	
t		3.88	
p		.000*	
VFLEX			
Mean	30.73		33.71
S.D.	10.98		13.23
M.D.		2.97	
S.D.		11.38	
t		1.75	
p		.086	
VORIG			
Mean	29.28		39.31
S.D.	15.24		20.67
M.D.		10.02	
S.D.		17.13	
t		3.92	
p		.000*	

M.D. = Mean Difference N = 45
* = Significant at .05 level

Hypothesis 6

In Hypothesis 6 it was stated that there would be no treatment effect on figural originality from pretest to post-test. Results in Table 8 indicate that the mean pretest score for all subjects decreased from 38.33 to 32.68. This resulted in a t-value of -2.45 which was significant. Hypothesis 6 can be rejected. There was a treatment effect on figural originality.

Hypothesis 7

In Hypothesis 7 it was stated that there would be no treatment effect on figural elaboration from pretest to post-test. Results in Table 8 indicate that the mean pretest score for all subjects increased from 73.86 to 76.26. This resulted in a t-value of .33 which was not significant. Hypothesis 7 cannot be rejected. There was no demonstrated treatment effect on figural elaboration.

Hypothesis 22

In Hypothesis 22 it was stated that there would be no treatment effect on moral reasoning from pretest to post-test. In Table 9 t-test comparisons of pretest to post-test for all subjects on sociomoral reasoning are presented. The mean pretest score for all subjects decreased from 205.13 to 204.86. This resulted in a t-value of .05 which was not significant. Hypothesis 22 cannot be rejected. There was no demonstrated treatment effect on moral reasoning.

Table 8. T-Test Comparisons of Pretest to Post-Test for All Subjects on Figural Creative-Divergent Thinking (TTCT).

	Pretest		Post-Test
FFLUE			
Mean	25.68		20.15
S.D.	7.18		6.47
M.D.		5.53	
S.D.		8.51	
t		- 4.36	
p		.000*	
FFLEX			
Mean	19.48		16.33
S.D.	5.95		4.12
M.D.		3.15	
S.D.		6.75	
t		- 3.14	
p		.003*	
FORIG			
Mean	38.33		32.68
S.D.	12.49		12.47
M.D.		5.64	
t		- 2.45	
p		.018*	
FELAB			
Mean	73.86		76.26
S.D.	36.14		30.56
M.D.		.80	
S.D.		16.10	
t		.33	
p		.741	

M.D. = Mean Difference N = 44
* = Significant at .05 level

Table 9. T-Test Comparisons of Pretest to Post-Test for All Subjects on Sociomoral Maturity Reasoning Scores (SRM).

	Pretest		Post-Test
SRMS			
Mean	205.13		204.84
S.D.	31.16		35.15
M.D.		.27	
S.D.		35.88	
t		.05	
p		.960	

M.D. = Mean Difference (N = 44)

Hypothesis 8

In Hypothesis 8 it was stated that there would be no treatment effect on verbal fluency when the treatment group was compared to the non-treatment group at post-testing. In Table 10 t-test mean change scores and standard deviations comparing treatment and non-treatment groups are presented. The treatment group's mean change score of 15.54 for verbal fluency, when compared to the non-treatment group's mean change score of 14.86, resulted in a t-value of .07 which was not significant. Hypothesis 8 cannot be rejected. There was no demonstrated treatment effect on verbal fluency when change scores for the groups were compared.

Hypothesis 9

In Hypothesis 9 it was stated that there would be no treatment effect on verbal flexibility when the treatment group was compared to the non-treatment group at post-testing. Results in Table 10 indicate that the treatment group's mean change score of .37 for verbal flexibility, when compared to the non-treatment group's mean change score of

3.59, resulted in a t-value of -.80 which was not significant. Hypothesis 9 cannot be rejected. There was no demonstrated treatment effect on verbal flexibility when change scores for the two groups were compared.

Table 10. T-Test Mean change Scores and Standard Deviation Comparing Treatment and Non-Treatment Groups on the TTCT and SRM

	Treatment (N = 24)		Non-Treatment (N = 22)			
	Mean Change	S.D.	Mean Change	S.D.	t	p
VFLUE	15.54	36.17	14.86	32.82	.07	.947
VFLEX	.37	11.78	3.59	15.02	- .80	.427
VORIG	7.04	15.66	10.95	21.42	- .70	.487
FFLUE	- 5.41	10.22	- 4.68	7.66	- .28	.783
FFLEX	- 2.87	6.92	- 2.63	7.63	- .11	.912
FORIG	- 2.56	17.27	- 8.86	12.95	1.73	.091
FELAB	- 2.39	29.57	4.13	30.92	- .99	.330
SRMS	15.20	53.82	- 2.90	62.78	.71	.481

Hypothesis 10

In Hypothesis 10 it was stated that there would be no treatment effect on verbal originality when the treatment group was compared to the non-treatment group at post-testing. The results in Table 10 indicate that the treatment group's mean change score of 7.04 for verbal originality, when compared to the non-treatment group's mean change score of 10.95, resulted in a t-value of -.70 which was not significant. Hypothesis 10 cannot be rejected. There was no demonstrated treatment effect on verbal originality when change scores for the two groups were compared.

