A Study of the Creative Thinking Abilities of Teachers and the Tested Creativity of Their Pupils

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A STUDY OF THE CREATIVE THINKING ABILITIES OF TEACHERS AND THE TESTED CREATIVITY OF THEIR PUPILS

A Thesis
Presented to
The Graduate Faculty
Central Washington State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by
Florine Creekmore
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APPROVED FOR THE GRADUATE FACULTY

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CHAPTER I

INTRODUCTION AND PROBLEM

INTRODUCTION

Since the 1890's, there have been isolated efforts to develop information about creative talent. However, recent breakthroughs in knowledge and the beginning of sustained efforts by researchers have made available an almost geometrically increasing amount of information concerning creativity. This current awakening of interest and recent burst of research on creativity promises new developments on many fronts.

Creativity has probably been as important as any human factor in changing history and in reshaping the world. The creative performance of individuals may be recognized in man's striving to improve his knowledge, to conquer the unknown, and to create new ideas and new, more useful things. Today, as never before, we are faced with a world of vastly complex problems. It takes little imagination to recognize that the future of our civilization--our very survival--depends upon the quality and direction of our creative imagination.

Creative talent is, no doubt, one of our greatest natural resources. Its discovery and nurture is one of the most difficult of man's achievements, and yet, once attained it makes the true artist or scientist. Its attainment affects not only scientific progress, but society in general,
and those nations who learn best how to identify, develop, and encourage the creative potential of their people will be in a very advantageous position.

Education has sound, legitimate reasons for concern about all aspects of creative talent, its nature, assessment, development, nurture, and utilization. Education in a democracy should help all individuals toward the full development of their talents. If the intellectual capacities are to be fully developed, the abilities involved in creative thinking cannot be ignored. It is an investment in the child's future, his happiness, and the well being of his society. Certainly an individual is not fully functioning intellectually if the abilities involved in creative thinking remain undeveloped, unused, or "paralyzed."

Many national and regional educational conferences in the past four years have headlined or included in their programs creative thinking, creative talents, or subtopics. The tremendous advances in science during the past quarter century has resulted in a demand for more scientists, more engineers, more technicians, and more trained workers. Now because some knowledge has been accumulated and because society faces new needs, the development of creative talent not only in science, but also social sciences and humanities, will be one of education's greatest concerns.
It may be that normal conditions of mass education are on the whole inhibiting to the development of creative individuals, for creativity is highly individualistic. Educators are now examining what research has to tell us about creativity. There are many questions concerning effective ways of preparing the individual to perform creatively. Differences in creative thinking abilities of teachers have been hypothesized as an influencing factor.

THE PROBLEM

Statement of the problem. The purpose of this study was to investigate the creative thinking abilities of teachers and the tested creativity of their pupils.

The creative thinking abilities of the teachers and pupils tested for this study were identified through the use of the Minnesota Test of Creative Thinking (MTCT). The null hypothesis investigated was:

There are no differences in the tested creativity of children taught by a teacher of high tested creativity and that of a teacher of low tested creativity.

Limitations. The limitations of the study are these: (1) since the sample is limited to two classrooms with only one experimental and one control teacher, the findings cannot be taken as definite and there is obviously need for replication; (2) the MTCT which was used to measure creative
thinking abilities of teachers and pupils is an experimental instrument developed by Dr. Paul Torrance (1962) and the Bureau of Educational Research of the University of Minnesota, and permission granted for its use only in experimental and research projects. With tenuous validities to date, creativity can only be defined operationally as "that factor measured by the MTCT." The adequacy of this definition depends on the strengthening or weakening of the construct in subsequent validation studies; and (3) it is possible that the teachers deduced in early April that the MTCT would be readministered later in April since permission had to be gained "to test the children later in that month" even though no mention was made to the teachers specifically that the test was again to be the MTCT.

DEFINITION OF TERMS USED

Creativity. Schachtel defines creativity as the "art of seeing the familiar fully in its inexhaustible being, without using it autocentrically for purposes of remaining embedded in it and reassured by it." In effect it is the ability to remain perceptually open to the world. He contends that the creative individual perceives the world differently from the less creative person and does not create to reduce tension, but rather, creates because of an ability to relate directly to the environment. Creativity is characterized by
a capacity for objectification of perceptual experience which obviates the need for reaction to conformity pressure.

Such a perceptual theory is supported by Getzels and Jackson (1962) who believe that creative children prefer risk situations, Crutchfield (1962) who found better adjustment among nonconformists, and Torrance (1963) who finds that creatives retain their self-confidence in the face of opposition.

The analytic position is typified by Kris (1951) who finds the creative individual as differing from others only in the possession of his creative skill which may be called on to avoid neurosis by ego regression in preconscious thinking. Rapaport (1951) claims the ego renounces control when necessary to defend against a threat to the self at the conscious level. These implications indicate creatives express neurotic behavior in some art form.

