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No. 4825

A STUDY OF CREATIVITY AND EDUCATION

THESIS

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

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Denton, Texas

May, 1974

Cook, Ellen L. Goldston, A Study of Creativity and Education.

Master of Science (Secondary Education), May, 1974, 140 pp., 25 tables, 2 figures, bibliography, 40 titles.

This investigation is concerned with the identification of creative students in the classroom. One purpose of the study is a search of the literature to determine the emphasis given to creativity in education today. A second is to determine if a measure of creativity given to a group of students would reveal a discrimination between the students.

The measure of creativity used in this study was the Christensen-Guilford Fluency Tests. The sample group for the study included fifty-two male and fifty-three female students in the ninth grade of the Richardson Independent School District in Dallas, Texas.

This study concludes that measurements of mental abilities must include measurements of creativity as well as intelligence if the more gifted students are to be recognized.

PREFACE

The truly creative mind in any field is no more than this: A human creature born abnormally, inhumanly sensitive. To him a touch is a blow, a sound is a noise, a misfortune is a tragedy, a joy is an ecstasy, a friend is a lover, a lover is a god, and failure is death. Add to this cruelly delicate organism the overpowering necessity to create, create, create--so that without the creating of music or poetry or books or buildings or something of meaning, his very breath is cut off from him. He must create, must pour out creation. By some strange, unknown, inward urgency he is not really alive unless he is creating.

Pearl Buck, "Points to Ponder,"
Reader's Digest, CII (June, 1973),
196.

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CHAPTER I

INTRODUCTION

Once upon a time, the animals decided they must do something heroic to meet the problems of "a new world." So they organized a school.

They adopted an activity curriculum consisting of running, climbing, swimming, and flying. To make it easier to administer the curriculum, all the animals took all the subjects.

The duck was excellent in swimming, in fact better than his instructor; but, he made only passing grades in flying and was very poor in running. Since he was slow in running, he had to stay after school and also drop swimming in order to practice running. This was kept up until his web feet were badly worn and he was only average in swimming. But average was acceptable in school, so nobody worried about that except the duck.

.....

The squirrel was excellent in climbing until he developed frustration in the flying class, where his teacher made him start from the ground up instead of from the treetop down. He also developed "charlie horses" from over-exertion and then got C in climbing and D in running.

The eagle was a problem child and was disciplined severely. In the climbing class he beat all the others to the top of the tree, but insisted on using his own way to get there.

At the end of the year an abnormal eel that could swim exceedingly well, and also run, climb, and fly a little, had the highest average and was valedictorian¹

¹G. H. Reavis, "The Animal School," Handbook of Singing, Richard B. Rosewall (Evanston, 1961), p. 106.

Educators should ask themselves if this is not in fact what is happening in "The People School." Are students frustrated by being required to climb slowly step by step, when they should be encouraged to soar rapidly to the heights of which they are capable? Wolfe questions whether our schools should be used for the cultivation of diversity among the students or for the imposition of uniformity of thought?² The educational challenge for the immediate future is the task of finding ways to bring creative underachievers up to their cognitive potential and to raise cognitive potential by educational procedures.³

Basis for Study

The educator who understands and appreciates creative ability in his students has a need for a means of measuring this ability. This measurement would enable him to recognize creative ability while it was still potential and to include in the gifted category the students with a high degree of creativity as well as the students with a high I. Q.⁴ The educator who accepts this definition of giftedness will be able to

²Dael Wolfe, "Diversity of Talent," The Discovery of Talent, The Walter Van Dyke Bingham Lectures on the Development of Exceptional Abilities and Capacities, edited by Dael Wolfe (Cambridge, 1969), pp. 145, 147.

³J. P. Guilford, Intelligence, Creativity and Their Educational Implications (San Diego, 1968), p. 143.

⁴E. Paul Torrance, Creativity (Washington, 1963), p. 28.

develop new methods and techniques for teaching so his students will learn in the ways best suited to their motivations and abilities.⁵

The research studies of Guilford, Torrance, Getzels and Jackson, MacKinnon, and others provide a basis for the effective development of creativity in education.⁶ Measures of creative thinking were developed in the course of this research. Although these creativity tests are still considered to be in the research and development stage, the use of them has resulted in an expanded concept of the human mind and its functioning.⁷ The measurement of mental abilities must include measurements of both intelligence and creativity if the educator is to discover the creative potential his students possess and to formulate the educational environment necessary to permit the students to achieve their potentialities.⁸

The development of creativity in students must be an educational objective. Guilford said:

Creative education aims at a self-starting, resourceful, and confident person, ready to face personal, interpersonal,

⁵Hugh Lytton, Creativity and Education (New York, 1972), p. 97.

⁶T. A. Razik, "Psychometric Measurement of Creativity," Creativity, edited by P. E. Vernon (Harmondsworth, 1970), pp. 165-166.

⁷Torrance, Creativity, p. 9.

⁸Lillian Zach, "The I. Q. Debate," Today's Education, LXI (September, 1972), 68.

and other kinds of problems. Because he is confident, he is also tolerant where there should be tolerance. A world of tolerant people would be peaceful and cooperative people. Thus creativity is the key to education in its fullest sense and to the solution of mankind's most serious problems.⁹

Overview of Study

The aim of this study is the identification of the creative person and the creative product. If the creative student is to be recognized in the classroom, the teacher must have a knowledge of what constitutes a creative situation and what is involved in the various stages of the creative process. This understanding will enable the teacher to be tolerant as his students work and to be accepting of their creative products.

A knowledge of the relationship between creativity and the various psychologies is necessary for the educator who wishes to facilitate the development of creativity in his students. The implications for education of teaching for creativity are assessed since the research of others has determined that education for creativity is feasible.

The use of a measure of creativity as a means of identifying the creative student is investigated in this study. The study is concerned with whether or not a discrimination can be revealed between the

⁹Guilford, Intelligence, Creativity, p. 147.

highly-intelligent students, as determined by an I. Q. test, and the highly-creative students, as determined by a measure of creativity. The creativity test used in this study is the Christensen-Guilford Fluency Tests. The students in the sample group were in the ninth grade in the Richardson Independent School District. These students were primarily of average or above-average intelligence, with half of them being in accelerated classes and half of them being in heterogeneous classes.

The identification of creative students who were not in the accelerated classes and non-creative students who were in the accelerated classes is made. This discrimination between the students using a measure of creativity leads to the conclusion that measurements of mental abilities must include measurements of creativity as well as intelligence if the more gifted students are to be recognized and permitted to benefit from the accelerated class situation.

CHAPTER II

CREATIVITY

Recognition of the creative potential and creative characteristics of students enables the educator to allow a creative situation to develop. Understanding the creative process as it is performed by the student and rewarding the creative product when it is brought forth by the student are important functions of the educator. The educator must accept a definition of creativity and the creative person into which he can accommodate the various creative aspects of the school day and the student's behavior. This definition will permit him to support and encourage the students in their creative endeavors.

Definition of Creativity

No consensus as to how creativity is to be recognized exists, and different authors have employed various criteria as to what constitutes the creative person. Freud and Sharpe considered the creative person one who was generally acclaimed for creative eminence. Eiduson considered the creative person one who pursued acknowledged creative activities. Rossman, Clifford, and Drevdahl and Cattell used as a criteria the published works or artistic creations of persons.¹

¹A. J. Cropley, Creativity (London, 1967), p. 7.

Educators have defined the gifted child as one with a high I. Q. score and the creative child as one who has artistic talents. This conception of the gifted child has blinded educators to other forms of potential excellence and presupposes that the I. Q. test represents an adequate sampling of all of the child's intellectual functions.² Further, it has resulted effectively in the elimination of 70 per cent of the most creative from the gifted child category, according to Torrance, who states, "This percentage seems to hold fairly well, no matter what measure of intelligence we use and no matter what educational level we study, from kindergarten through graduate school."³ The conception of the artistic child only as being creative has limited attempts to identify and foster cognitive abilities related to creativity in other areas.⁴

Creativity has been defined as the ability to bring something new into existence, whether it be an original idea, a different point of view, a work of art, a technological innovation, or a new way of looking

²J. W. Getzels and P. W. Jackson, "The Highly Intelligent and the Highly Creative Adolescent," Creativity, edited by P. E. Vernon (Harmondsworth, 1970), p. 189.

³E. Paul Torrance, "Education and Creativity," Creativity: Progress and Potential, edited by Calvin W. Taylor (New York, 1964), p. 53.

⁴Getzels and Jackson, "The Intelligent and the Creative Adolescent," p. 53.

at problems.⁵ Creativity encompasses the ability to bring "new order out of non-order, new form out of the formless, a comprehensible out of the incomprehensible . . ."6 The ability to produce both relevant and unusual ideas, to make a response which will solve a problem, fit a situation, or accomplish some recognizable goal is involved. Further, creativity includes the sustaining of the original insight, an evaluation and elaboration of the insight, and a developing of it to the full.⁷ Creativity which shatters the mold of custom and extends the possibilities of thought and perception represents the highest order. This creative novelty represents a rearrangement of existing knowledge into something new which is an addition to knowledge.⁸ A lower order of creativity is subjective creativity. A person can be subjectively creative when he

combines things in ways that are individual to him, when he does not simply imitate, but regroups given stimuli or data

⁵John D. Roslansky, Creativity: A Discussion at the Nobel Conference Organized by Gustavus Adolphus College, St. Peter, Minnesota, 1970 (Amsterdam, 1970), p. 19.

⁶Stanley Krippner and Myron Arons, "Creativity: Person, Product, or Process?" The Gifted Child Quarterly, XVII (Summer, 1973), 116-118.

⁷Donald W. MacKinnon, "The Nature and Nurture of Creative Talent," The Discovery of Talent, The Walter Van Dyke Bingham Lectures on the Development of Exceptional Abilities and Capacities, edited by Dael Wolfle (Cambridge, 1969), p. 186.

⁸George F. Kneller, The Art and Science of Creativity (New York, 1965), p. 4.

by means of his own thoughts or actions, irrespective of the effect his creation has on others. A person can be subjectively creative even if thousands of others have acted similarly . . .⁹

The definitions for creativity range from the concept of its being simple problem-solving to that of the full realization and expression of all of the individual's unique potentialities. The term properly carries all of these meanings and others, too.¹⁰

Much of the recent work connected with divergent thinking, or open thinking, has been reported as an investigation of creativity. The independent variable in these studies has been the tendency towards divergent thinking, not creativity. While psychologists refer to divergent thinking as creativity, this connotation "does not make the assumption that a preference for the divergent mode of thinking is necessarily directly related to creativity in the aesthetic and professional sense."¹¹ Creativity per se, defined as a unique manifestation of talent in a particular field of endeavor, is a particularized substantive capacity. The divergent thinking tests measure the creative abilities which implement the expression of creativity. Creative potentialities are converted into creative achievements by these supportive abilities.

⁹Lytton, Creativity and Education, p. 3.

¹⁰Roslansky, Creativity, p. 19.

¹¹Cropley, Creativity, pp. 7-8.

Creative potentialities are normally distributed in the population with the differences among individuals being in degree rather than in kind.¹² These supportive abilities are often called into play together, though in differing degrees. Therefore, they can be grouped under a single term, creativity, to define a mental process.¹³ The process can lead to many kinds of products, whether verbal or non-verbal, concrete or abstract.¹⁴

Major Aspects of Creativity

The person who creates, the environmental and cultural influences which allow for creation, the mental processes by which he creates, and the products of the creative process represent four categories into which reliable definitions of creativity are divided.