Hypothesis 11

In Hypothesis 11 it was stated that there would be no treatment effect on figural fluency when the treatment group was compared to the non-treatment group at post-testing. The results in Table 10 indicate that the treatment group's mean change score of -5.41 for figural fluency, when compared to the non-treatment group's mean change score of -4.68, resulted in a t-value of -.28 which was not significant. Hypothesis 11 cannot be rejected. There was no demonstrated treatment effect on figural fluency when change scores of the two groups were compared.

Hypothesis 12

In Hypothesis 12 it was stated that there would be no treatment effect on figural flexibility when the treatment group was compared to the non-treatment group at post-testing. Results in Table 10 indicate that the treatment group's mean change score of -2.87 for figural flexibility, when compared to the non-treatment group's mean change score of -2.63, resulted in a t-value of -.11 which was not significant. Hypothesis 12 cannot be rejected. There was no demonstrated treatment effect on figural flexibility when change scores of the two groups were compared.

Hypothesis 13

In Hypothesis 13 it was stated that there would be no treatment effect on figural originality when the treatment group was compared to the non-treatment group at post-testing. Results in Table 10 indicate that the treatment group's mean change score of -2.56 for figural

originality, when compared to the non-treatment group's mean change score of -8.86, resulted in a t-value of 1.73 which was not significant. Hypothesis 13 cannot be rejected. There was no treatment effect demonstrated on figural originality when change scores of the two groups were compared.

Hypothesis 14

In Hypothesis 14 it was stated that there would be no treatment effect on figural elaboration when the treatment group was compared to the non-treatment group at post-testing. The results in Table 10 indicate that the treatment group's mean change score of -2.39 for figural elaboration, when compared to the non-treatment group's mean change score of 4.13, resulted in a t-value of -.99 which was not significant. Hypothesis 14 cannot be rejected. There was no demonstrated treatment effect on figural elaboration when change scores of the two groups were compared.

Hypothesis 23

In Hypothesis 23 it was stated that there would be no treatment effect on moral reasoning when the treatment group was compared to the non-treatment group at post-testing. Results in Table 10 indicate that the treatment group's mean change score of 15.20 for the sociomoral maturity score, when compared to the non-treatment group's mean change score of -2.90, resulted in a t-value of .71 which was not significant. Hypothesis 23 cannot be rejected. There was no demonstrated treatment effect on moral reasoning when change scores of the two groups were compared.

Hypotheses Dealing With Interaction

The following eight hypotheses deal with the interaction effect in this experimental study. In order to test the interaction effect, the Multiple Analysis of Variance (MANOVA) was the statistical tool chosen. This statistical device is able to include two or more dependent variables in the same analysis and is an extension of the univariate ANOVA. The MANOVA produces descriptive information about the constructs that underlie the dependent variables. In this study a repeated measures MANOVA was used because the scores used in the analyses were derived from the same subjects and this statistical tool is able to adjust for this situation.

Hypothesis 15

In Hypothesis 15 it was stated that there would be no interaction effect between testing and treatment groups when the two-way analysis of pretest to post-test and treatment to non-treatment group was made on verbal fluency scores. Results in Table 11 indicate a .932 probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 15 cannot be rejected.

It should be noted however, that the treatment effect on verbal fluency was consistent across pretest to post-test and treatment to non-treatment groups.

Hypothesis 16

In Hypothesis 16 it was stated that there would be no interaction effect between testing and treatment groups when the two-way analysis

of pretest to post-test and treatment to non-treatment group was made on verbal flexibility scores. Results in Table 12 indicate a .917 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 16 cannot be rejected.

Table 11. MANOVA Tests of Significance for Verbal Fluency Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within CEIls	79903.88	43	1858.22		
Constant	474804.10	1	474804.10	255.51	0.0
Treatment	13.51	1	13.51	.007	.932

The treatment effect on verbal fluency was consistent across pre-test to post-test and treatment to non-treatment group.

Table 12. MANOVA Tests of Significance for Verbal Flexibility Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	10153.93	43	236.13		
Constant	93444.44	1	93444.44	395.71	0.0
Treatment	2.62	1	1.61	.01	.917

Hypothesis 17

In Hypothesis 17 it was stated that there would be no interaction effect between testing and treatment groups when the two-way analysis of pretest to post-test and treatment to non-treatment group was made on verbal originality scores. Results in Table 13 indicate a .873 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 17 cannot be rejected.

It should be noted that the treatment effect on verbal originality was consistent across pretest to post-test and treatment to non-treatment groups.

Table 13. MANOVA Tests of Significance for Verbal Originality Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	22567.88	43			
Constant	105884.10	1	105884.10	201.74	0.0
Treatment	13.51	1	13.51	.02	.873

Hypothesis 18

In Hypothesis 18 it was stated that there would be no interaction effect between testing and treatment groups when the two-way analysis of pretest to post-test and treatment to non-treatment group was made on figural fluency scores. Results in Table 14 indicate a .082 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 18 cannot be rejected.