Creativity in the review of the literature must be variously defined as above. For the actual testing of the hypothesis, creativity has the limited operational definition of "that which is measured by the Minnesota Test of Creative Thinking." Its limitations have been expressed.

Creative process. For Wallas (1926) and Patrick (1955) the creative process consists of the following stages: (a) preparation— the stage in which the problem is investigated from all directions and ideas are rapidly shifted;
(b) incubation- the stage during which the individual is not consciously thinking about the problem; (c) illumination- the stage accompanied by reading, discussion, exploring and critically analyzing until the birth of a new idea occurs; and, (d) verification- in which the validity of the idea is tested. Kris (1953) describes the process in terms of inspiration and elaboration. Stein (1953) prefers to describe the creative process as consisting of three major phases: hypothesis formation, hypothesis testing, and communicating of the results. Analysts acknowledge the fact that characteristics of the process are not separate or distinct but they overlap.

Subsequent chapters include a review of literature on creativity, procedures used in the present study, results, and discussion.
CHAPTER II

REVIEW OF THE LITERATURE ON CREATIVITY

One way to approach a rationale for tests of creativity is to understand what takes place, psychologically, as creative thinking comes into being. Four theoretical approaches to creative thinking are: (1) traditional logic, (2) classical associationism, (3) psychoanalytic, and (4) perceptual.

THEORIES OF CREATIVITY

Traditional logic, after the Renaissance, focused on gathering facts and observing their relationship, which culminated in general assumptions. Classical associationism assumes that thinking is, essentially a chain of ideas, stimuli and responses, or a chain of behavior elements.

One of the most influential current systematic approaches to creative thinking is the psychoanalytic concept. Freud dealt with creative production, but made no systematic statement. Kris' "neo-psychoanalytic" formulation shifts the locus of creativity from the unconscious to the preconscious and conceptualizes that in effect creativity is an "act of regression in the service of the ego" (8:93-4). Kubie shifts further from the original position by not only denying the unconscious in creative work, but argues that if it operates at all it is likely to be injurious to the creative process.
He believes that both the conscious and the unconscious rigidify the preconscious and can render even the most potentially gifted person uncreative. The essential quality of the creative person lies in his ability to allow preconscious material readily to achieve conscious expression (8:106).

Schachtel's perceptual theory, refers to freedom of approach in openness of the individual to the world about him. The two basic perceptual modes are autocentric and allocentric. Autocentric mode emphasizes how and what the person feels, and has close relation to, almost a fusion between sensory quality and pleasure and unpleasure feelings. Allocentric has objectification with emphasis on what the object is like. Essential development is from autocentric perception in early childhood to allocentric in adulthood. A secondary autocentricity develops during this metamorphosis that can block one's view of reality and lead to stagnation in a closed autocentric world. In this stage, objects are perceived as to how they will serve a need, how they can be used, or how they may be avoided in order to prevent pain. A struggle exists between the two tendencies of man: to remain open toward the world, capable of allocentric perceptions, or to seek the security of secondary embeddedness in a closed world and in the shared autocentricity of familiar perspective. Creativity signifies victory of allocentric over autocentric perception (8:113-4).
Schachtel indicates, as Getzels further extracts, that the essential differences between psychoanalytic and perceptual formulations is that where one conceives of creativity due to a "drive discharge function", the other conceives of it as due to an "openness in the encounter with the world." In extreme form, for the one creative behavior is seen as tension-reducing, for the other as tension seeking (8:114).

The mainspring of creativity appears to be man's tendency to actualize himself, to become his potentialities. It is the urge to extend, develop, and mature—the tendency to express and activate all the capacities of the organism, to the extent that such activations enchaince the organism of the self (16:67-8). According to Adler, the self searches for or creates experiences for development of its unique talents for self-satisfying and socially constructive accomplishment.

Self-esteem is a need that ranks high in man's hierarchy. It is likely to flourish when others feel pride in one's creativity. However, the basis of evaluation lies within himself, in his own reaction to and appraisal of his product. If to the person it has the "feel" of being "me in action", of being an actualization of potentialities in himself which have not before existed and are now emerging into existence, then it is satisfying and creative (16:67-8).
It involves risk-taking which seems essential, but one cannot know what he is capable of unless he tests his limits. Since creative children are daring, there should be control until skills are adequate, and then wide testing of their limits should be permitted (21:116).

FACTORS IN CREATIVE ABILITY

Creativity is regarded as a collection of different component abilities or other traits. Guilford's (1955) groups of thinking factors, as briefed and paraphrased from Stein, include:

1) Discovery factors—measuring an ability to develop information out of what is given by stimulation. Included here are perceptual classification, spatial orientation, education of patterns, and general reasoning.

2) Production factors—measuring the ability to produce words, ideas, expressions, orders, etc. Included here are word fluency, associational fluency, expressional fluency, ideational fluency, visualization, and redefinition.