The Creative Person

To be creative is to fulfill oneself as a person.¹⁵ The creative person, whether he be an artist or a scientist, finds a new unity in the variety of nature. He finds unexpected likenesses between things.

¹²David P. Ausubel, "Fostering Creativity in the School," Accelerated Learning and Fostering Creativity, edited by David W. Brison (Toronto, 1968), p. 11.

¹³Kneller, The Art and Science of Creativity, p. 9.

¹⁴Torrance, Creativity, p. 4.

¹⁵Kneller, The Art and Science of Creativity, p. 89.

thought to be different; this gives him a sense of richness and of understanding.¹⁶

A number of abilities are characteristic of a creative person. These abilities determine whether he has the power to exhibit creative behavior to a noteworthy degree, but his motivational and temperamental traits determine whether or not he will actually produce results of a creative nature.¹⁷ The degree to which the person exhibits these abilities is determined by four factors: his intellectual characteristics, his motivational characteristics, his personality characteristics, and his environmental characteristics.

Intellectual characteristics. --Barron wrote that "intelligence is a complex set of interrelated aptitudes and abilities, some verging closely on the temperamental." This statement could be applied to creativity.¹⁸ The intellectual characteristics which appear to have some relationship to creative performance fall within the categories of memory, cognition, evaluation, convergent production, and divergent production. The divergent production factors which involve the

¹⁶Jacob Bronowski, "The Creative Process," Creativity, edited by John D. Roslansky (Amsterdam, 1970), p. 12.

¹⁷Guilford, Intelligence, Creativity, p. 77.

¹⁸H. J. Butcher, Human Intelligence, Its Nature and Assessment (London, 1968), p. 95.

production of multiple possible solutions in quantity and in quality, originality, adaptive and spontaneous flexibility, sensitivity, and ability to redefine are the most important. Fluency in association, expression, ideation and words is included in the factors which measure intellectual abilities but is generally ignored in talent searches and in most educational programs.¹⁹

Creative talent requires intelligence, and the creative mind is attracted by the unknown and the undetermined. It is stimulated by risk and uncertainty and is innovative, exploratory, and venturesome. It prefers to devise new categories rather than to absorb the new into the already known in order to expand existing categories.²⁰ The intelligence of the creative person can be measured by the quality of his accomplishments or by standardized tests, but there is essentially zero correlation between his measured intelligence and the judged creativeness of his work.²¹ Other intellectual characteristics of the creative person--idea manipulation power, nonverbal originality, mental imagery, intuition and preconscious rapport, and long-range, sustained, incubation-like thinking--cannot be adequately measured.

¹⁹John L. Holland and Calvin W. Taylor, "Predictors of Creative Performance," Creativity: Progress and Potential, edited by Calvin W. Taylor (New York, 1964), pp. 19-20.

²⁰Kneller, The Art and Science of Creativity, pp. 6-7.

²¹Rosdansky, Creativity, p. 27.

with tests currently in use, although they have been recognized as important.²²

Motivational characteristics. --The tendency to be self-actualizing is the primary motivation for creativity. This tendency exists in every individual and requires only the proper conditions to be released and expressed.²³ The creative person is strongly motivated to achieve in situations which allow for independence of thought and action, but in situations which demand conformity he has less motivation.²⁴ Curiosity, which includes the desire to know, to gain information, to increase competence, and to self-actualize, is a strong motivation for the creative person.²⁵ He has positive reactions to new, strange, incongruous, or mysterious elements in his environment. He exhibits a persistence in examining and exploring stimuli and in seeking new experiences.²⁶ Drive, dedication to work, resourcefulness, striving for general principles, desire to bring

²²Calvin W. Taylor, "Some Knowns, Needs, and Leads," Creativity: Progress and Potential, edited by Calvin W. Taylor (New York, 1964), p. 180.

²³C. R. Rogers, "Towards a Theory of Creativity," Creativity, edited by P. E. Vernon (Harmondsworth, 1970), p. 140.

²⁴Roslansky, Creativity, p. 29.

²⁵Guilford, Intelligence, Creativity, p. 123.

²⁶Torrance, Creativity, p. 12.

order out of disorder, and desire for discovery are also important motivational factors.²⁷

Personality characteristics. --The complexity of the personality of creative persons has proved as valid as any other device for discovering creative talent. They tend to produce adaptive responses that are original in nature on multiple-choice biographical questions.²⁸ Willingness to take risks, possession of a broad variety of environmental information, high levels of flexibility, and an adequate level of intellect are the chief factors which determine whether thinking is likely to be of the divergent kind or the convergent kind.²⁹ The highly divergent person exhibits characteristic qualities, such as adventurousness, unwillingness to accept authority, humor, and ability to ask awkward questions, which are usually admired in boys, but seldom valued in girls. "The accepted behavioral norms for girls in our culture are considerably less favorable to divergent thinking than are those for boys."³⁰

The ability to see patterns in data and to sense problems is a characteristic of gifted and creative persons. This awareness of

²⁷Taylor, "Some Knowns, Needs, and Leads," p. 180.

²⁸Holland and Taylor, "Predictors of Creative Performance," pp. 27-28.

²⁹Cropley, Creativity, p. 51.

³⁰Cropley, Creativity, p. 63.

problems involves the rejection of superficial explanations and the ability to sense ambiguities and to question effectively.³¹ The creative person sees a problem in a light different from that in which it was originally presented. Sufficient information to solve the problem is requisite, but an excessive amount would make the problem appear to be more complex than it actually is. This constructive discontent requires the reconciliation of "the opposites of expert knowledge and the childlike wonder of naive and fresh perception."³²

A second characteristic is a wide range of interests and abilities. Open to experience and seeking to know as much about life as possible, observant and placing high value on accurate reporting of observations, the creative person senses more complexities in the world than others do and is more than usually sensitive to his environment.³³ He prefers the richness of perceptual complexity to the relative poverty of a simplified geometrical design. This preference for the visually complex, as measured by the Art Scale, indicates a high discrimination value between the creative and the non-creative.³⁴

³¹Holland and Taylor, "Predictors of Creative Performance," p. 21.

³²Roslansky, Creativity, pp. 21-23.

³³Holland and Taylor, "Predictors of Creative Performance," p. 23.

³⁴Lytton, Creativity and Education, p. 51.

The creative person has a personal courage of the mind and spirit. He is willing to question that which is generally believed, accepting nothing on the mere assertion of his teachers.³⁵ He exhibits a skepticism which makes him more skeptical of accepted ideas and less suspicious of new ones. This predisposes him to take the intellectual risks of creative discovery.³⁶ Capable of revolt against some of man's past knowledge and experiences, he is willing to be destructive in order that something better can be constructed and to think thoughts unlike any one else's.³⁷

A preference for abstractions, generalizations, and concepts is characteristic of the creative person.³⁸ Intuitive in his perceptions and in his thinking, he immediately grasps the deeper meanings, the implications, and the possibilities for use or action.³⁹

The creative person is independent in his thought and action. He is self-confident, leading to the question of which came first-- originality yielding success or self-confidence yielding originality.

³⁵MacKinnon, "The Nature and Nurture of Creative Talent," p. 209.

³⁶Kneller, The Art and Science of Creativity, p. 65.

³⁷Roslansky, Creativity, p. 32.

³⁸Marvin D. Alcorn, James S. Kinder and Jim R. Schunert, Better Teaching in Secondary Schools (New York, 1970), p. 210.

³⁹Roslansky, Creativity, p. 30.

He exhibits a lack of anxiety about non-conformist responses.⁴⁰ His self-assurance is manifested by confidence in his own judgment and his own evaluations of his work.⁴¹ His creative products must be satisfying to him, with the value of the product established by him.⁴² Accepting responsibility for his decisions, he is sometimes willing to do no work at all in school courses which do not strike his imagination.⁴³

A sixth characteristic of the creative person is his preference for working independently. This preference for independent thought and action may be the factor which accounts for the lack of correlation between the creative person's grades in school and his subsequently demonstrated creativeness.⁴⁴ He is willing to follow his intuition rather than logic, to imagine the impossible and try to achieve it, to stand aside from the collectivity and in conflict with it, if necessary, to become and to be himself.⁴⁵ His nonconformity may be disruptive.

⁴⁰Lytton, Creativity and Education, p. 101.

⁴¹Guilford, Intelligence, Creativity, p. 111.

⁴²Rogers, "Towards a Theory of Creativity," pp. 143-144.

⁴³MacKinnon, "The Nature and Nurture of Creative Talent," P. 209.

⁴⁴Roslansky, Creativity, p. 28.

⁴⁵Roslansky, Creativity, p. 32.

in the classroom, but the creative person is an involved person at almost any academic level. He shows a willingness to take greater and more long-range risks for greater gain and is willing to try a variety of approaches. An over-abundance of raw material for the task at hand is accumulated by him.⁴⁶

Motivation is not a problem; the creative person learns quickly and easily. He enjoys exploring ideas for their own sake, playing with them to see where they will lead him. Spontaneous play with ideas, colors, shapes and relationships is the source of his hunches, his creative seeing of life in new and significant ways.⁴⁷ This creative behavior is substituted for and is a continuation of the play of childhood.⁴⁸

He exhibits a marked concentration and attention span. He is discerning, with a high degree of sensitivity to problems. He is observant of things that are in need of improvement or that have an inadequate solution.⁴⁹ This observation, coupled with a persistence that helps him to sustain his interest in a problem, is an important

⁴⁶Holland and Taylor, "Predictors of Creative Performance," p. 24.

⁴⁷Rogers, "Towards a Theory of Creativity," p. 144.

⁴⁸Kneller, The Art and Science of Creativity, p. 29.

⁴⁹Guilford, Intelligence, Creativity, p. 107.

factor in his creativity. Creative persons "work intermittently over long periods of time (though perhaps almost continually below the conscious level) on their key problems." Capable of concentrating his attention and of shifting it at appropriate intervals, the creative person can manipulate several ideas at the same time, forming and testing hypotheses, foreseeing consequences, inferring causes, evaluating revisions in products, and putting forward his ideas.⁵⁰

The creative person is very articulate, being quite fluent in his ability to scan thoughts and produce those that serve to solve the problems which he undertakes. He has a wide range of information at his command and is able to put the elements of his experience into new combinations.⁵¹ This fluency permits him to produce many ideas on a subject, which he may or may not express verbally.⁵²

The creative person has tremendous energy and experiences large quantities of tension because of the richness of his experience and the strong opposites of his nature.⁵³ A sense of humor is valued by the creative person. In the study done by Getzels and Jackson, this sense of humor was ranked second among the traits most preferred by

⁵⁰Holland and Taylor, "Predictors of Creative Performance," p. 22.

⁵¹Roslansky, Creativity, p. 29.

⁵²Kneller, The Art and Science of Creativity, p. 63.

⁵³MacKinnon, "The Nature and Nurture of Creative Talent," p. 209.

the highly creative students.⁵⁴ This sense of humor permits him to express feelings that a normal person would repress. It is "a sign of the intensity of his emotions, which seek a release this way."⁵⁵

A sense of social and ethical values is characteristic of the creative person. Congruent with his intuitiveness, he values most highly the theoretical and the aesthetic. This orients him to seek a deeper and more meaningful reality beneath or beyond that which is present to his senses. To be satisfactory to him, his solutions to problems must be aesthetically pleasing.⁵⁶ Sustained by faith in his creative powers, he possesses an inner confidence in the worth of his work. "He may have a sense of mission, even of destiny."⁵⁷

The creative person often creates a tension in his group because his ideas and work represent a threat to the status quo. A further tension is created between him and his teachers because of his tendency to strive for more comprehensive answers and to be intellectually thorough.⁵⁸ More of an individualist than the average

⁵⁴Getzels and Jackson, "The Intelligent and the Creative Adolescent," p. 196.