Table 14. MANOVA Tests of Significance for Figural Fluency Using sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	2342.69	43			
Constant	47288.54	1	47288.54	867.97	0.0
Treatment	173.26	1	173.26	3.18	.082

It should be noted that the treatment effect on figural fluency was consistent across pretest to post-test and treatment to non-treatment group.

Hypothesis 19

In Hypothesis 19 it was stated that there would be no interaction effect between testing and treatment groups when the two-way analysis of pretest to post-test and treatment to non-treatment group was made on figural flexibility scores. Results in Table 15 indicate a .145 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 19 cannot be rejected.

Table 15. MANOVA Tests of Significance for Figural Flexibility Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	1244.37	43	28.93		
Constant	28872.71	1	28872.71	997.70	0.0
Treatment	63.90	1	63.90	2.20	.145

The treatment effect on figural flexibility was consistent across pretest to post-test and treatment to non-treatment group.

Hypothesis 20

In Hypothesis 20 it was stated that there would be no interaction effect between testing and treatment groups when the two-way analysis of pretst to post-test and treatment to non-treatment group was made on figural originality scores. Results in Table 16 indicate a .782 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 20 cannot be rejected.

With regard to figural originality, the treatment effect was consistent across pretest to post-test and treatment to non-treatment group.

Table 16. MANOVA Tests of Significance for Figural Originality Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	8423.25	43	195.88		
Constant	113493.51	1	113493.51	579.37	0.0
Treatment	15.23	1	15.23	.07	.782

Hypothesis 21

In Hypothesis 21 it was stated that there would be no interaction effect between testing and treatment when the two-way analysis of pre-test to post-test and treatment to non-treatment group was made on figural elaboration scores. Results in Table 17 indicate a .593 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 21 cannot be rejected.

Table 17. MANOVA Tests of Significance for Figural Elaboration Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	6759.48	43	157.19		
Constant	56350.04	1	56530.04	358.46	0.0
Treatment	45.47	1	45.47	.28	.593

In the area of figural elaboration it should be noted that the treatment effect was consistent across pretest to post-test and treatment to non-treatment group.

Hypothesis 24

In Hypothesis 24 it was stated that there would be no interaction effect between testing and treatment when the two-way analysis of

pretest to post-test and treatment to non-treatment group was made on moral reasoning scores. Results in Table 18 indicate a 1.0 F probability was obtained for treatment. No statistically significant interaction was found and Hypothesis 24 cannot be rejected.

Table 18. MANOVA Tests of Significance for Moral Reasoning Using Sequential Sum of Squares

Source of Variation	Sum of Squares	df	Mean Square	F Ratio	F Prob
Within Cells	67219.00	42	1600.45		
Constant	3698200.00	1	3698200.00	2310.72	0.0
Treatment	0.00	1	0.00	0.0	1.0

The treatment effect on moral reasoning was, however, consistent across pretest to post-test and treatment to non-treatment group.

Summary

In this chapter the results of an experiment designed to test the effect of creative-divergent thinking training on creative-divergent thinking ability and on moral reasoning ability were reported.

In order to establish the equivalency of the two groups both were administered the Sociomoral Reflection Measure (Gibbs and Widaman, 1982) and the Torrance Tests of Creative Thinking, Figural and Verbal Forms (Torrance, 1974). An analysis of these test results showed that the groups were equivalent with regard to the variables of moral reasoning and creative-divergent thinking.

Upon completion of a ten week program of training in creative-divergent thinking based on New Directions in Creativity, Mark 1

(Renzulli, 1973), the treatment and non-treatment groups were post-tested using alternate forms of the assessment instruments.

Change scores for each group were calculated. The treatment group demonstrated significant increases in verbal fluency and originality but no significant change in verbal flexibility. In the figural area the treatment group declined significantly in fluency and flexibility but showed no significant change in figural originality or elaboration. The non-treatment group demonstrated significant increases in verbal fluency, flexibility, and originality. In the figural area the non-treatment group declined significantly in fluency and originality but showed no significant change in flexibility and elaboration. Neither group changed significantly in moral reasoning ability.

Finally, the results of the statistical analyses of the twenty-four hypotheses in Chapter 3 were listed. Of the sixteen hypotheses dealing with treatment effect, hypotheses 1, 3, 4, 5, and 6 were rejected. In these hypotheses it was stated that there would be no treatment effect from pretest to post-test, with regard to verbal fluency (1), verbal originality (3), figural fluency (4), figural flexibility (5), and figural originality (6).

Interaction between treatment and pretest and post-test was statistically tested to determine if differential effects might be observed. All tests for interaction showed no significance and none of the interaction hypotheses was rejected. As a result, the treatment effect findings appear to be the same across pretest to post-test and treatment to non-treatment groups.

In hypotheses 22, 23, and 24 the effect of creative-divergent thinking training on moral reasoning ability was considered. No effect was observed with regard to moral reasoning and the null hypotheses could not be rejected.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

In the research findings discussed in the preceding chapters of this study, the investigator dealt with the effect of training in creative-divergent thinking on students' creative-divergent thinking ability and level of moral reasoning. Two sixth grade classes, treatment and non-treatment, were studied to determine the effect of training. There was a total of forty-six students in the two classes. Since random assignment of the students to groups was not possible, the nonequivalent control group research design was used.