3) Divergent thinking factor—here the common feature seems to be that in order to make a good score in a test, the examinee must allow himself to go off in different directions. Included here are adaptive flexibility, spontaneous flexibility, originality, and elaboration.

4) Evaluation factors—measuring the ability of the individual to determine whether any step in thinking is good, correct, reasonable, or suitable. Logical evaluation is the most promising factor here.

5) Symbolic factors—measuring the possession of symbols and abilities to manipulate them. Included here are verbal comprehension, numerical facility, symbol substitution, and symbol naming (18:158-61).
The divergent and cognitive areas are probably most important in creative talent. They are considered basic of the "fifty known factors" of the intellect (16:160). Cog­nitive tends toward the usual and expected, the other toward the novel and speculative. The one favors certainty, the other risk. One represents intellectual acquisition and conformity, the other intellectual inventiveness and inno­vation. Both processes are found in all people, but in varying proportions. Both have their places and both are recognized for their differences, commonalities, inter­actions and distinctive functions in the individual's psychic energy (8:13).

The brain is far too complex to hope that all of its intellectual activities can be represented by only a handful of dimensions. Of the fifty factors labeled, we may refer to about forty of these as "nonintelligence intellectual characteristics." They are being stressed in the search for creative individuals. More cases with high creativity scores are missed than are identified by using intelligence tests to locate creative talent (16:172). Guilford (1950) specified that as the factors comprising creativity were identified, it would be possible to select individuals on the basis of creative potentiality. He gives nine factors for which creative tests should be constructed: (1) sensitivity to problems, (2) ideational fluency, (3) flexibility of set,
(4) ideational novelty, (5) synthesizing ability, (6) analyzing ability, (7) reorganizing of redefining ability, (8) span of ideational structure, and (9) evaluating ability (11:440-54).

There are many paths along which people travel toward the full development and expression of their creative potential, and there is no single mold into which all creative individuals will fit. The full and creative picturing of the highly creative will require many images. McKinnon (1962) indicates they will likely reveal themselves in: (1) high level of effective intelligence, (2) openness to experience, (3) freedom from crippling restraint and impoverishing inhibitions, (4) esthetic sensitivity, (5) cognitive flexibility, (6) independence in thoughts and action, (7) high level of creative energy, (8) unquestioning commitment to creative endeavor, and (9) unceasing striving for solutions to the ever more difficult problems that he constantly sets for himself (14:15-17).

PROCESSES IN CREATIVITY

Emphasis in creativity measurement has been on the product rather than the process. However, the more recent assessment efforts have been focused on creative thinking abilities—those abilities presumed to be involved in creative thinking.

Torrance states that creative thinking includes the sensing of gaps or disturbing, missing elements; forming ideas
or hypothesis; and communicating the results, possibly modifying and retesting the hypotheses. Most analysts (Wallas, 1926; Patrick, 1955) identify four steps: preparation, incubation, illumination, and revision. The steps involved in this process evolve in an idea that may find embodiment in inventions, scientific theories, improved products or methods, novels, musical composition, paintings, or new designs (21:16-17).

CREATIVITY AND INTELLIGENCE

Torrance refers to the evidence cited by Baron (1955), Hargreaves (1927), Osborne (1948), Simpson (1922), and Thurstone (1953), concerning the independence of measures of intelligence and measures of creativity. He further states that in all attempts to assess the creative thinking abilities, the correlation tends to be low between measures of creative thinking ability and traditional measures of intelligence. Markey sought in various ways to explain away the relatively low correlation between mental age and creative behavior. Andrews recognized more clearly the difference between the two types of measures and concluded that "very little relationship exists between intelligence and the fantastic imagination of the young child" (22:9).
ASSESSMENT OF CREATIVE ABILITY

Torrance, in reviewing early assessment efforts, indicates typical methods of measurement during the elementary school years were Kirkpatrick's (1900) work with inkblots. Colvin (1906) used compositions, giving attention to such qualities as invention, sense of humor, imaginative power, and perceptive power. Simpson (1922) used fifty sets of small round dots, representing the four corners of squares, as the stimuli for constructions which assessed fluency, originality, and flexibility. Harms (1939) employed a test requiring the representation of words (mostly various actions) by single lines in grade one through twelve. Stephenson (1949) reports the use of a poetry-writing test and an art form test (22:9).

Since 1958, Torrance has been engaged in a continuing program of development and utilization of creative talent. Although attention has been given to a period from kindergarten through graduate school, concentration thus far has been on the elementary school period. A variety of tasks has been devised and an effort is being made to develop a comprehensive approach to the measurement and development of the creative thinking abilities.