⁵⁵Kneller, The Art and Science of Creativity, p. 66.

⁵⁶Roslansky, Creativity, p. 31.

⁵⁷Kneller, The Art and Science of Creativity, p. 68.

⁵⁸Holland and Taylor, "Predictors of Creative Performance," p. 26.

person, he craves tolerance of his efforts, if not special treatment.⁵⁹ He is more interested in his own ideas than he is in popularity and acceptance by his peers. However, he is able to maintain a balance between his self-centeredness and group-centeredness. He remains sufficiently attuned to the ideas of others that he does not lose touch with the thinking of his society.⁶⁰

The creative person tends to show evidence of his creative talent early in life. Lytton stated that "a distinction between convergent and divergent traits, independent of intelligence, has been shown faintly as early as in the pre-school years and certainly in the primary grades."⁶¹ The creative person has been found to be interested in and aware of unconventional careers as a young person.⁶² Creative work of a superior quality is usually produced by the time he has reached the age of thirty.⁶³

A knowledge of the characteristics of the creative person is important for the educator. Recognition of some degree of creative

⁵⁹Guilford, Intelligence, Creativity, p. 195.

⁶⁰Kneller, The Art and Science of Creativity, pp. 67-69.

⁶¹Lytton, Creativity and Education, p. 114.

⁶²Holland and Taylor, "Predictors of Creative Performance," p. 25.

⁶³Guilford, Intelligence, Creativity, p. 142.

potential in everyone and of every person's different pattern of abilities will lead to an education in which the focus is on the individual and in which the educator will support and encourage his students in their creative efforts.⁶⁴

Environmental characteristics. --Environmental influences, including those of the home, the school, working conditions and climate, and training programs, exert either positive or negative effects on creative attributes.⁶⁵

The most versatile person is one who can operate in either a convergent situation or a divergent situation. He usually comes from a home in which the parents do not tend towards either extreme in child-rearing practices. They do not over-control the child nor are they guilty of grossly under-controlling permissiveness.⁶⁶ These parents permit their child

to function independently and treat him as a worthwhile person with worthwhile views of his own. They lay stress on logic and order, and are thus sometimes inconsistent in their behavior, but they are tolerant of playful non-logical regressive behaviors of the kind which are known to be important in creative functioning.⁶⁷

⁶⁴Guilford, Intelligence, Creativity, p. 195.

⁶⁵Holland and Taylor, "Predictors of Creative Performance," p. 29.

⁶⁶Cropley, Creativity, p. 67.

⁶⁷Cropley, Creativity, p. 62.

In the school, most of the creative characteristics of the students are not stressed and are often ignored. In many cases, the creative person is penalized. His honest curiosity, genuine independence of thought, and wit are seen by the teacher as "signs of rebelliousness and lack of cooperation springing from sheer malice."⁶⁸ Getzels and Jackson did a study of teacher reactions to convergent and divergent thinkers. They found that the teachers preferred "students whose results were obtained by the application of convergent, authority-centred [sic], conventional thought processes over those who tended to be highly creative in obtaining equally good results." This finding was supported by a study Torrance made in 1959.⁶⁹ The educator encounters a variety of problems when he permits spontaneity, initiative and creativity in the classroom. These include:

1. a threat to discipline in that the idle and malicious members of the class will take advantage of the disruptions of the creative;
2. the unexpected responses of the creative which may disconcert the teacher;
3. the time factor in which diversions take up valuable time;
4. the creative child's seeing relationships and significances of which the teacher is unaware;

⁶⁸Cropley, Creativity, p. 73.

⁶⁹Cropley, Creativity, p. 71.

5. embarrassing questions which the teacher may be unable to answer;
6. teacher sanctions against guessing and playfulness, which are considered by the teacher to be an inferior level of problem-solving activity;
7. time pressures and scheduling problems; and
8. the realistic knowledge that children must be taught to conform in many ways in order to get along in life.⁷⁰

In American education at all levels, the educator often fails to distinguish between convergent and divergent abilities. Sometimes, he attempts to convert the divergent students into convergent students.⁷¹ This reduction of variability among the student population is a result of the methods developed for dealing with people in groups. The use of uniform lesson assignments, general aptitude measures, and the average grade or rank in class as the device for selecting the students for the next higher educational level places a premium on uniformity and conformity.⁷² In addition to teacher pressure for conformity, the student also encounters a peer-group pressure. If he deviates from the behavioral norm, he is pressured to conform or be considered eccentric.⁷³ Another negative influence on creative production is the

⁷⁰Torrance, "Education and Creativity," pp. 91-92.

⁷¹Getzels and Jackson, "The Intelligent and the Creative Adolescent," p. 202.

⁷²Wolfe, "Diversity of Talent," p. 144.

⁷³Butcher, Human Intelligence, pp. 111-112.

practice of stating the rules of procedure which will remain unaltered. The creative process may require the emergence of a new rule or a new combination of rules.⁷⁴ A biographical study by V. Goertzel and M. G. Goertzel in 1962 indicated that many eminent people received individual instruction rather than group instruction.⁷⁵ This would lead one to infer that the group instruction received by students in the schools is detrimental to their creative ability.

The Creative Situation

The creative situation is one in which the person can open himself to the world--to listen to life and to remain alive to his curiosity. Knowledge is used to help him come to terms with the world, making it applicable to and a part of his attitude toward life. New connections are created between knowledge acquired in one lesson and that drawn from other areas of his experience. This creation of new patterns of ideas, placing them where they can touch his experience at many points and interact with a range of thoughts and feelings, results generally in a product of insight--a creative product.⁷⁶

⁷⁴Kurt Danziger, "Fostering Creativity in the School--Social and Psychological Aspects," Accelerated Learning and Fostering Creativity, edited by David W. Brison (Toronto, 1968), p. 20.

⁷⁵Guilford, Intelligence, Creativity, p. 195.

⁷⁶Kneller, The Art and Science of Creativity, pp. 91-97.

Realization of creative potentialities is dependent on the guidance, stimulation, and encouragement that the creative person receives from such agencies as the school. Torrance said, "Research tells us that children and adults develop along the lines that they find rewarding. If schools are to develop creative thinking abilities, they must devise ways of rewarding this kind of thinking or achievement."⁷⁷

In the schools, there has been a tendency to emphasize the convergent response by students; yet, in everyday life, most of the problem solving involves divergent thinking.⁷⁸ A 1968 study by Haddon and Lytton was made to determine if the pupils of a traditional school would have higher or lower divergent scores than those who attended an informal school. Their prediction that the children from the informal schools would have higher divergent scores was borne out. The primary difference between the two schools lay in the degree of emphasis placed upon self-initiated learning in the informal school.⁷⁹ Educators must give more attention to the development of divergent thinking skills and must show more tolerance of outcomes of divergent thinking in order to provide a creative situation in the schools.⁸⁰

⁷⁷Ausubel, "Fostering Creativity in the School," p. 14.

⁷⁸Guilford, Intelligence, Creativity, p. 8.

⁷⁹Lytton, Creativity and Education, p. 99.

⁸⁰Guilford, Intelligence, Creativity, p. 8.

The Creative Process

The term, creativity, represents a complex set of cognitive, motivational, and emotional processes. These processes are involved in perceiving, remembering, imagining, appreciating, thinking, planning, deciding, etc. They are found in all persons, but there are wide differences in the quality of the processes and the degree to which the persons are creative.⁸¹ The creative process has been recognized as scientifically researchable. It involves the skills of

1. the transfer of training across subjects;
2. the finding of unifying principles which demonstrate the relatedness of segments of knowledge usually held to be separate;
3. the ability to see the "facts" in a new light and to question what is usually held to be self-evidently true; and
4. the ability to see analogies and to exercise imagination.⁸²

The different authors list various steps in the process of creativity, but it must always start with the seeing or sensing of a problem. After the problem has been recognized and defined, the first stage of the process is a period of preparation in which the problem is inspected and information or material for solving it is collected.⁸³ This phase

⁸¹MacKinnon, "The Nature and Nurture of Creativity," p. 21.

⁸²Cropley, Creativity, p. 84.

⁸³Guilford, Intelligence, Creativity, p. 90.

of the creative process may occur in a less conscious region of the mind where the solution may generate itself. Or, it may involve the conscious collection of the ideas of others so that the person may feed his imagination with the materials on which it works.⁸⁴ Relatively early in the sequence of the creative process, "some kind of system appears--it is the backbone, skeleton, or framework of the major production to come. Sub-systems are developed within the system."⁸⁵ While this original insight gives direction and purpose to the process, it may be totally transformed in the exploration of the insight.⁸⁶ During this phase, evaluation of ideas generated is suspended to allow full play to imagination and to permit a variety of viewpoints or possible solutions.⁸⁷

The next phase of the creative process is a period of time called the period of incubation in which the unconscious mind takes over. This period may be long or short; the creator works intermittently on the solution and periodically turns aside to pursue other endeavors.⁸⁸

⁸⁴Kneller, The Art and Science of Creativity, pp. 45, 48-49.

⁸⁵Guilford, Intelligence, Creativity, p. 212.

⁸⁶Kneller, The Art and Science of Creativity, p. 50.

⁸⁷S. J. Parnes, "Education and Creativity," Creativity, edited by P. E. Vernon (Harmondsworth, 1970), pp. 344-345.

⁸⁸Kneller, The Art and Science of Creativity, p. 53.

The phase of the creative process which has been called "illumination" is the moment of insight when the process is climaxed. In this moment, the creator experiences an exhilaration, a glow, and an elation of the restructuring "a-ha" experience.⁸⁹ The solution to the problem is grasped; the concept focuses all the facts and everything falls into place. Bruner has defined the creative enterprise as any act that produces effective surprise. This effective surprise occurs at the moment of insight.

What is curious about effective surprise is that it need not be rare or infrequent or bizarre and is often none of these things. Effective surprises . . . seem rather to have the quality of obviousness to them when they occur, producing a shock of recognition, following which there is no longer astonishment.⁹⁰

This moment of insight or effective surprise comes to the conscious mind at unpredictable times; it cannot be forced but rather "bubbles up like a spring of water." While it is rarely subject to conscious control, it normally follows an earlier period of intense involvement with the problem. The moment of insight is frequently fleeting or ephemeral; it must be grasped immediately and the insight should be put down on paper to prevent its loss. The creator experiences a calm certainty with respect to his insight. He knows that his solution will work, even

⁸⁹Roslansky, Creativity, p. 20.

⁹⁰Lytton, Creativity and Education, p. 2, citing Jerome S. Bruner.

before he consciously examines the details. This certainty prevents obliteration of the insight by premature self-criticism.⁹¹

Following the moment of insight, the creator brings his solution under the control of his intellect in order that he can complete the process. During this period of evaluation and verification, the solution is tested or the product is examined for its fitness or value.⁹² This verification may lead to further insights or insights of an altogether different kind.⁹³

The elaboration or working out of details is one of the final steps in the creative process. This elaboration is followed by application of the insight, by transformation of information, by redefinition, by revision, or by reformulation.⁹⁴

There are some conditions which limit the creative process. The creative person must immerse himself in his subject so that he will be able to channel his energies, to think more deeply and comprehensively, and to perceive difficulties which he might not otherwise notice. He must combine commitment and detachment so that his creativity will not be hindered or his thinking too narrowed. He must

⁹¹Butcher, Human Intelligence, p. 120.

⁹²Guilford, Intelligence, Creativity, p. 90.

⁹³Kneller, The Art and Science of Creativity, pp. 56-57.