The treatment group was trained by the investigator over a period of ten weeks using New Directions in Creativity, Mark 1 (Renzulli, 1973) as the instructional method. Training occurred three times a week in thirty minute periods near the end of the school day. The non-treatment group was located in the same building as the treatment group; contact between the investigator and the non-treatment group was limited to pretesting and post-testing.

In order to establish the equivalency of the two groups with regard to the variables being studied, students were pretested using the Sociomoral Reflection Measure (Gibbs and Widaman, 1982) as well as the Torrance Tests of Creative Thinking, Verbal and Figural Forms (Torrance,

1974). the groups were found to be equivalent in both moral reasoning and creative-divergent thinking. At the end of the ten week training period, both groups were post-tested using alternate forms of these instruments to determine if changes had occurred in the areas of creative-divergent thinking and/or moral reasoning.

Review of the Problem Statement

The problem as presented in Chapter 1 centered on a question of whether creativity might be an independent contributing factor in the development of moral reasoning which could complement other factors which have been proposed to be associated with moral reasoning. This investigation was not concerned with factors, such as emotion, religious training, or intelligence, which impact upon individual's morality. Reasoning about morality, and not moral behavior, was the major concern.

Specifically in this study, the investigator was concerned with the question of whether training in creative-divergent thinking would have an effect on creative-divergent thinking ability or on moral reasoning ability. In Chapter 2 an argument was presented concerning the tenability of the relationship between creative thinking ability and level of moral reasoning. The crux of the argument centered on the contention that in order to reach higher levels of moral reasoning a more creative-divergent thought process was necessary. It was the investigator's belief that in order to make higher level moral decisions, concomitantly high ability in creative-divergent thinking was required.

This study has provided some insight with regard to the stated problem. It appears that training in creative-divergent thinking does

have a significant effect on some areas of creative-divergent thinking ability. However, changes in the non-treatment group's ability in this area tended to obfuscate the results of the experiment. Although there was positive change in mean score for the treatment group in the area of moral reasoning ability, the increase was not statistically significant.

In this chapter there will be discussion of these mixed findings, as well as recommendations for further research, and the possible implications of this study for education.

Discussion of Findings

Previous research indicated the generally positive effect of training in creative-divergent thinking on students' ability in the area of creative-divergent thinking (Razik, 1966; Feldhusen, 1969; Renzulli and Callahan, 1975). A review by Torrance (1972) of one hundred forty-two creativity training program evaluations indicated that seventy-two percent had been successful. These programs were divided by Torrance into nine types of intervention and demonstrated success rates from sixty-nine to ninety-one percent. On the negative side was a study by Mansfield, Busse, and Krepelka (1978). After studying seventy-two creativity program evaluations, they questioned whether such training in fact facilitated real life creativity or only enhanced the results of creativity tests.

A meta-analysis of fifty-five studies that dealt with stimulating the development of moral judgments was recently published (Schlaefli, Rest, and Thoma, 1985). The subjects ranged from junior high school

through adults. Three approaches to training were identified: group discussion of moral dilemmas, personality development programs, and social studies and humanities courses that involve moral issues. The findings of the meta-analysis included: intervention with adults produced greater change than intervention with young people; intervention of three to twelve weeks was optimal; and modest overall effect was found for the discussion and personality approaches.

In the present study the results of the pretesting to post-testing indicated that the treatment group improved significantly in two of the seven areas of creative-divergent thinking. However, the non-treatment group improved significantly in three areas, thus causing the results of the study to be mixed. Unexpected decreases in both groups' ability in figural creative-divergent thinking were observed as well. Both groups decreased significantly in the area of figural fluency. In addition, the treatment group decreased significantly in figural flexibility, while the non-treatment group decreased significantly in figural originality.

Tan-Willman (1980) reported positive results for an experimental study of the effect of creativity training on the moral reasoning of teachers-in-training. In the present study of sixth grade students, neither the treatment nor the control group demonstrated significant change in the area of moral reasoning ability. The results of this investigation indicate that training in creative-divergent thinking has not been shown to have an effect on the moral reasoning ability of sixth grade students.

Pretest to Post-Test Findings.

Findings from the pretesting to post-testing may be listed as:

1. In the area of verbal fluency the mean scores of both the treatment and non-treatment groups increased significantly. The verbal fluency score reflects the subjects' ability to produce large numbers of ideas with words.

2. In the area of verbal flexibility the mean score of the non-treatment group increased significantly while that of the treatment group did not change significantly. The verbal flexibility score reflects the subjects' ability to produce various kinds of ideas using different approaches.

3. In the area of verbal originality the mean scores of both groups increased significantly. The verbal originality score reflects the subjects' ability to produce ideas that are unique or novel.

4. The figural fluency mean scores of both the treatment and non-treatment groups decreased significantly. The figural fluency score reflects the subjects' ability to produce a large number of ideas with figures.