Torrance (1964) has found, through numerous partial replications of the Getzels and Jackson (1962) studies at the elementary school level, that the MTCT (Torrance, 1962)
identifies a type of individual different from those identified by traditional intelligence tests. They are different from "intelligent" individuals in ways which may be regarded as "creative". In studies using the MTCT, coefficients of correlations between creative thinking scores and scores on intelligence tests tend to be higher for unselected groups than for highly talented groups, and higher for group-administered tests than for individual, orally administered. In unselected groups of elementary school children, coefficients of correlation are about .16 with performance on the Stanford-Binet, about .25 with scores on the California Test of Mental Maturity and the Kuhlmann-Anderson Intelligence Test, and about .32 with the Otis Quick-Scoring Test of Intelligence (19:86-8).

Torrance, since 1958, has sought to develop tasks for use with children. His 1962 version of the MTCT combines a verbal and nonverbal battery. Its scoring system evaluates fluency (total number of responses), flexibility (ability to make rapid mental shifts), elaboration (ability to expand ideas), and originality (uniqueness of responses) (21:44-6).

Stein (1959) pointed out that prediction of creativity involves two basic problems: (a) a better understanding of the psychological criteria of creativity, and (b) a better understanding of the environment. He believes that the more we learn about an individual, his environment, and their
inter-relationships, the closer we will come to solving the prediction problem. Creative behavior, like all other forms of human behavior, is a function of the transactional relationship between the individual and his environment. Other problems to be faced include the typologies of creative individuals, styles of creativity, and variations in psychological factors in different areas of creativity (24:281-3).

In Kaoru Yamamaoto's review of validation of tests of creative thinking, she concludes that satisfactory validities are not obtainable until and unless stable and consistent measures are developed. She suggests that (a) investigators have not come to an agreement as to the most meaningful and practical immediate criteria of creative-thinking; (b) every one of the easily obtainable measures (grades, teacher ratings, peer nominations, and psychiatric diagnoses) has shortcomings as a suitable criterion; and (c) more validation studies are urgently needed to establish both empirical and conceptual validities of the current instruments (24:281-90).

**RESEARCH ON ASSESSED CREATIVITY**

In creative research, the Getzels and Jackson (1959) experiment is one of the most notable and recent to be made. In this study the evidence suggests that intelligence tests are not effective measures of creative potential. It was found that about 70 per cent of the most creative individuals
would have been eliminated if a "gifted" group was being selected on the basis of an intelligence test. Intelligence measures account for only a small part of the variation in creative performance (Torrance, 1959) (McKinnon, 1959). Further findings of Getzels indicate the highly creative individual may achieve academically equal to the highly intelligent, that his ideas, values, and attitudes are likely to be unusual and different, that he is independent in his thinking, and that his teacher rates him below average in desirability as a student.

Torrance (1962) made five replications of the Getzels-Jackson (1958) study at the elementary level and the results from one school he studied for two years is generally consistent with the original research and replications. However, in view of their data, Getzels and Jackson raised the specific issue of whether it is emotional or motivational pathology, or distinctive intellectual ability that accounts for the superior scholastic ability of the creative students, despite their relatively lower intelligence. They also wonder if measures of intelligence reflect general potential or "capacity" to perform (8:27).

Brandwein (1955) states that there is no doubt that some teachers have invented a better teaching method than have others—better in the sense that they affect the growth of students in a wholesome and desirable way. From the
summary of his studies of 82 science teachers, he concluded that the traits which characterize students with high level ability also identify the teacher. These teachers are described as well trained, they like children, and on the average, they are 40 years of age (4:63-70).

When Torrance, more recently, conducted an experiment, it was found that the pupils of teachers scoring in the upper half of the sample on a measure of creative motivation or intellectual curiosity showed significant growth in creative writing during a three-month period. Pupils of the teachers scoring in the lower half failed to show any gain in creative writing during this period (20:91-2).

VIEWS ON EDUCATING FOR CREATIVITY

Nurturing creativity during the elementary school years is a problem that teachers, administrators, psychologists, and other school personnel have not been successful in solving. One difficulty is permitting spontaneity, initiative, and creativity in the classroom while maintaining control of the situation. This is Jules Henry's (1959) conclusion based on research data involving direct observations of teacher-pupil interaction and interviews with teachers on their ideas about classroom discipline (20:90-1).

Young children come to school with enthusiasm and curiosity for learning, and both often diminish as they proceed through school. Sanders (1961) points out that it may be a
natural phenomenon in child development, or it may be that school actually dulls enthusiasm for learning. He further indicates that the intellectual curiosity of the teacher may be a possible determining factor (20:91).

Boraas (1922) refers to Socrates as the teacher who helped young people to think. This educator would have more teachers in the schoolroom who stimulate and guide pupils to think honestly, persistently, and effectively about the important problems of life. He further emphasizes that all effective thinking is creative in the sense that it is not a repetition of something learned. It is a variation, an adaptation, and an invention. He states that people live mostly by habit rather than by thought. This need not necessarily be true since the original nature may be refined. It is not necessary that they should remain unchanged (3:1-18).