⁹⁴Guilford, Intelligence, Creativity, pp. 211-212.

exhibit imagination in order to produce ideas and judgment in order to communicate them. He must have the ability to question the facts as he knows them. He must be able to use his errors to modify his approach. He must be willing to follow the direction of his subconscious and allow the work of creation to direct him. Finally, he must be receptive to the moment of insight and perceptive to the significance of it.⁹⁵

The Creative Product

In the East, the product of creativity is self-actualization; the product of creativity in the West is more apt to be something of value in Man's dominance over nature. It could be a technological innovation, a scientific discovery, a new theory, a work of art, or a philosophy. The creative person whose work does not result in some observable creative product has not been generally recognized. Investigators of creativity have traditionally started with the product and then attempted to understand the creator.⁹⁶

Creativity is a transactional concept. There is a social relationship between the creator and his beneficiary. The creator cannot be considered creative unless his product is recognized as having a

⁹⁵Kneller, The Art and Science of Creativity, pp. 58-61.

⁹⁶Krippner and Arons, "Creativity: Person, Product, or Process?" pp. 122-123.

social value.⁹⁷ For a product to be considered creative, it must meet certain criteria. It must be original to a person, a group, or all mankind. Judged in terms of novelty, originality, or statistical infrequency relative to a given population of products, the most creative products are novel to an entire civilization.⁹⁸

The product must be relevant to be creative. It must solve a problem, be a response to a particular situation, or accomplish some recognizable goal. The product must be completed from the original insight through the entire process of evaluation, elaboration, development, and communication to others. The product is more creative when it is aesthetically pleasing and when it creates new conditions of human existence by the introduction of new principles that change radically the existing view of the world.⁹⁹

Summary

Creativity is the bringing of an original idea, point of view, way of looking at something, or solution of a problem into being. Creativity can result in a product which is novel to any given group, whether it be a local group or all of civilization, and which fills a specified need.

⁹⁷Danziger, "Fostering Creativity in the School," p. 18.

⁹⁸Roslansky, Creativity, p. 24.

⁹⁹Roslansky, Creativity, pp. 24-25.

The creative person shares certain characteristics in common with other creative persons. These characteristics can be categorized as intellectual, motivational, personality, and environmental. The degree of creativity exhibited by the creative person is dependent upon the latitude of freedom permitted him in a creative situation. The development of creativity in students can be encouraged through the guidance, stimulation, and encouragement received in the schools. The reverse is also true.

The creative person develops his creative product through a process which always starts with the step of identification of a problem. A period of time which is referred to as incubation follows, during which the creator works on the problem periodically. The moment of insight in which the solution comes to the creator can be at any time. It is followed by a period of verification and elaboration of the solution. The creative person is always able to judge his creation and to recognize whether the solution is acceptable or in need of modification.

CHAPTER III

PHILOSOPHIES AND CREATIVITY

In the ancient world, men thought that the creative person had either received a divine inspiration or suffered from a form of madness. The theory of madness persisted through the nineteenth century, when the expression of creativity was considered a sort of "emotional purgative that kept men sane."

Kant made the association between creativity and genius in the eighteenth century. While he thought that creativity was a form of intuitive genius which was unpredictable, nonrational, and limited to a few unusual people, he felt that some aspects of the creative process could be taught. He could not account for the sources of originality and spontaneity and did not feel that they were subject to rational inquiry.

Other theories have held creativity to be a manifestation of the creative life force inherent in life itself or an expression of a universal creativity imminent in everything that exists.¹ These philosophies of creativity have been adapted into various psychologies.

¹Kneller, The Art and Science of Creativity, pp. 18-25.

Associationism and Creativity

The psychology of associationism held creative thinking to be the "activation of mental connections which continues until either the right combination presents itself or the thinker gives up." The more creative person had acquired a larger number of associations from which to select ideas for recombination into original thoughts.²

Gestalt Psychology and Creativity

Gestalt theorists consider creative thinking a reconstruction of gestalts that are structurally deficient. This theory can be accepted in those situations in which the thinker begins with a problematic situation. Wertheimer suggested that the thinker "envisage" or imagine a gestalt for those situations where the thinker must find the situation. He did not offer an explanation for the origin of the imagined gestalt or for the motivation to realize it.³

Psychoanalysis and Creativity

The Freudian psychoanalysts provided the fundamental ideas which guide contemporary research into creativity. Freud believed that creativity originated in a conflict within the unconscious mind. This conflict resulted in creative behavior if the solution reinforced . . .

²Kneller, The Art and Science of Creativity, pp. 25-27.

³Kneller, The Art and Science of Creativity, p. 27.

an activity intended by the conscious part of the personality. In this event, the creative person could accept the "free-rising ideas of his unconscious." If the conscious part of the personality rejected or repressed the products of the unconscious mind, the result was a neurosis which was creatively useless. Erich Fromm extended this theory to the idea that a person is genuinely happy only when spontaneously creating because of the harmony between his intellect and feeling. For the creator to enjoy a healthy ego, he has to communicate his creations and have them accepted by the world.⁴

Neopsychoanalysis and Creativity

The Neo-Freudians, or neopsychoanalysts, modified Freud's view of creativity. They contributed the principle that creativity is the product of the preconscious mind which is open to recall when the ego is relaxed. The preconscious mind enjoys a freedom to gather, compare, and rearrange ideas, which is the source of creativity. This creativity, according to Freud, reduces tension by restoring the state of equilibrium, which the creative drive had disturbed. Schachtel and Rogers extended this theory to include creativity as an end sought for its own sake, not merely for drive reduction. Schachtel saw creativity as a manifestation of a mental flexibility, an intensity of interest, and

⁴Kneller, The Art and Science of Creativity, pp. 28-33.

a repetition and variety of approach by which man can relate to the world around him. Rogers defined creativity as self-realization with the motive for it being the urge to fulfill oneself. Rogerians conceive creativity in a narrow sense as behavior characterized by such traits as intuition and spontaneity and also the products of this behavior. Maslow designated two senses of creativity. The first was called "special talent creativeness," which can occur despite neuroses. The second, "self-actualizing creativeness," is an expression of a sound and integrated personality or of a personality moving from neurosis toward health.⁵

Unified Theory of Creativity

In his book, The Act of Creation, Koestler attempted to formulate a single theory of creativity. The central idea of his theory is that all creative processes share a common pattern: bisociation, which is the connecting of previously unrelated levels of experience or frames of reference. This connection enables man to attain a higher level of mental evolution, defeating habits of past association by originality in thinking simultaneously on more than one plane of experience. When two independent matrices of perception or reasoning interact with each other, the result is "either a collision ending in laughter, or

⁵Kneller, The Art and Science of Creativity, pp. 33-38.

their fusion in a new intellectual synthesis, or their confrontation in an esthetic experience."⁶

Summary

Creativity in persons has always been a source of interest to those around them. The study of creativity has gained a place of status in the field of psychological studies with its incorporation into the various psychologies. Creative behavior is a factor in the mental health of all persons and represents a need for fulfillment felt by the self-actualizing person. Understanding of the nature of creativity is the first step towards acceptance of creative persons and creative products.

⁶Kneller, The Art and Science of Creativity, pp. 41-42.

CHAPTER IV

EDUCATION AND CREATIVITY

Education should have a legitimate concern about creativity because its task is to assist students to become fully functioning persons who are mentally healthy. Scattered evidence is available which indicates that

the stifling of creative desires and abilities cuts at the very roots of satisfaction in living and ultimately creates overwhelming tension and breakdown. There is little doubt that one's creativity is an invaluable resource in coping with life's daily stresses, thus making breakdown less likely.¹

The highly creative student may not be able to reveal his potential due to lack of motivation, personality disturbances, or unfavorable reactions to time pressures or testing conditions.² Education must develop ways to recognize this creative talent--whether it be scientific and inventive or in the arts and writing areas.³ The student is not fully functioning intellectually if his creative abilities are undeveloped, unused, or paralyzed.⁴

¹Torrance, "Some Knowns, Needs, and Leads," pp. 51-52.

²Torrance, "Some Knowns, Needs, and Leads," p. 88.

³Torrance, "Some Knowns, Needs, and Leads," p. 109.

⁴Torrance, "Some Knowns, Needs, and Leads," p. 51.

The term, creativity, has been defined broadly by humanistic psychologists as a basic human potential, and the term, genius, has been reserved for those with an extraordinary special talent creativeness.⁵ Louis Fliegler said this:

All individuals are creative in diverse ways and to different degrees. The nature of creativity remains the same whether one is producing a new game or a symphony Creativity is within the realm of each individual depending upon the area of expression and capability of the individual.⁶

This universal possession of some degree of creative ability has been referred to as the principle of continuity. This principle makes it possible to investigate creativity in people who are not necessarily distinguished.⁷ A national Child Development Study of 11,000 children born in 1958 included among its measures a rating on creativity but none on general ability.⁸ As educators gain more knowledge about the individual student, they will be able to modify educational practices in order to maximize creative growth among all individuals.⁹

⁵Krippner and Arons, "Creativity: Person, Product, or Process?" pp. 123-124.

⁶Kneller, The Art and Science of Creativity, p. 14, citing Louis Fliegler.

⁷Guilford, Intelligence, Creativity, p. 82.

⁸Butcher, Human Intelligence, p. 17.

⁹Torrance, Creativity, p. 27.

In the past, when a student failed to learn, educators made the assumption that there was something wrong with the child.¹⁰ It would be more appropriate to question the techniques in use in the schools, the emphasis on rote learning, the reliance on I. Q. scores to determine which students should be placed in high, average, or low groups. Educators should question why there is so little apparent correlation between education and creative productivity. They should ask themselves whether another dimension should be added to their task--that of cultivating human creativity by giving creative products the reward and attention they deserve, reinforcing this type behavior and encouraging the development of imagination and innovation.¹¹ The need today is for teaching which will give students an

easy competence in rigorous methods of reasoning, the amassing of large collections of facts and theories that constitute current knowledge, and the inculcation of habits for efficient use of available ideas and facts, without the simultaneous establishment of inhibitions and intellectual rigidities that limit free and imaginative use . . . of all the skill and knowledge that have been acquired.¹²

The educator who would teach in this manner needs skills in the recognition of creativity and a knowledge of the obstacles to and facilitators.

¹⁰Zach, "The I. Q. Debate," p. 68.

¹¹Krippner and Arons, "Creativity: Person, Product, or Process?" p. 124.

¹²Jerome B. Wiesner, "Education for Creativity in the Sciences," Creativity and Learning, edited by Jerome Kagan (Boston, 1967), p. 95.

of creativity. This information will enable the educator to understand the implications of teaching for creativity.

Recognition of Creativity

The educator who has an understanding of the nature of creative performance in terms of the abilities and other traits that contribute to it will be able to teach his students to use all of their resources for creative intellectual pursuits in an effective way.¹³ The essential factors in the opportunities for creative thinking are the attitude of the teacher and the way in which the subject matter is presented.¹⁴

Education exists to help students, not to pass a verdict on them. Educators must recognize extraordinary talent, regardless of whether or not the work is in an acceptable form. In 1969, a nine-year-old English boy turned in the following piece to his teacher:

The wint is saying the wimter is cumeing and all the squirrels abawt thrling with friyt the trees get rid of theer onley bytey the niyt lovs impasele across its glomey medows winters coming cots and and scars the old wold is come dacto use the winte movs sloley pist snow flow lily fethers of an engel.

This work would merit a failing grade if it were judged by the usual indices of school performance. The student would predictably either accept the idea that he was not intelligent or stop risking distinctive

¹³Wiesner, "Education for Creativity," p. 96.