5. The figural flexibility mean score of the treatment group decreased significantly while the score of the non-treatment group did not change significantly. The figural flexibility score reflects the subjects' ability to produce various ideas using different figures.

6. The figural originality mean score of the non-treatment group decreased significantly while the score of the treatment group did not change significantly. The figural originality score reflects the subjects' ability to create new or unique figural ideas.

7. In the area of figural elaboration neither group demonstrated a significant change in mean score. The figural elaboration score reflects the subjects' ability to embellish ideas in the figural realm.

8. In the area of moral reasoning ability neither group demonstrated a significant change in mean score. The sociomoral reasoning maturity score reflects the subjects' ability to produce a rational point of view with regard to a moral dilemma.

Discussion of Mixed Results

The most difficult of these results to explain was the significant decrease in figural creative-divergent thinking which was exhibited by both the treatment and non-treatment groups. The expectation of the investigator was that either positive change or no change would be found. The most probable explanation for these results appears to involve instrumentation or maturation. Although the Torrance Tests of Creative Thinking are among the most reliable instruments in the assessment of creative-divergent thinking, testing in this area of human ability remains problematic. Maturation involves change in subjects between observations that is independent of the treatment. Perhaps the figural aspect of creative-divergent thinking did not stimulate the subjects either through the pretesting of the non-treatment group or the actual training of the treatment group, and they did not respond as well on the post-test as they had on the pretest.

The results of this study are somewhat perplexing. Based upon pretest results, the treatment and non-treatment groups were found to be statistically equivalent with regard to creative-divergent thinking

ability and level of moral reasoning. After ten weeks of training in creative-divergent thinking, the treatment group demonstrated some significant changes. However, both increases and decreases, across the areas of creative-divergent thinking ability, as well as a non-significant increase in moral reasoning ability were observed. The non-treatment group also showed changed ability in several areas of creative-divergent thinking performance, as well as a non-significant decrease in moral reasoning ability. There are several factors which can be suggested which could have led to these mixed results.

1. Relationship of Creative-Divergent Training and Testing

A primary reason for the mixed results with regard to changes in creative-divergent thinking may be the alignment of the creative-divergent thinking training approach with the instrument used for testing creative-divergent thinking. As indicated in Chapter 3, the New Directions in Creativity approach to training was chosen as the method of intervention as a result of both its research base and the investigator's previous experience with the model. The Torrance Tests of Creative Thinking were chosen as the assessment instrument due to their almost universal acceptance in this area of human measurement. The following analysis of the lessons used in the ten week treatment-training and the instrument used for assessing creative-divergent thinking ability, indicates that the two approaches may not be as closely aligned as the investigator initially thought.

Fifteen two-part lessons from New Directions in Creativity, Mark 1 were selected to be used in the creative-divergent thinking training of

the treatment group. The lessons were taught in a manner as described in Chapter 3 and as indicated in the teacher's manual that accompanies the program. Each two-part lesson centered on one of three cognitive areas: semantic, symbolic, or figural.

In a post hoc analysis of the training program, it was found that sixty-four percent of the learning objectives dealt with verbal creative-divergent thinking and thirty-six percent dealt with figural creative-divergent thinking. More specifically, verbal fluency accounted for twenty-eight percent of the learning objectives, and verbal flexibility and originality accounted for eighteen percent each. Figural flexibility accounted for sixteen percent of the learning objectives, figural elaboration for twelve percent, and figural originality for eight percent. None of the learning objectives was concerned with figural fluency.

The Torrance Tests of Creative Thinking, Figural and Verbal Forms, appeared to be an appropriate device for assessing the impact of the training in this study due to its wide use and extensive norming. In addition, much of the development of the training program was based on the research conducted by the developer of the assessment instrument, E. Paul Torrance. The full battery of the Torrance Tests gauges the creative-divergent thinking areas of verbal fluency, flexibility, and originality, as well as figural fluency, flexibility, originality, and elaboration. The alignment of the two approaches will be discussed by describing which training lessons parallel which parts of the assessment measure.

a. Verbal Creative-Divergent Thinking

The verbal form of the Torrance Tests consists of five sections all of which gauge ability in the areas of verbal fluency, flexibility, and originality. The first of the five verbal subtests of the Torrance Tests is called the "Ask and Guess Activity." The aim of this subtest is to reveal the subject's ability to formulate hypotheses and to sense what one cannot find out from simply looking at a picture. The number and type of questions, fluency and flexibility, that the subject asks is important. None of the training activities required skills that were directly related to this task.

The second verbal subtest is the "Product Improvement Activity." Presented with a small stuffed animal, the subject is asked to think of as many ways as possible to make the toy more interesting and fun to play with. Fluency, flexibility, and originality are all important here. Training lesson thirteen, "Changing Things," appears to be related to this skill. In this lesson the students are trained to make things smaller or larger in order to improve them. Another task that this lesson requires is the general improvement of a home or automobile.