From the various researches and writings on creativity, particularly educating for creativity, the writer became interested in teacher creativity, pupil creativity, how each might be assessed and, once measured, how one might be related to the other.
CHAPTER III

RESEARCH INSTRUMENT AND PROCEDURES

Instruments involved in measuring creative thinking are mostly in the experimental stage. Since the MTCT is emerging after much experimentation, a lengthy description of it will be given. The MTCT has little or no evidence of available validity except that done by Torrance. Most of the following data is from Torrance's research and experiments.

MINNESOTA TEST OF CREATIVE THINKING

The Minnesota Test of Creative Thinking, Abbreviated Form VII (1962) was used in identifying creative thinking abilities in this study. This instrument, by Dr. Paul Torrance, developed after three years of experimenting, began with a partial adaptation of Guilford's (1951) materials. The MTCT manual includes specific directions for administering the four sub-tests and for scoring each of their tasks.

The MTCT has tasks appropriate for use from kindergarten through graduate school, for both sexes, and for diverse cultures. Its tasks have features that make use of what is known of the nature of the creative thinking processes, the qualities of creative products, the creative personality, and the conditions facilitating or inhibiting creative behavior. The selected tasks were chosen because they involve
divergent solutions, multiple possibilities, and thinking abilities theoretically involved in creative behavior. They are classified into three major categories: non-verbal tasks, verbal tasks using non-verbal stimuli, and verbal tasks using verbal stimuli. The verbal tasks have involved materials that stimulate the senses of sight, hearing, and touch. The scoring categories for the four sub-tests include fluency (total number of responses), flexibility (ability to make rapid mental shifts), elaboration (ability to expand ideas), and originality (uniqueness of responses) (22:11).

Task I: Figure Completion is an adaptation of the Drawing-Completion Test developed by Kate Franck and used in studies of creativity by Baron (1958). The ten incomplete figures (parallel lines, parts of geometric figures, numerals and alphabet) presumably set up in the subject tensions to complete it in the simplest and easiest way possible. Torrance contends that the subject must be able to handle his tensions and delay gratification of his impulse in order to produce an original and elaborate set of figures. Each figure elicits variability in originality, fluency, flexibility, and elaboration, and is separately scored in these categories. The scoring scale used for elementary level is based on frequency counts of the responses of 217 pupils from kindergarten through grade six. A scale value of zero is assigned to responses given by twelve per cent or more of the subjects.
Responses given by from five to twelve per cent are assigned a value of one; from two to five per cent, a value of two; from one to two per cent, a value of three; and less than one per cent, a value of four. The interscorer reliability for this sub-test provided by the test author is .82 (21:215).

Task III. Product Improvement is both verbal and non-verbal. It permits the subject to "regress in the service of the ego" and play around with ideas he would not express in a more serious task. He lists clever, interesting and unusual ways for changing a toy dog to make it more fun to play with.

Task IV. Unusual uses (Tin Cans) is a verbal task modeled from Guilford's Brick Uses Test. This task should be used in conjunction with Product Improvement.

The revised scoring procedures given in the manual are specific and rather easy to follow. Since responses in each category in the tasks have scaled values based on uncommonness of the response, the interscorer reliability claimed by Torrance for originality is .82, elaboration .93, and flexibility .94 (21:215). The improved scoring procedure now in use is time consuming to the extent that it would be almost prohibitive in volume situations (It took the researcher close to an hour per test in order to be certain of accuracy in scoring).
Evidence concerning the validity of the MTCT is scattered but encouraging. Most of the evidence established has involved one or the other of the following two approaches:

1. Identifying high and low groups on some test measure and then determining whether or not they can be differentiated in terms of behavior which can be regarded as 'creative.'

2. Identifying criterion groups on some behavior regarded as creative and then determining whether or not they can be differentiated by test scores (22:20).

Test-retest reliabilities after two weeks, three months, eight months, and twelve months in the phraseology of the test author have been "reasonably satisfactory." In intermediate grades, Torrance reports the reliabilities have been around .88 (20:19). Presumably these are among highest reliabilities and for this experiment with sixth graders this is fortunate.

SAMPLE

Sixth grade teachers and their pupils participated in the major testing phase of the study. The teachers were not informed at the time about the nature of the study. Following clearance from three building principals, teachers volunteered to take the MTCT and gave permission for their pupils to also be tested if it were later requested. The test was administered to six teachers during the first month of the school term. Since these teachers were in two widely separated schools, the test was administered to one group, then, one
week later to the other group. On the basis of the results of the MTCT, the high and low scoring teachers were identified. (They were both from one elementary school and were the first group to be tested.) The pupils of these two teachers became the Experimental Group and the Control Group.

PROCEDURE

Since it is intended that the MTCT, Form VI, be used as a written group test at the sixth grade level, the test was administered in the early Fall to the two groups under standardized instructions and procedures. The same test was administered six months later to the Experimental and Control Groups to determine possible change in the creative thinking abilities of these pupils.