¹⁴Guilford, Intelligence, Creativity, p. 186.

expression and words he could not spell. This student had a rare ability to express himself even though he could not spell; this is what he wrote:

The wind is saying the winter is coming and all the squirrels about thrilling with fright. The trees get rid of their only beauty. The night moves impatiently across its gloomy meadows. Winter is coming. Coats and scarves. The old world has come back to us. Winter moves slowly past. Snow falls like the feathers of an eagle.¹⁵

With understanding and help from his teacher, this student could learn to spell and would retain his ability to express himself.

Creativity has received little recognition in the past with the consequent loss of much potential. The National Merit Scholarship Corporation is taking steps to remedy this situation and has developed a creative science scale based on high school experiences. This scale provides for recognition of the following achievements:

1. Giving an original paper at a scientific meeting sponsored by a professional society.
2. Winning a prize or award in a scientific talent search.
3. Constructing scientific apparatus on one's own initiative.
4. Inventing a patentable device.
5. Having a scientific paper published in a science journal.¹⁶

¹⁵National Education Association of the United States, Schools for the 70's and Beyond: A Call to Action, A Staff Report (Washington, 1971), pp. 61-62.

¹⁶Torrance, "Education and Creativity," p. 109.

A scale for achievements in the creative arts has also been developed by the National Merit Scholarship Corporation, which includes:

1. Winning one or more speech contests.
2. Having poems, stories, or articles published in a public newspaper or magazine or in a state or national high school anthology.
3. Winning a prize or award in an art competition.
4. Receiving the highest rating in a state music contest.
5. Receiving one of the highest ratings in a national music contest.
6. Composing music that is given at least one public performance.
7. Arranging music for a public performance.
8. Having minor roles in plays (not high school or church-sponsored).
9. Having leads in high school or church-sponsored plays.
10. Winning a literary award or a prize for creative writing.
11. Having a cartoon published in a public paper or magazine.¹⁷

Creativity and Educational Achievement

Creativity is a very important factor for educational achievement. Learning involves "the production of novelty as well as the remembrance of course content--discovering as well as recalling"¹⁸

¹⁷Torrance, "Education and Creativity," p. 110.

¹⁸Butcher, Human Intelligence, p. 98.

Creative ways of learning--such as exploring, manipulating, questioning, experimenting, risking, testing, and modifying ideas--are preferred by man.¹⁹ Students have different learning styles and may be uneven in the different aspects of their intelligence. Many times, a weakness in one area is compensated for by a strength in another.²⁰ The student who earns very high marks on individual tests or measures of ability should not be overlooked because his composite score is not high. He may be "so highly gifted and so intensely interested along one line that he had neglected, or rebelliously disdained, to keep pace with his fellows in other lines."²¹

School grades and intelligence tests have been very inefficient predictors of creative performance. Terman's study of 1,000 children of exceptionally high I. Q. has shown that, even though this group had superior educational attainment and superior vocational and social adjustment, there has been no indication of superior creative performance in their maturity.²² On the other hand, there is evidence of a lack of mastery of school subjects followed by highly creative work. James Whistler was expelled from West Point for failing a chemistry...

¹⁹Torrance, Creativity, p. 14.

²⁰Guilford, Intelligence, Creativity, p. 13.

²¹Wolfe, "Diversity of Talent," p. 156.

²²Guilford, Intelligence, Creativity, p. 82.

examination; he then took up painting. Thomas Edison's mother was told that her son was "unable" by his first-grade teacher. She gave him an elementary text on physics to keep him occupied and was surprised to find that he needed little help in learning to read it. Gregor Mendel began experimenting with sweet peas in the garden of his monastery after he had failed four times to pass the Austrian teacher's examination; he deciphered the genetic code which Charles Darwin had known must exist but could not decipher. Darwin, himself, was a medical school and divinity school dropout. Winston Churchill attended Harrow, an exclusive English boys' school. He would be found at the end of the line of students on parents' visiting day, because the boys were paraded in a single line according to scholastic standing.²³

Educators should consider the fact that these persons were highly creative in spite of their education and question the possibility that other highly creative persons might be in classes where their abilities are misunderstood. Tests of ability or attainment should not be criticized, but factors of temperament, motivation, and interest need to be taken into account.²⁴ The key word in the recognition of creativity is novelty, which may be within the context of the person's own development or within the context of the social group.²⁵

²³National Education Association, Schools for the 70's, pp. 61-62.

²⁴Butcher, Human Intelligence, p. 95.

²⁵Guilford, Intelligence, Creativity, p. 190.

Obstacles to Creativity

Rather than foster creativity, education has had a tendency to inhibit it. Studies have been made of the growth of creative thinking abilities in school children. The growth in the first three grades is followed by a sharp decline in the fourth grade. This decline is not a natural phenomena but is brought about by peer pressure which influences the child to behave in certain ways. Once the child has accepted these behaviors, he becomes secure enough to pursue creative behaviors again.²⁶ The rise begun in the fifth grade goes into a decline between the sixth and seventh grades, after which there is a period of growth until near the end of the high school years. At this time, creative ability seems to level off or decline slightly. It is realized fully with the development of the other factors necessary for creative achievement.²⁷

The inhibition of creativity begins in our culture prior to the time the child begins his formal education, with the tendency to shorten the period of play and imagination. Imagination is considered an inferior faculty and the child is taught accordingly.²⁸ Once the child enters the school system, he is confronted with a number of forces which inhibit

²⁶Kneller, The Art and Science of Creativity, p. 73.

²⁷Torrance, Creativity, p. 11.

²⁸Kneller, The Art and Science of Creativity, p. 75.

his creative growth. Our system of education doesn't prepare students for failure; it is success oriented.²⁹ There is an overemphasis on cooperation and competition, an excessive faith in reason or logic, a stress on self-satisfaction and perfectionism, a reliance on authority, and a fear of mistakes or failure.³⁰

The student receives peer pressure to conform. He finds his unusual or original ideas are not acceptable, and he suppresses them for the sake of group harmony.³¹ He also is under peer pressure to do his work accurately and on time and to prepare for a conventional career or role in life.³²

The most forceful inhibitors of creativity present in education are the teacher's sanctions against questioning and exploration. These are based on the attitude that discipline must be maintained; evaluation should be external, strictly logical, and power oriented; answers should be correct; and time should not be wasted.³³ When knowledge is acquired by students in authoritarian situations, convergent thinking measures will be most predictive of future success.³⁴ This emphasis

²⁹Torrance, "Education and Creativity," pp. 98-99.

³⁰Parnes, "Education and Creativity," p. 344.

³¹Torrance, "Education and Creativity," p. 99.

³²Kneller, The Art and Science of Creativity, p. 76.

³³Cropley, Creativity, pp. 90-92.

³⁴Lytton, Creativity and Education, p. 97.

on the acquisition of information, a minutely-organized curriculum, adherence to the credit system, over-reliance on textbooks, and the use of the lecture system--even into the college years-- effectively prevents the original use of information and perpetuates the estrangement of students and teachers.³⁵

In the elementary grades, students encounter a cultural emphasis on sex roles which causes them to simply shut out certain areas of awareness and refuse to think about them. Sensitivity is considered a feminine virtue and independent thinking, a masculine virtue. A creative person must have both.³⁶

The development of creativity has rarely been an objective in the secondary schools. In the 1959-60 school year, a survey was made of Minnesota social science teachers to determine the three most important objectives they had for a course or unit. Classification of the answers according to Guilford's five mental operations gave the following results:

Cognition	70.7 per cent
Convergent Production	18.7 per cent
Memory	5.3 per cent
Evaluation	3.6 per cent
Divergent Production	1.7 per cent ³⁷

³⁵Kneller, The Art and Science of Creativity, pp. 75-76.

³⁶Torrance, "Education and Creativity," p. 100.

³⁷Torrance, "Education and Creativity," pp. 108-109.

Divergency has been looked upon as an "abnormality" or "weakness" to be compensated for. Rather, the educator should consider divergency a unique strength of the student.³⁸

The practice most antagonistic to the growth of creativity has been the dichotomy of labeling education "work," which is stern and demanding and not to be confused with "play," which is frivolous and light. There can be no overlap between the two; in our culture, work is something to be disliked and play is something which is enjoyed. In some creative learning situations, students sometimes appear to be playing around; this makes teachers uneasy.³⁹ They feel that "the free use of imagination, the testing of the limits of logic and sense, humor and lightheartedness do not belong in the serious setting of the classroom."⁴⁰

Facilitators of Creativity

In 1961, Torrance wrote:

Perhaps the most promising area, if we are interested in what can be done to encourage creative talent to unfold, is that of experimentation with teaching procedures which will stimulate students to think independently, to test their ideas, and to communicate them to others.⁴¹

³⁸Torrance, "Education and Creativity," p. 101.

³⁹Torrance, "Education and Creativity," pp. 101-102.

⁴⁰Cropley, Creativity, pp. 90-92.

⁴¹Parnes, "Education and Creativity," pp. 341-342.

Teaching for creativity can help in the actualizing of creative expression in those who already possess this potentiality,⁴² and it can revive creativity, to some degree, in those whose potentiality has been stifled.⁴³ In addition, teaching for creativity is a worthwhile goal because it makes school a more enjoyable place to be and "may lead children a little nearer the 'rich emotional life' which is every progressive psychologists' wistful dream."⁴⁴ This goal necessitates the use of a range of curriculum and the choice or invention of teaching methods so that the learning experiences of students can be individualized according to the cognitive style of each student.⁴⁵ This humane education would make learning one of the most exciting and deeply fulfilling of human activities, with each student attaining a full measure of self-actualization in terms of his unique talents, capabilities, and potentialities.⁴⁶

The educator has a number of strategies available to him for the nurturing of creativity. He can encourage originality of ideas

⁴²Ausubel, "Fostering Creativity in the School," p. 14.

⁴³Torrance, "Education and Creativity," p. 126.

⁴⁴Liam Hudson, "The Question of Creativity," Creativity, edited by P. E. Vernon (Harmondsworth, 1970), p. 233.

⁴⁵J. P. Guilford, "Three Faces of Intellect," The Discovery of Talent, The Walter Van Dyke Bingham Lectures on the Development of Exceptional Abilities and Capacities, edited by Dael Wolfe (Cambridge, 1969), p. 131.

⁴⁶National Education Association, Schools for the 70's, pp. 71-72.

rather than accuracy, correctness, and fidelity to authority. This originality would allow for a diversity of methods and solutions.⁴⁷

This would lead to the acquisition by the student of skills which may be transformed for use in other situations.⁴⁸ The educator should emphasize principles, laws, and structural relationships of information to aid the student in acquiring habits of forming classes and relationships between classes.⁴⁹

The educator who is willing to introduce new and unknown elements into the curriculum and to accept new ideas will help his students to gain an appreciation of the new.⁵⁰ The student will need encouragement in his skepticism toward knowledge so that he can recognize the gaps in it. He will remain open to new experiences if he is made aware of the revolutionary nature of most great creative achievements at the time of their introduction.⁵¹ The educator's aim should be the development of imaginative and cognitively flexible students who feel that they are creating knowledge.⁵²

⁴⁷Kneller, The Art and Science of Creativity, p. 79.

⁴⁸Cropley, Creativity, p. 89.

⁴⁹Wiesner, "Education for Creativity," p. 96.

⁵⁰Cropley, Creativity, p. 90.

⁵¹Kneller, The Art and Science of Creativity, p. 80.

⁵²Cropley, Creativity, p. 90.