The third verbal subtest of the Torrance Tests, the "Unusual Uses Activity," also seems to be related to lesson thirteen of the training program. This subtest requires the subject to think of unusual uses for tin cans and cardboard boxes, reflecting abilities in fluency, flexibility and originality. Also related to this subtest is lesson eleven. "Alternate Uses," which trains the student to think of unusual uses for a variety of items.

The fourth subtest, "The Unusual Questions Activity," bears little resemblance to any of the training activities. In analyzing the questions that the subject asks about tin cans or cardboard boxes, one differentiates between lower level factual questions and higher order questions and again this is used to gauge strength in fluency, flexibility, and originality of thought.

The final subtest of the verbal form of the Torrance Tests is called the "Just Suppose Activity." Presented with an improbable situation, like strings attached to clouds, the subject is required to propose possible consequences. This is directly related to training lesson three, "Consequences," where similar situations and consequences are considered. Once again this subtest is used to measure abilities in all three verbal areas.

Thus of the five subtests of the verbal form of the Torrance Tests of Creative Thinking it appears that only three are related to the training program used with the treatment group.

b. Figural Creative-Divergent Thinking

The figural form of the Torrance Tests consists of three subtests. The first, called the "Picture Construction Activity," involves drawing a picture using a pear or jelly bean-shaped image as a stimulus. The main purpose of the activity is to determine originality of thought; a secondary purpose is to determine elaboration ability. None of the four training lessons in the area of figural ability had a close relationship to this activity. However, lessons four and eight, which are discussed below, appear to have had a peripheral relationship.

The second figural subtest activity, "The Incomplete Figures Activity," consists of ten different stimulus scribbles that must be completed so that each scribble is transformed into a reasonably recognizable figure. This activity measures the ability to bring structure and completeness to an unstructured and incomplete figural stimulus. Flexibility of thought is the primary interest, with elaboration and originality also considered. Lessons four and eight of the training method seem most closely associated with this subtest. Lesson four, "Fun With Figures," trains the student to relate non-meaningful shapes to each other. Lesson eight, "Figural Arrangement," trains the student to use geometric figures to form meaningful pictures.

The third and final subtest of the figural form of the Torrance Tests is called the "Repeated Figures Activity." Given the stimulus of thirty sets of short, vertically parallel lines or forty small circles, the subject is required to create something new for each item, thus making multiple associations from a single stimulus. Fluency, flexibility, originality, and elaboration are all important here. Lesson twelve of the training procedure, "Figure Completion," appears to be directly related to this subtest. In this lesson the student is required to change from six to ten ovals or inverted v's into drawings of real things.

A final training lesson in the figural area is called "Can You Design it?" It requires the planning of the interior of a camper trailer and also a space station. This lesson appears to be only peripherally related to the assessment measure.

It seems that of the eight total lessons devoted to figural creative-divergent thinking, six are somehow related to two of the three subtests in this area. An additional retrospective concern is that perhaps insufficient time was devoted to figural creative-divergent thinking training: only eight of thirty lessons. Future researchers who intend to use both forms of the Torrance Tests would do well to balance the training between verbal and figural activities.

This review of the relationship between the creative-divergent thinking training program, New Directions in Creativity, Mark 1, and the assessment device that was used, the Torrance Tests of Creative Thinking, leads to the conclusion that approximately one-third of the treatment activities were not related to the measurement device. Perhaps teaching more directly to the test would result in a more definitive distinction between the treatment and non-treatment groups in the area of creative-divergent thinking at the end of the treatment period. Certainly teaching to the test is not normally a recommended educational practice. The investigator would hope to enhance real-life creative ability as well as increase scores on assessment instruments.

Another adjustment would be in selecting specific portions of the Torrance Tests that would be more directly related to the instructional program. Or perhaps an assessment device more closely correlated with the training program could be found. The developer of New Directions in Creativity has used the Creativity Test for Children (Guilford, 1976) as a pretest to post-test measure of the effect of his program. This assessment instrument was rejected, perhaps too quickly, due to the paucity of reliability and validity data available. In these areas it

did not compare to the Torrance Tests. Another instrument that has been used in measuring creative-divergent thinking is the Wallach-Kogan Battery (Wallach and Kogan, 1965). It consists of both verbal and visual subtests and is administerable to children in groups.

2. Difficulty in Testing Creativity

A second reason for the mixed results of this experimental study could be the difficulty in measuring creative ability in a testing situation. One problem is that measures of creative-divergent thinking tend to be more variable than most other types of human ability assessment. According to Torrance (1974: 16), emotional factors, body states, and group atmosphere all contribute acutely to test results in this area.

The creation of a playful and motivational atmosphere while "testing" creative-divergent thinking, which was recommended by Torrance, was difficult to achieve. Whereas a fairly successful attempt was made to establish an instructional program that was playful and open, a decision was reached to keep the pretesting and post-testing as business-like as possible. This may have been a mistake, as a standard testing atmosphere may have a tendency to subdue creative-divergent energy.

Another factor with regard to testing may have been test anxiety on the part of the treatment group. Since students in that group were aware of the intervention, they may have felt more pressure to perform well on the post-test than did the non-treatment group. This could have had a negative effect on the treatment group, with no such effect on the non-treatment group.