In October no mention was made of a second test (retest) in the Spring. However, in gaining permission from the principal in April for the retest in May the principal, rightfully insisted on scheduling with the teachers. Permission was asked of each teacher "to test the children in April." Mention has been made of this situation under Limitations.

The groups of students from both classes were considered average or typical groups of the grades they represent. All classes were heterogeneously grouped, a school policy, being relatively evenly matched in intelligence, achievement, sex,
and age. The greatest portion came from middle class families residing in the immediate neighborhood.

To determine whether or not there was a significant difference in measured creativity between the Experimental Group and the Control Group in the Fall (pre-test), an analysis of the difference was made between the means (t-test) using formula for independent samples (6:131).

It was also of interest to determine whether Experimental and Control Groups differed on measured intelligence to further check the school on its assumed policy of making classes heterogeneous and relatively equal. A t-test of significance was run between Experimental and Control Groups on their California Test of Mental Maturity scores which were taken in October of their sixth grade. Again formula for independent samples was used (6:131).

Two ways of determining changes in the groups post-test performance were used. First, Experimental and Control Groups mean performance was checked for significance of difference using a t-test for independent samples. Second, a change or growth score was calculated by finding the difference between Fall and Spring performance for each group. This "growth" score was tested for significance between Experimental and Control Groups once again by using a t-test for independent samples (6:131).
CHAPTER IV

RESULTS OF THE INVESTIGATION

This study was an attempt to evaluate creative thinking abilities of children taught by a teacher of high tested creativity and that of a teacher of low tested creativity using the MTCT.

In an attempt to support that the two classes were heterogeneously grouped, but equitable, and were essentially two random samples drawn from the same sixth grade population, two measures of the groups were studied to describe the pre-test situation. First, it was important to find that no significant difference existed between measured creativity, or scores on MTCT, prior to the experiment. Table I shows that the mean difference of six raw score points cannot be considered a significant difference since the of 1.57 falls considerably short of meeting the 5 per cent level of confidence. We can assume the classes were reasonably equal in tested creativity at the beginning of the school year.

Second, it was of interest to determine whether tested intelligence was significantly different in the two groups at the beginning of the year in case intelligence might be construed to be a factor in the growth of creativity. Table I shows that although the Control Group had a mean IQ on the California Test of Mental Maturity of 4.62 points higher, the difference
TABLE I

PRE-TEST MEAN DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS ON THE MINNESOTA TEST OF CREATIVE THINKING AND CALIFORNIA TEST OF MENTAL MATURITY

<table>
<thead>
<tr>
<th></th>
<th>Experimental Mean</th>
<th>Control Mean</th>
<th>Difference Mean</th>
<th>Standard Error of Difference Mean</th>
<th>t</th>
<th>df</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTCT</td>
<td>146</td>
<td>140</td>
<td>6</td>
<td>3.79</td>
<td>1.57</td>
<td>47</td>
<td>.05</td>
</tr>
<tr>
<td>CTMM</td>
<td>105.38</td>
<td>110</td>
<td>4.62</td>
<td>5.61</td>
<td>.82</td>
<td>42</td>
<td>.05</td>
</tr>
</tbody>
</table>
was not a significant one. The groups can be considered to be reasonably equitable at the beginning of the experiment.

As the reader recalls the Experimental Group was taught by a teacher selected because of his highest score on the MTCT and the Control Group was taught by the lowest scoring teacher on the MTCT.

Post-tests of the Experimental and Control children were made in late April. Table II shows a mean difference of 32 in favor of the Experimental Group which is significant beyond the .01 level of confidence.

A second statistical check was used. A change or perhaps "growth" score was obtained by finding the difference between Fall and Spring MTCT scores for both Experimental and Control Groups. The means of these obtained scores were compared and as shown in Table III resulted in a difference significant beyond the 5 per cent level of confidence.

The null hypothesis that there is no difference in tested creativity of children taught by a teacher of high tested creativity and creativity of pupils taught by a teacher of low tested creativity is rejected.
**TABLE II**

**POST-TEST MEAN DIFFERENCE BETWEEN EXPERIMENTAL AND CONTROL GROUPS ON THE MINNESOTA TEST OF CREATIVE THINKING**

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Control Group N</th>
<th>Mean Difference</th>
<th>Standard Error of Mean Difference</th>
<th>t</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>172</td>
<td>140</td>
<td>49</td>
<td>32</td>
<td>4.25</td>
<td>7.57</td>
</tr>
</tbody>
</table>
Table III

Mean Difference in "Change" or "Growth" Scores Between Experimental and Control Groups on the Minnesota Test of Creative Thinking

<table>
<thead>
<tr>
<th>Experimental Group Mean &quot;Growth&quot; Score</th>
<th>Control Group Mean &quot;Growth&quot; Score</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>t</th>
<th>df</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.5</td>
<td>-1.47</td>
<td>23.97</td>
<td>8.93</td>
<td>2.65</td>
<td>47</td>
<td>.05</td>
</tr>
</tbody>
</table>
CHAPTER V

DISCUSSION

The present paper has presented a problem which dealt with the theory of creative thinking abilities. The Minnesota Test of Creative Thinking was employed as a measurement of creative thinking abilities of the teachers and their pupils. A resume of psychological theories concerned with creative thinking, and possible environmental factors effecting creativity has been presented. Also given were the experimental procedures and an analysis of the investigation. Although there are few empirical elementary school creativity studies to guide our thinking, there are efforts being made to discover potential creative capacity at an early age so that it does not become sidetracked into non-creative areas.