The acceptance of inventiveness on the part of students is a strategy which the educator can use to facilitate creativity. He must encourage spontaneous expression, the use of imagination in writing and drawings, and fluency of ideas.⁵³ He must challenge students with provocative ideas which call for the juxtaposition of ideas which at first do not appear to be interrelated. He must aid the student in the use of the informal process of searching for new ideas and insights and of the formal process of verification of results.⁵⁴

The educator should arouse the curiosity of his students through the presentation of new evidence that apparently conflicts with information which the student has already acquired. This curiosity as to how his studies relate to the world should lead the student to assess the implications of his insights. The student needs to learn to draw implications from general principles and to form generalizations from particular facts.⁵⁵ The maximum transfer of knowledge comes from connections made with other information in the form of implications, relations, class memberships, and system memberships.⁵⁶

The student should be permitted to take the initiative in exploring and discovering things for himself. Information discovered by the

⁵³Kneller, The Art and Science of Creativity, p. 82.

⁵⁴Wiesner, "Education for Creativity, pp. 96-97.

⁵⁵Kneller, The Art and Science of Creativity, pp. 85-86.

⁵⁶Guilford, Intelligence, Creativity, p. 208.

learner is rarely forgotten and is readily available in recall.⁵⁷ This type of learning should not be over-evaluated; the creator should verify his own ideas.⁵⁸

Educators have been guilty of placing most emphasis on adjustment to a norm and the development of the well-rounded personality. The creative student has not wanted to appear different and has not valued his creativeness.⁵⁹ The educator who would teach for creativeness should encourage his students to value their ideas and perceptions through his acceptance of them.⁶⁰ He would help the student to develop a personal style through his encouragement of the use of imaginative and unconventional interpretations of experiences; he would tolerate novel ideas and unconventional patterns of action.⁶¹

The educator must make creativity one of his educational objectives. There are two ways in which this can be done; creativity can be taught as a new subject or skill, or the present curriculum can be modified to allow for creative activities. When creativity is taught as a new subject, creative thinking or problem-solving skills, as such,

⁵⁷Guilford, Intelligence, Creativity, p. 208.

⁵⁸Kneller, The Art and Science of Creativity, pp. 86-87.

⁵⁹Torrance, "Education and Creativity," pp. 96-97.

⁶⁰Kneller, The Art and Science of Creativity, p. 87.

⁶¹Wiesner, "Education for Creativity," pp. 96-97.

are taught, without any relation to normal school subjects.⁶² This can be done in summer camps, special seminars and workshops, or through new programs which have the aim of stimulating creative growth.⁶³

Modification of the curriculum is the preferable method. Mastery of subject matter is essential and should not be subordinated to creative techniques, but students can be given experience in creative application of knowledge gained.⁶⁴ The educator will find it necessary to develop methods and materials which will allow for an experimental, open-ended approach to learning in each individual field.⁶⁵ The educator can do this through the making of assignments which call for original work, independent learning, self-initiated projects, and experimentation. In the class, he can lead discussions which call for productive thinking rather than recall. He can respond to unusual questions, ideas, and solutions with respect, not ridicule. He can provide for creative learning without the threat of immediate evaluation.⁶⁶ When evaluation is necessary, he can make separate judgments of work, on

⁶²Lytton, Creativity and Education, p. 97.

⁶³Torrance, "Education and Creativity," p. 113.

⁶⁴Kneller, The Art and Science of Creativity, p. 88.

⁶⁵Lytton, Creativity and Education, p. 98.

⁶⁶Torrance, Creativity, pp. 14-16.

the basis of "quality without originality" and "original type of work with quality."⁶⁷

There are some fundamental changes in the school organization which could make contributions to creative learning. These would include team teaching, varied class size, provisions for individual study, resource centers, and programs which emphasize creativity.⁶⁸ Specialists in the school, such as the counselor, social worker, psychologist, and nurse, could also be called upon to serve as "sponsors" or "patrons" to help nurture the student's creativity.⁶⁹

Implications for Education

Why is there so much stress in educational circles today on the subject of creativity? Bruner has described the study of the inventive and innovative aspects of human intellect as restoring dignity to the human being in a computer-dominated age. Toynbee feels that it is a vital aspect of a nation's resources.⁷⁰ Lytton looks upon it as a symptom of revolt against the "threatening mechanization of man and society, which also shows signs of engulfing the schools." He feels that creativity

⁶⁷Holland and Taylor, "Predictors of Creative Performance," p. 21.

⁶⁸Torrance, "Education and Creativity," pp. 113-114.

⁶⁹Torrance, "Education and Creativity," p. 97.

⁷⁰Cropley, Creativity, p. 19.

represents a plea to educators to produce independent and intelligent thinkers. The emphasis on creativity also represents a need for the schools to emerge from the formal, traditional routine and drill of the conventional subject division organization.⁷¹

The schools must be re-created if they are to nourish creativity. The students must be allowed outlets for their potentially-creative energy, rather than being frustrated by regulations designed to keep them in order by making them behave in unison. The teachers must be allowed the time to nurture the creativity of the students through being relieved of administrative detail and basic requirements of stereotyped syllabii. The mass guidance and counseling procedures must be revised, so the individual student can regain his individuality.⁷²

The conception of the learner as a kind of stimulus-response organism must be revised to that of an agent for dealing with information in the manner of an electronic computer. The learner is one who "seeks and discovers new information from sources outside himself, stores the information, generates new information by either divergent or convergent thinking, and evaluates the results."⁷³ The teaching of understandings or intellectual conceptualizations, with logical

⁷¹Lytton, Creativity and Education, p. 113.

⁷²Kneller, The Art and Science of Creativity, p. 99.

⁷³Guilford, "Three Faces of Intellect," p. 130.

interrelationships and organizations, will produce skilled, imaginative, problem solvers. This kind of education will be more exciting to the learner and more fruitful for the society.⁷⁴

The educator provides the recognition and reinforcement for the creativity of the student. He will give recognition for original work when he receives professional rewards for the fostering of creativity. This kind of professionalism would be strengthened by a higher level and different kind of teacher training which included a systematic grounding in the behavioral sciences. Additionally, there is a need for agreed-upon criteria by which creative achievement can be assessed, before there can be adequate professional recognition for the fostering of creativity.⁷⁵

Another implication for education is the need for a review of the appropriateness of examinations and other means of assessing achievement. The role of intelligence has been overweighted; the single score measure of ability has been used to determine which students will be admitted to the next higher education level or will receive awards. It has resulted in the reduction of the apparent pool of talent because various kinds of ability may be indicated by the use of separate scores for separate types of ability which are not apparent.

⁷⁴Guilford, Intelligence, Creativity, p. 127.

⁷⁵Danziger, "Fostering Creativity in the School," p. 20.

in the single score that represents the sum of several part scores.⁷⁶ Attention should be given to the possibility of weighting creative-thinking abilities, through the reward of varieties of successful solutions in examinations. Aptitude testing needs to be revised and new tests developed which will be of pragmatic use in the classroom situation.⁷⁷

Creative education is becoming more important because there is no way of foreseeing what knowledge will be needed in the next five or ten years. Educators can develop in their students the attitudes and abilities that will help them to meet future problems creatively and inventively.⁷⁸ This will be done by giving the student a basic education through explicit teaching, followed by opportunities to use the information gained in the form of new constructive efforts and in problem solving.⁷⁹

This creative education will narrow the gap between the student's innate creative talent, which may be limited by heredity, and his creative output, which may be extended through education.⁸⁰ This type of education can meet the student's need for self-actualization, as well as

⁷⁶Wofle, "Diversity of Talent," p. 154.

⁷⁷Guilford, Intelligence, Creativity, pp. 193-194.

⁷⁸Parnes, "Education and Creativity," p. 351.

⁷⁹Guilford, Intelligence, Creativity, pp. 193-194.

⁸⁰Parnes, "Education and Creativity," pp. 342-343.

provide the psychological safety and freedom necessary to the creative individual. It permits him "complete freedom for non-conformity of thought."⁸¹

Summary

The child spends the formative years of his life in the schools; during this period of his life, he either develops his creative talents or inhibits the growth of his creative abilities. He is under a great deal of pressure to conform, from his peers, his teachers, and his society. The teacher who has the development of creativity in his students as one of his educational objectives will develop the techniques and strategies which will assist the student in becoming more creative. This teacher would be willing to deviate from his lesson plans to explore interesting ideas. He would be willing to allow the students to work individually on projects of their own choosing. This type of education is becoming more important with each passing year, because the teacher of today cannot foresee the needs of tomorrow. The student who has been educated creatively will have the necessary attitudes and abilities to meet future problems creatively and inventively.

⁸¹Parnes, "Education and Creativity," pp. 351-352.

CHAPTER V

MEASUREMENT OF INTELLECT

Schools have been among the major users of tests. Tests are used to identify the intellectually retarded and the intellectually gifted children. They are used to classify children according to their ability to profit from different types of instruction. They are important tools in the educational and vocational counseling of students. They are used in the diagnosis of academic failures,¹ to determine the abilities a student has so that some concrete means of exploiting his strengths and developing his weaknesses can be devised.²

A psychological test is an objective and standardized measure of the differences between individuals or between the reactions of the same individual on different occasions. In order for the single independent variable to be the individual being tested, the administration and scoring of the test must be uniform for all persons who take the test.³ A representative sample of persons for whom the test is

¹Anne Anastasi, Psychological Testing 3rd ed. (London, 1968), p. 3.

²Mary Nacol Meeker, The Structure of Intellect (Columbus, 1969), p. 6.

³Anastasi, Psychological Testing, pp. 21, 23.

designed is used for the establishment of norms so that test scores made by individuals can be interpreted. Prior to the establishment of the norms, there are no predetermined standards of passing or failing.⁴

Validity and Correlation.

The most important characteristic of any psychological test is the degree of its validity--whether or not it measures that which it is supposed to measure. If the validity coefficient is high, it signifies that the person who scores high on the test would be relatively successful in the activity which the test was designed to measure.⁵ Divergent tests, or creativity tests, can be said to possess face validity; we expect "originality" to play an important part in original work. Wallach and Wing established a form of validity for divergent tests by relating them to the concurrent extra-curricular activities of college students. They found that talent in the visual arts, expertise in literary activities, extra-curricular activity in science, and signs of leadership were strongly related to ideational productivity. These activities were not as clearly related to uniqueness of ideas and were not related to intelligence status.⁶

⁴Anastasi, Psychological Testing, p. 24.

⁵Anastasi, Psychological Testing, pp. 28-29.

⁶Lytton, Creativity and Education, pp. 41-42.

Torrance described two methods for establishing the validity of creativity tests. In the first, high and low groups of students are identified through the use of some intelligence measure; a determination is then made of whether or not they can be differentiated in terms of behaviors that are regarded as creative. The second method involves the identification of a criterion group on the basis of a behavior regarded as creative. A determination is then made of whether or not they can be differentiated by appropriate test scores.⁷

Guilford determined the validity of his tests through the internal validity or factorial validity method. A factorial study of the tests was done to determine which tests measured each factor and to what extent. The factor measures were then correlated with practical criteria as to which factors are related to the creative productivity of people in everyday life. Any test which uniquely measures a factor which is not related to the criteria of creative productivity is invalid for predicting these criteria.⁸

The correlation between intelligence-test scores and creativity-test scores is moderate, being in the range of 0.25 to 0.30.⁹ This low correlation was found in 1898 by Dearborn, who correlated the scores.

⁷Torrance, "Education and Creativity," p. 86.

⁸Guilford, Intelligence, Creativity, p. 94.