A final factor that has to do with the testing was the change in the seating arrangement of the treatment group. During the sixth week of the ten week training program, the seating arrangement of the treatment group was changed by the classroom teacher. Traditional rows gave way to a double semi-circle. At the time of the change, the investigator felt that the new arrangement would have a positive effect on student interactions. It was believed that such a seating arrangement would help establish a more creative atmosphere. Informal observation of increased interaction among students would suggest that it did seem to have that effect. In retrospect, however, this arrangement may have had a debilitative effect on testing. It may have decreased the competitive mind-set of the treatment group at post-testing and thus decreased scores.

Finally there is the problem of validity as it applies to any instrument that purports to measure creative ability. The Torrance Tests do not measure creativity, they measure aspects of it: fluency, flexibility, elaboration, and originality. For these factors Torrance indicated positive evidence of content and construct validity, as well as concurrent and predictive validity (1974). This investigator felt that the Torrance Tests were a more than adequate measure of creative-divergent thinking. The investigator knows of no instrument that claims to gauge the overall phenomenon of creative ability.

3. Age and Number of Subjects

Sixth grade students were chosen as the subjects of this study because of the investigator's interest in elementary education and also

because they were available at an appropriate time. The age of the subjects may have contributed to the mixed results. In general, the students who were the subjects of the study ranged in age from eleven years and six months to twelve years and six months. Given this age range, few if any should have been expected to function at the higher levels of moral reasoning where creative-divergent thinking ability would be most crucial. Research indicates that sixth grade students would at best be in Stage Three of moral development. Stage Four to Five, where creative-divergent thinking would be most critical, does not usually develop until young adulthood (Lickona, 1983). Perhaps older subjects would have demonstrated greater change in moral reasoning ability when exposed to training in creative-divergent thinking. Subjects at the senior high level or possibly college students might have demonstrated more patterned findings.

The present study consisted of only forty-six subjects. An increased sample size could have enhanced the precision of the statistical analyses. A larger number of treatment groups might have provided a clearer picture statistically of the relationships that were investigated. An increase in the classrooms involved from two to ten would have provided a total subject pool in the area of two hundred and fifty. Such an increase would have required that classroom teachers be trained as agents in the intervention technique in order to have conducted the experiment. This, however, might have introduced other factors such as stability across treatment which could have confused the results.

4. Length of Intervention and Lessons

The total time of the training could have been extended well beyond the ten weeks of this experiment. Certainly a training program closer to eighteen weeks in length, half of an academic year, would have helped to solidify the results of the training. Extending the training much beyond eighteen weeks might have introduced confounding variables such as the effects of substantial maturation and outside influences.

The length of the actual lessons could also have been expanded to forty-five minutes or more. Middle school students have the attention span and interest to benefit from longer lessons. On two occasions the investigator had to conduct the lessons for close to an hour earlier in the day in order to make up for lessons that were missed. Both of these lessons seemed to elicit more creative-divergent responses than usual. However, it would have been difficult to get permission to increase the length of the lessons in the teacher's already crowded day. In retrospect, thirty minute lessons were probably too brief to have the totally desired effect.

A more productive time for the lessons to have taken place may have been early morning or mid-afternoon. As the last activity of the day, creative-divergent thinking may have taken second place to thoughts of going home, after school sports, social life, and the like. One student admitted to the researcher that the class was "pretty pooped" by the time creative-divergent training occurred.

5. Role of Investigator

Having the same person, the investigator, perform both testing and training may have caused anxiety within the treatment group which was

not a factor with regard to the non-treatment group. If the classroom teacher had conducted the creativity training it might have resulted in a dual benefit: it would have been more realistic than having an outsider do the training and it might have encouraged the teacher to continue to use such exercises.

Perhaps none of the above factors individually explain the mixed post-test results. Taken as a complex of interacting factors, however, they may be powerful in explaining the results that were described in Chapter 4. On the other hand, it could well be that the results of the experiment are accurate: no real change in creative-divergent thinking ability occurred as a result of the invervention. The expectation that any treatment would have had an effect on creative-divergent thinking or moral reasoning in a period of ten weeks may have been overly optimistic.

Although all of the above may have contributed to the mixed results of this experiment, it is probably begging the question of why the non-treatment group showed significant growth in creative-divergent thinking even though they were not exposed to the treatment. The daily lesson plans of the non-treatment group were checked on a weekly basis and a brief conference was held with the classroom teacher to be sure that specific creative-divergent thinking activities were not being used. Contact between the students in the two groups could not be controlled after school. It is unrealistic to believe that the children did not discuss creative-divergent thinking after school, but that discussion would probably have been minimal. Perhaps as much as anything, the explanation relates to the previously described variability of

assessment measures used to gauge creative-divergent thinking ability. Although consideration of the other factors mentioned above is important for future studies in this area.

Recommendations for Further Research

The mixed results of this study make it difficult to derive any definitive conclusions regarding the variables under study. The fact that no relationship has been demonstrated does not prove that no relationship exists. The investigator continues to feel that an association does exist between creative-divergent thinking and moral reasoning. The following recommendations are made in the hope that they may lead to improved designs for studies to investigate such a relationship in the future. The first of the following recommendations is a change that would have made the present study stronger; the remaining recommendations are intended to spur further research in the area of the relationship between creative-divergent thinking and moral reasoning.