The hypothesis of this study was that there are no differences in the tested creativity of children taught by a teacher of high tested creativity and that of a teacher of low tested creativity. The findings allow this hypothesis to be rejected to the extent that the findings of this study might be replicated this is a finding of considerable importance. It suggests that highly creative teachers increase the creative thinking abilities of their pupils over the span of a school year.

It was implied in the limitations that implications drawn from this particular study would be very limited. This
is necessarily due to the selection of only one Experimental teacher and one Control teacher. The limitation gains significance when it becomes obvious to the researcher that the Experimental teacher not only scored highest of all sampled teachers but his "creative talent" was not only a test score or latent potential but a very manifest talent. He "created" far more teaching materials and devices than the usual teacher. Consequently one has to ask in retrospect, would another teacher who scores also similarly high on the MTCT show as great a manifest creativity and have the same effect on children as shown here through significantly raised MTCT scores?

Some support is gained when it is recognized that the limited studies to date have obtained results in this same direction. With evidence agreeing to date much of this discussion will more confidently focus on ways of eliciting creative talent from children--a background purpose of this study.

Some factors which may have influenced the children's creative growth may be found in the theory that each one was being successfully helped toward his potential. This research is focused on the "creative potential" of each subject. It is assumed that creative potential is to be found in all people--that if nurtured it will develop from a "closed to an openness of the individual to the world about him," and
his sensibilities will be more freely receptive to new reflections of the world and its objects. These are Schactel's views of creativity based on the perceptual theory (18:113).

He further contends that the main motivation at the root of creative experience is the individual's need to relate to the world around him. This is apparent in the young child's interest in all the objects around him (23:409).

In the process of socialization, Schachtel continues, the child learns to renounce, suppress, or to redirect drives and impulses that are at variance with proper social standards. It is during this socialization that the distinctive pattern of what will be expressed and what will be suppressed is established. It is also during this period that the pattern of behavior is learned. The individual's behavior is a function of the particular standards and values of the group in which he lives (8:17).

It is in this context that the data of this study is significant. The "creative potential" of the Experimental Group was developing at a rapid rate. In a similar experiment, Torrance (1962) found that pupils of teachers scoring in the upper half of the sample on a measure of creative motivation showed significant growth in creative writing during a three month period. Pupils of the teachers scoring in the lower half failed to show any gain in creative writing during this period (20:91).
Others who have suggested intellectual curiosity of teachers as a possible determining factor in creative development include Boraas (1922), Brandwein (1955), and Sanders (1961). Boraas gave Socrates as an example of how a teacher may help students to think. Rather than blindly accept traditions, the youths were helped to formulate their questions, to investigate, and come to conclusions of their own. Boraas further emphasized that every schoolroom needs a teacher who can stimulate and guide pupils to think honestly, persistently, and effectively (3:1-17).

When Brandwein (1955) explored the problem "What makes a Scientist?" he noted that many working scientists spoke of the influence of a teacher, or of two or three teachers, in their lives—not of teaching in general, but of the effect. These were teachers they trusted, who were sympathetic to their problems, and held firm and high standards of achievement (4:61-70).

Torrance has consistently affirmed that highly creative individuals prefer to learn creatively rather than by authority, and when given an opportunity to learn in this way achieve as well as their more intelligent but less creative peers. Recent experiments (Moore, 1961; Ornstein, 1961) suggest that many things can be learned more economically in a creative situation than in an authoritarian one, and that some people who learn little by authoritarian methods can learn much creatively. Researchers (Getzels and Jackson, 1962; Torrance
1962) are also finding that creative thinking can contribute importantly to the acquisition of information and educational skills (20:53).

There is evidence that teachers rate highly intelligent children as more desirable, better known or understood, more ambitious, and more hardworking or studious than highly creative children. These values and attitudes toward qualities they prefer in children may be subtly communicated to the child. The recognition and understanding needed by the highly creative child may fail to take place, and he may decide that it is wiser to be "successful" (conform?) than to be "gifted" (creative?) (8:19).

Nurturing creativity is not only a goal but a necessity. It is important to keep fantasy alive until the child has the intellectual development necessary for a sound type of creative thinking. Children must learn to distinguish between fact and fancy, but it is most important that it proceed without sacrificing creative growth. Music, art, literature, and the sciences are suggested outlet channels.