⁹Ausubel, "Fostering Creativity in the School," p. 11.

obtained from tests involving productive imagination with tests of intelligence. Other persons have replicated these findings through the years.¹⁰ A fairly high correlation was obtained by Hargreaves when he scored his tests of imagination for fluency of ideas, with emphasis on quantity rather than quality. He found very little correlation when the same tests were scored for originality.¹¹ Dewing found a positive relationship between performance on the Minnesota Tests of Creative Thinking and a combination of teacher ratings, peer ratings, imaginative writing, and a check list of extra-curricular activities.¹²

The correlation between intelligence test scores and creative behavior is low because the primary abilities represented in intelligence tests are not all important for creative behavior. At the same time, the primary abilities important for creative behavior are not represented in the intelligence tests.¹³ There is a high, but not absolute, correlation between creativity and intelligence. While a high I. Q. does not guarantee high creativity, a person with low or average I. Q. tends to have a low or average degree of creativity.¹⁴

¹⁰Guilford, Intelligence, Creativity, p. 128.

¹¹Torrance, "Education and Creativity," pp. 121-122.

¹²Lytton, Creativity and Education, p. 42.

¹³Guilford, Intelligence, Creativity, p. 84.

¹⁴Kneller, The Art and Science of Creativity, p. 8.

It appears that a minimum level of intelligence, approximately an I. Q. of 120, is required for outstanding success of a creative nature. Those who are identified as gifted on the basis of scoring in the upper 20 per cent on intelligence tests would not include 70 per cent of those who would score in the upper 20 per cent on a measure of creativity, according to Torrance. Therefore, measures of creativity as well as measures of intelligence should be used in the identification and study of intellectual talent.¹⁵

Predictive Value of Tests

The diagnostic or predictive value of a test is determined by the degree to which it serves as an indicator of a relatively broad and significant area of behavior. As long as there is an empirical correspondence between the behavior the test is to predict and the test items, there is no necessity for a resemblance between the two.¹⁶ Intelligence or aptitude tests cannot predict genius or measure its quality, because they cannot measure the creative spark or original mind.¹⁷ Tests of creativity measure the originality of a person's thoughts, but they cannot predict the originality the person will exhibit in his later years.¹⁸

¹⁵Torrance, Creativity, pp. 8-9.

¹⁶Anastasi, Psychological Testing, p. 22.

¹⁷Hillel Black, They Shall Not Pass (New York, 1963), p. 132.

¹⁸MacKinnon, "The Nature and Nurture of Creative Talent," p. 186.

Conventional intelligence tests provide fair predictions of school success but cannot reveal the capacity or potential of the student. They do not explain the performance on the test or the behavior sampled by the test and cannot assist educators in the matching of students with educational treatments. They should never be used alone to make selection decisions.¹⁹ Banesh Hoffman stated the case succinctly, as follows:

Whatever is exceptional is, by its very nature, rare, and being rare, it makes no statistical splash. Normalcy and mediocrity are common, and statistics tend to be dominated by what is average. The people rated highest according to statistically based norms are apt to be the brilliant representatives of mediocrity at its pinnacle. This would not be undesirable if high ability of an unusual type were comparably rewarded.²⁰

The best combination of predictors of creativity has not yet been determined. Taylor arranged prediction devices in descending order according to efficiency, as follows: biographical items and past achievements, self-ratings and direct expression of goals and aspirations, originality and personality inventories, high-level aptitude and intelligence tests, and reports of parental attitudes. He did not rate divergent thinking tests as being of any practical use in making

¹⁹John T. Neisworth, "The Educational Irrelevance of Intelligence," Teacher Diagnosis of Educational Difficulties, edited by Robert M. Smith (Columbus, 1969), p. 45.

²⁰Banesh Hoffman, The Tyranny of Testing (New York, 1964), p. 141.

predictions.²¹ Vernon felt that creativity tests might represent a common factor other than general intelligence which might be useful in cross-cultural comparisons. Spearman, however, felt that anything describable as creativity was ascribable to general intelligence except at the genius level.²² This view was contradicted by Getzels and Jackson who found that the I. Q. does not provide a reliable indication of potential creative achievement.²³ This is not to refute the role of intelligence in creativity, for it has been found that "high scores on tests of both general intelligence and general supportive traits are more generously distributed among creative than among noncreative individuals."²⁴

Although an investigation like Terman's will be necessary to determine whether or not divergent thinking tests predict creative behavior in later life, there is still a use for them in the field of psychological testing. In Guilford's opinion, students in the secondary schools can benefit from the knowledge of the nature of their intellectual resources and the role these resources play in their lives. Torrance found that fifth-grade students had improved performance on tests of

²¹Taylor, "Some Knowns, Needs, and Leads," p. 180.

²²Butcher, Human Intelligence, p. 93.

²³Liam Hudson, editor, The Ecology of Human Intelligence, (Harmondsworth, 1970), p. 128.

²⁴Ausubel, "Fostering Creativity in the School," p. 11.

divergent-production abilities following a discussion on the nature of divergent thinking.²⁵ The major implication for the use of divergent thinking tests is that they are necessary if we are to know a person's intellectual resources thoroughly. "A multiple-score approach to the assessment of intelligence is indicated."²⁶

Tests of Intelligence

In 1905, the first formal scale for the measurement of intelligence was produced by Theodore Simon and Alfred Binet. This test started a "boom" in psychology which is paralleled by the present boom in creativity begun by J. P. Guilford in 1950.²⁷ Binet and Simon's first test was designed to sample the intellectual performances of which children at particular ages were capable, with very little emphasis on items that were distinctively scholastic.²⁸ When L. M. Terman did his revision of the Simon-Binet test, he restricted his choice of questions to items from the school curriculum. He based his decision on a study which he made in 1906. Selecting the seven brightest and seven most stupid boys from a group of 500, he tested them using some

²⁵Guilford, Intelligence, Creativity, p. 195.

²⁶Guilford, "Three Faces of Intellect," p. 128.

²⁷Lytton, Creativity and Education, pp. 26-27.

²⁸Butcher, Human Intelligence, p. 220.

of Binet's tests and some devised by himself. He found that the scores made on the tests correlated with the high-low criterion with one exception, the psychomotor tests which were devised as a measure of inventive and creative imagination. Only five or six items of a total of 140 included in the latest revision of the Stanford-Binet would today be reorganized in the area of creative potential.²⁹

The concept of the Intelligence Quotient (I. Q.) was contributed by a German psychologist, Wilhelm Stern. In 1912, he suggested that the ratio of the mental age to the chronological age be used to arrive at a brightness index, so that test scores could be interpreted by comparing the score of each individual with the average.³⁰ Neither Stern nor Binet claimed that the intelligence test measured inborn capacity.³¹

In 1916, Terman recommended that the I. Q. score be used to pick out the potentially brilliant students. Terman's reasoning for this suggestion was based on his belief that a country's manpower resources could be developed to the fullest if the brilliant child could be identified and developed.³² Through the years, the idea that intelligence was that

²⁹Guilford, Intelligence, Creativity, pp. 128-129.

³⁰George Shouksmith, Intelligence, Creativity and Cognitive Style (New York, 1970), p. 55.

³¹Zach, "The I. Q. Debate," p. 40.

³²Shouksmith, Intelligence, Creativity and Cognitive Style, p. 56.

which intelligence tests measure came to be accepted. This idea represented a perversion of test results by those who used numbers to support their positions.³³

Several years ago, psychologists began warning against putting so much faith in intelligence tests.³⁴ These tests are nothing more than a sample of the kinds of skills which are regarded as representing intelligent behavior. They do not measure mental capacity, thinking process, or any other inner process. The critical issue is the interpretation of the test results.³⁵ The I. Q. score is a symbol which tells how well the child did on a particular test, as compared to a norm group which performed the identical series of tasks under similar conditions.³⁶ The correlation between different intelligence tests is fairly high, but not perfect.³⁷

The traditional tests of intelligence are measures of achievement in learning. The criterion used for the validation of them has been achievement in school, primarily in the areas of reading and

³³Zach, "The I. Q. Debate," p. 42.

³⁴Meeker, The Structure of Intellect, p. 24.

³⁵Neisworth, "The Educational Irrelevance of Intelligence," p. 32.

³⁶Black, They Shall Not Pass, pp. 146-148.

³⁷P. E. Vernon, editor, Creativity (Harmondsworth, 1970), p. 11.

arithmetic.³⁸ Most of the items require cognition, memory, and convergent thinking.³⁹ Many of the items are tests of relations between sequences of numerals or geometric figures.⁴⁰ The problems are exactly defined and require the student to remember, recognize, and solve, but under no circumstances is the student allowed to invent or explore. As measures of convergent thinking, intelligence tests are adequate, but they do not measure the whole range of mental abilities.⁴¹ The most accepted, used, and standardized intelligence test in our culture is the Stanford-Binet; it includes few items of a creative nature. Most group tests of intelligence generally omit such items entirely.⁴²

Tests of Creativity

Anastasi has stated, "One of the major developments in psychological testing during the second half of the twentieth century concerns the measurement of creativity." Psychologists and educators are becoming more aware of the fact that creative talent is not synonymous

³⁸Guilford, Intelligence, Creativity, p. 83.

³⁹Torrance, "Education and Creativity," p. 53.

⁴⁰Meeker, The Structure of Intellect, p. 24.

⁴¹Kneller, The Art and Science of Creativity, p. 7.

⁴²Guilford, Intelligence, Creativity, p. 83.

with academic intelligence and is not sampled by I. Q. tests.⁴³ In the United States, tests of divergent thinking, or open-ended tests, have come to be referred to as "creativity" tests. Hudson stated that there was very little factual support for this, but MacKinnon found that unusualness of mental association was one of the best indices of an individual's originality in his professional work. The more creative persons give the more unusual responses to a word association test.⁴⁴ Although, by definition, no general test of creativity is possible, the use of the word, creativity, to describe divergent thinking tests is useful. Creativity

implies a high degree of ability at divergent-type thinking (probably allied to a particular kind of temperament and motivation), enabling us to reserve "intelligence" as a description of the convergent thinking exemplified in the education of relations and correlates (in Spearman's language).⁴⁵

Two major batteries of standardized tests of creative aptitudes have been produced in the course of large-scale research projects. At the University of Southern California, Guilford and his colleagues produced one set of tests; the other set was produced by Torrance at the University of Minnesota.⁴⁶ Guilford's tests and concepts were

⁴³Anastasi, Psychological Testing, p. 373.

⁴⁴Hudson, "The Question of Creativity," p. 224.

⁴⁵Butcher, Human Intelligence, pp. 96-97.

⁴⁶Anastasi, Psychological Testing, p. 374.

originally designed for adults, but they are and have been directly usable by educators in devising further tests for use in school situations.⁴⁷ The norms for these creativity tests were based on small scattered groups, chosen primarily because of availability; data on reliability and validity is usually quite limited; and objective scoring is precluded because of the open-ended aspect of the tests. These factors limit the use of these tests at this time to research aspects.⁴⁸

Guilford began his search for broader and different kinds of tests because of his dissatisfaction with the narrowness of the multiple choice test format and the abilities being tested. He felt that there should be a test for such qualities as imagination, originality, fluency, and novelty of ideas.⁴⁹ To quote Guilford,

I do not now see how some of the creative abilities can be measured by means of anything but completion tests of some kind. To provide the creator with the finished product, as in a multiple-choice item, may prevent him from showing precisely what we want him to show: his own creation. The quest for easily objectifiable testing and scoring has directed us away from the attempt to measure some of the most precious qualities of individuals and hence to ignore those qualities.⁵⁰

⁴⁷Razik, "Psychometric Measurement of Creativity," p. 159.