1. Changes in the Present Study

The present study would have been stronger had adjustments been made for number of groups, length of the intervention and lessons, and age of the subjects. An expansion in the number of classrooms participating in the study would lead to a more definitive statistical analysis of results. Although increasing the treatment group to ten classes would require training classroom teachers to provide the creative-divergent thinking training, in retrospect this would be a worthwhile change in the study.

An increase in the length of the treatment lessons to forty-five or sixty minutes and an increase in the number of weeks of the experiment to a semester would enhance the effect of the creative-divergent thinking training and possibly a concomitant acceleration in moral reasoning. These changes would be more effective with older subjects, since it is at more mature levels of moral development that creative-divergent thinking would theoretically have most effect on moral reasoning. Using older subjects might give a clearer picture of the relationship. Thus using upper level high school students or teachers-in-training would be a suggested change in the current study.

Another variation of the present study would be an investigation that looked at the effect of creative-divergent thinking training on moral reasoning for subjects at several grade levels (e.g., fourth, eighth, twelfth, and college). This variation would test the effects, if any, at different age levels.

2. Changes in Training Approaches

Many approaches exist in the training of creative-divergent thinking. The following are some of the variations that could be used. Rather than having an adult teach creative-divergent thinking to students, the use of a self-instructional program (e.g., Covington, Productive Thinking Program, 1972) might be worthwhile. Such an approach could indicate patterns of change that are different from group-based training. Covington's method uses illustrated stories with a teenage boy and girl as the main characters. In following their adventures the reader learns to think more creatively. One benefit in this approach

is that the student can advance at his own pace and only minimal teacher training is necessary.

Another variation to directly teaching creative-divergent thinking would be a study based on the enhancement of imagination (e.g., Eberle, Scamper Games for Imagination Development, 1971). In these twenty minute group lessons the students are led through various fantasy exercises. This could result in interesting findings with regard to the development of creative-divergent thinking and moral reasoning.

A final variation would be the use of synectics training (e.g., Synectics, Inc., Making It Strange, 1968). This is an approach to creativity training that utilizes metaphor and analogy in attempting to come up with original solutions to problems. A study of the effects of this program on creative-divergent thinking and moral reasoning would be interesting.

3. Specific Areas of Creative-Divergent Thinking

A study that concentrates on a single ability within creative-divergent thinking might be less likely to result in mixed findings than one that attempts to change and study several abilities. For example, a study could be devised that concentrated exclusively on enhancing ideational fluency. Using brainstorming techniques (e.g., Osborn, Applied Imagination, 1963) as the method of training would be one approach. The possible consequent production of multiple solutions to moral dilemmas would be thought to lead to higher moral reasoning.

4. An Integrated Approach

The results of research have indicated the utility of teaching creativity skills through the regular curriculum (Tweet, 1980). Tweet's study demonstrated that creative thinking could be enhanced within the social studies curriculum. A replication that also investigated changes in moral reasoning ability would be useful. The research could also attempt to determine creative growth within other curriculum areas.

Educational Implications

Because of the somewhat mixed results of the present study, it is difficult to make many suggestions for educational decisions. However, the following implications seem to be warranted.

1. In exposing students to creative-divergent thinking training schools may not be able to reliably ascertain whether students have, in fact, become more creative-divergent thinkers. This lack of reliability seems to hold true for both the testing of creative-divergent thinking and for the application of creative-divergent thinking to real life situations.

2. In this study training in creative-divergent thinking appears to have had no systematic effect on students' moral reasoning ability. In settings where moral development is an explicit goal of education, more direct attempts to enhance moral reasoning, such as the discussion of moral dilemmas, may be a better approach.

Summary

Chapter 5 of this study dealt with a review of the problem statement, a discussion of pretest to post-test findings, a discussion of the mixed nature of the results, recommendations for further research, and educational implications.

The problem of this study was to ascertain, under experimental conditions, whether a program of training in creative-divergent thinking would have an effect on either the creative-divergent thinking or moral reasoning of sixth grade students. Both the treatment and non-treatment groups demonstrated significant gains and losses in creative-divergent thinking. Neither group demonstrated significant change in moral reasoning. Thus, the results of this study indicated no relationship between training in creative-divergent thinking and either creative-divergent thinking ability or moral reasoning ability.

The mixed results were attributed to several possible factors. The most important of these factors dealt with the less than optimal correspondence between the training program and the assessment instrument, and the general difficulty in assessing creative-divergent thinking ability.

Recommendations for further research included adjustments to the present study, variations in the creative-divergent thinking training approach, concentrating on limited areas of creative-divergent thinking, and an experiment that would integrate creative-divergent thinking training within a specific curriculum area. Two educational implications were drawn from this study. The first implication concerned the

lack of certainty with which the effects of creative-divergent thinking training must be approached. The second implication involved the need to teach more directly to moral development if such development is an explicit educational goal.

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