On the basis of exploratory research, including a review of the relevant literature, Torrance (1962) compiled the following 20 suggestions to teachers for nurturing creativity in the elementary school:

1. Value creative thinking.
2. Help children become more sensitive to environmental stimuli.
3. Encourage manipulation of objects and ideas.
4. Teach how to test each idea systematically.
5. Develop tolerance of new ideas.
7. Develop a creative classroom atmosphere.
8. Teach the child to value his creative thinking.
9. Teach children skills of avoiding or coping with poor sanctions without sacrificing their creativity.
10. Give information about the creative process.
11. Dispel the sense of awe of masterpieces.
14. Create necessities for creative thinking.
15. Provide for active and quiet periods.
16. Make available resources for working out ideas.
17. Encourage the habit of working out the full implications of ideas.
18. Develop skills of constructive criticism.
19. Encourage acquisition of knowledge in a variety of fields.
20. Be adventurous-spirited yourself (20:90-1).

Creativity is fostered when the individual has freedom of symbolic expression. This permissiveness is not softness or indulgence, but permission to be free, which also means that one is responsible. He is free to bear the consequences of his mistakes as well as of his achievements. He frequently attempts tasks that are too difficult for him, but he has the ability to cope with failure and frustration. It is this type of freedom and responsibility to be oneself which fosters the development of a secure locus of evaluation within oneself.

The fundamental problem of the highly creative individual in maintaining his creativity is in learning how to cope with the discomfort arising from his divergence--of so often being a majority of one. Some of the more important problems include: coping with the sanctions of society against diver-
gency, the alienation of one's friends through the expression of a talent, pressures to be a well-rounded personality, divergence from sex-role norms, desires to learn one's own way, attempts at tasks which are too difficult, searching for a purpose, having different values, being motivated by different rewards, and searching for one's uniqueness (21:124).

Problems arising by denying creative needs find the individual very conforming, too obedient, lack of confidence in his own thinking, uncertain of his self-concept, and overly dependent on others for making decisions.

A tragic kind of disability occurs in the case of the potentially creative individual who never finds anything which challenges him, anything worthy of his best efforts. He may fail to learn basic skills and later bog down because he does not have the fundamental skills for doing the creative work which he desires. When prevented from learning creatively, he may lose interest and refuse to learn by authority.

High creatives may from time to time need help in accepting themselves, as they may even despise an outstanding "gift" if their giftedness makes them different from others. Gardner Murphy (1958) points out that creative people may suffer anguish from specific discoveries through social disapproval (21:105). The child must learn either to repress his creativity or to cope with the tensions that arise from being frequently a majority of one. Their repressions lead, to loneliness, conflicts, and other problems of adjustment.
The highly creative child may also need help to maintain his aggressiveness without becoming hostile; to work alone, without becoming isolated, withdrawn, or uncommunicative; and to become less obnoxious without sacrificing creativity. He may need help in learning to deal with his anxieties, fears, hardships, and failures.

Personal soundness is not an absence of problems but a way of reacting to them. Pauline Pepinsky's (1960) successful strategies for coping with the dilemma of expression or repression of creative needs are:

1. The individual translates his own ideas into language relavent to others so that they see his contributions as instrumental to their own needs.

2. He states his criticism in a positive and constructive way.

3. He makes it evident that basically he stands for something that commands the respect of others in the group.

4. He minimizes personal threats to others by granting them dignity.

5. He builds up a "credit rating" and "buys" more freedom over a period of time by initial service in terms of existing demands and requirements.

6. He focuses on the job to be done, and not on acquiring status as an end in itself.

7. He takes into account matters of timing; he is able to delay responses as well as act upon them (21:139).

It is further assumed that psychological needs of highly creative individuals are much like those of other people. It has become increasingly apparent that capable supervision, adequate rewards and recognition, and an
environment that does not frustrate his efforts are needs that are vital for his success. It is not so much in his basic needs, but more in the detailed means by which his needs are met, that the highly creative differs from other pupils.
CHAPTER VI

SUMMARY

The purpose of this study was to investigate the creative thinking abilities of teachers and the tested creativity of their pupils. The instrument used to identify creative thinking abilities was the Minnesota Test of Creative Thinking (MTCT).

Two sixth grade teachers and forty-nine sixth grade pupils were used as subjects in this study. The MTCT was first administered to several teachers to identify the high scoring teacher and the low scoring teacher. These were labeled the "highly creative" teacher and the "less creative" for purposes of the experiment. Pre- and post-tests (October-April) were administered to their pupils.

The hypotheses was rejected that there are no differences in the tested creativity of children taught by a teacher of high tested creativity and that of a teacher of low tested creativity. Children under the tutelage of the "highly creative" teacher scored significantly higher on the post-test of the MTCT than children in the classroom of the "less creative" teacher.

These results are consistent with the limited research on this subject to date. Some implications are drawn and suggestions given for eliciting creativity in children.
BIBLIOGRAPHY