⁴⁸Anastasi, Psychological Testing, p. 374.

⁴⁹Lytton, Creativity and Education, pp. 30-31.

⁵⁰Guilford, Intelligence, a Creativity, p. 80.

Guilford and his associates developed an elaborate battery of tests. Most groups use only a portion of the tasks. He has continued to modify his conceptualization of the creative thinking abilities, and has made changes in the tasks used to assess them.⁵¹ All of his tests were placed within the Structure of Intellect (SOI) model framework. The factors of the intellect used to build the model were some which had already been identified and some which he hypothesized with verification to come through further research. The various tests were correlated with each other, and a mathematical determination was made to see which tests would cluster together along certain dimensions which had been arrived at by the factor analysis.⁵²

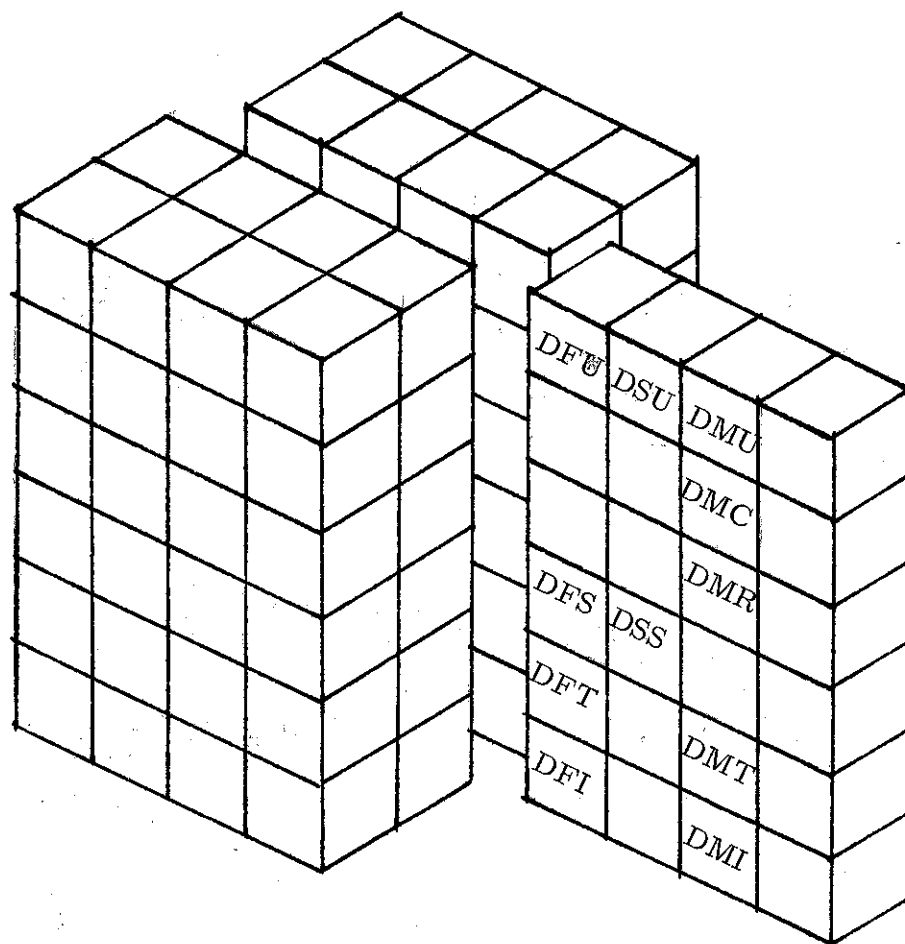
Guilford designed one or more appropriate tests for each of the factors which he regarded as important in creativity. The individual cells in the SOI model for which divergent production tests have been published are labeled on the model shown in Figure 2. The conventional order is used in the figure in the cell blocks, with the code for Operations first, Contents next, and Products last.⁵³

The Guilford- and Torrance-type tests which emphasize divergent thinking as a measure of creative potential have been criticized as

⁵¹Torrance, "Education and Creativity," p. 121.

⁵²Lytton, Creativity and Education, p. 31.

⁵³Anastasi, Psychological Testing, p. 376.



Code Symbols:

Operation

D -- Divergent Production

Contents

F -- Figural

S -- Symbolic

M -- Semantic

B -- Behavioral

Products

U -- Units

C -- Classes

R -- Relations

S -- Systems

T -- Transformations

I -- Implications

Fig. 1. --Southern California Tests of Divergent Production Placed Within the Structure of Intellect Model.

Source: Anastasi, Psychological Testing, p. 376.

being of unknown ability to make long-range predictions of creative ability. These tests have not been validated against substantive creativity in later life, and they do not measure substantive creativity but rather various supportive cognitive traits. Although the tests are supposed to measure an independent common quality, they generally correlate as highly with intelligence tests as they do among themselves. The scores made on these tests are affected by factors such as verbal fluency, uninhibited self-expression, impulsivity, and deficient self-critical ability.⁵⁴ In addition, the tests usually have time limits, and it is not always possible to hurry or force creativity.⁵⁵ They may measure the infrequency or originality of a person's ideas in response to the test items, but they do not reveal the extent to which the person will arrive at novel or adaptive solutions to problems which he will encounter later in life.⁵⁶

Scoring of Creativity Tests

Cropley pointed out that there are serious difficulties involved in the scoring of divergent thinking tests. Creativity has cultural overtones and that which is creative is partly determined by a particular

⁵⁴Ausubel, "Fostering Creativity in the School," p. 13.

⁵⁵Torrance, Creativity, p. 12.

⁵⁶MacKinnon, "The Nature and Nurture of Creative Talent," p. 186.

society.⁵⁷ Anastasi felt that divergent thinking tests could be scored with satisfactory consistency, even though the process is quite laborious and time consuming.⁵⁸

According to Torrance, there are several possible ways in which both Guilford- and Minnesota-type tests may be scored. They may be scored for fluency, the total number of acceptable responses made. They may be scored for flexibility, the number of switches of category made in the responses. A third method of scoring would be for originality, which involves allotting weights to the responses according to the frequency with which the responses are given by the sample group. The third method has the advantage of introducing some objectivity into the scoring method, but it necessitates the double marking of the tests--once to determine the frequency of the answer, and again to allot the weights for the responses.⁵⁹

The weights suggested by Torrance were modified by Cropley.

They are as follows:

- 0--responses given by more than 15 per cent of the sample group.
- 1--responses given by 7 to 15 per cent of the sample group.
- 2--responses given by 3 to 6 per cent of the sample group.
- 3--responses given by 1 to 2 per cent of the sample group.
- 4--responses given by less than 1 per cent of the sample group.

⁵⁷Cropley, Creativity, pp. 108-109.

⁵⁸Anastasi, Psychological Testing, p. 378.

⁵⁹Cropley, Creativity, pp. 108-110.

Cropley based these intervals on the normal distribution with the percentage limits for each category corresponding to equal standard score distances along the X-axis of a normal curve.⁶⁰

Scoring of creativity tests for originality can be based, according to Guilford, on the hypothesis that quantity breeds quality. This hypothesis postulates that the flow of ideas, good and poor alike, is inhibited by an evaluative or critical attitude. Therefore, a larger number of ideas is produced under quantity instructions, making a larger number of high-quality ideas more likely. An opposite hypothesis is that a person following quantity instructions spends his time producing a list of low quality responses. If he is given quality instructions, he applies judgment or evaluation, holding back the low-quality responses and letting the high-quality responses come through. In a 1960 study, H. Hyman found that 68 per cent more responses were generated under quantity instructions. However, the high-quality answers did not keep pace with the total output. Hyman concluded that quantity breeds quality in some types of problems, but not others.⁶¹

Summary

Intelligence tests have traditionally been used by schools to predict the ability of a student to succeed in academic tasks, to determine

⁶⁰Cropley, Creativity, pp. 109-110.

⁶¹Guilford, Intelligence, Creativity, pp. 104-105.

the student's achievement in school, and to pick out the potentially bright and dull students. The use of the one measure for classification of students has been based on the assumption that all of a student's potentiality could be assessed through the use of an intelligence test. This assumption did not take into consideration the fact that intelligence tests generally omit items of a creative nature.

Tests of divergent thinking, referred to as creativity tests, have been devised to counteract this reliance on items of a scholastic nature. These tests are still useful primarily as tools for research; they measure the supportive traits for originality and they have not been validated against substantive creativity in later life. The correlation between intelligence test scores and creative behavior is low, although there is a correlation between creativity and intelligence. A minimum level of intelligence is necessary for outstanding creativity to be manifested. The assessment of a person's total intellectual resources requires the use of measures of creativity as well as measures of intelligence.

CHAPTER VI

REVIEW OF RELATED RESEARCH

Through the years, many conferences have been held and research studies of creative persons, intelligent persons, and intelligent, creative persons have been made. Each study has become part of the foundation the next researcher has built upon.

In 1869, Sir Francis Galton studied men of genius in an attempt to understand the hereditary determination of creative performances. He did not attempt to identify the mental operations by which they produced their novel ideas.¹ In 1883, he published a second study, Inquiries into Human Faculty, in which he concerned himself with the problem of measuring mental characteristics. His work, and that of McKen Cattell who established a testing program at the University of Pennsylvania, took the assessment of mental ability from the field of abstract philosophy and showed that it could be developed as an experimental and practical study.²

With his revision of the Binet test to emphasize scholastic abilities only, Lewis M. Terman of Stanford University influenced the

¹Guilford, Intelligence, Creativity, p. 137.

²Shouksmith, Intelligence, Creativity and Cognitive Style, pp. 51-52.

direction of mental assessments for many years to come. One of the more definitive studies of intelligence was begun by Terman in 1921. He selected a group of highly intelligent, eleven-year-old school children, using intelligence test scores as his basis for selection. His objective was to follow them throughout their lives in order to observe their achievements. Five reports have been published in this study, with the subjects being approximately forty-five years old at the time of the last one. At that time, the subjects were richly talented and generally quite successful, but none appeared to be "geniuses." Terman died in 1956, but the study is continuing and should be completed about 2000.³

Studies of Creativity

The studies of creativity are cumulative in effect; the research findings of each study provide the foundation for the studies which follow. The basic study is that of J. P. Guilford. His definition of intelligence to include creative behaviors redirected the emphasis of those who have conducted studies of intellectual functioning in the last twenty-four years. Torrance's study resulted in a major battery of tests for the study of creativity. Getzels and Jackson's study formed a pattern which other researchers have followed in their studies.

³Butcher, Human Intelligence, pp. 273-279.

Guilford's Structure of Intellect

Guilford opened the present era of research on creativity with his 1950 presidential address to the American Psychological Association. Education was without a formal theory of intelligence, and the curriculum was not organized according to a theory of human intellectual functioning.⁴ As traditionally conceived, intelligence was limited in scope. Guilford redefined intelligence to include creative behaviors. This redefinition was based on factor-analysis studies at the University of Southern California. The separate abilities found by this method fit into a logical system known as the Structure of Intellect (SOI), shown in Figure 2. The abilities significant for creative thinking fit neatly into this model.⁵

Guilford believed that the intellect is an information-processing agency, dealing with varied information in a variety of ways.⁶ The three dimensions of intellect were labeled "Operations," "Products," and "Contents" by Guilford. To describe an intellectual task, one needs to know what kind of material is being processed (contents), what is being done to it (operations), and what kind of result this leads to (products).⁷

⁴Meeker, The Structure of Intellect, p. 183.

⁵Guilford, Intelligence, Creativity, p. 190.

⁶Lytton, Creativity and Education, p. 36.

⁷Cropley, Creativity, p. 102.

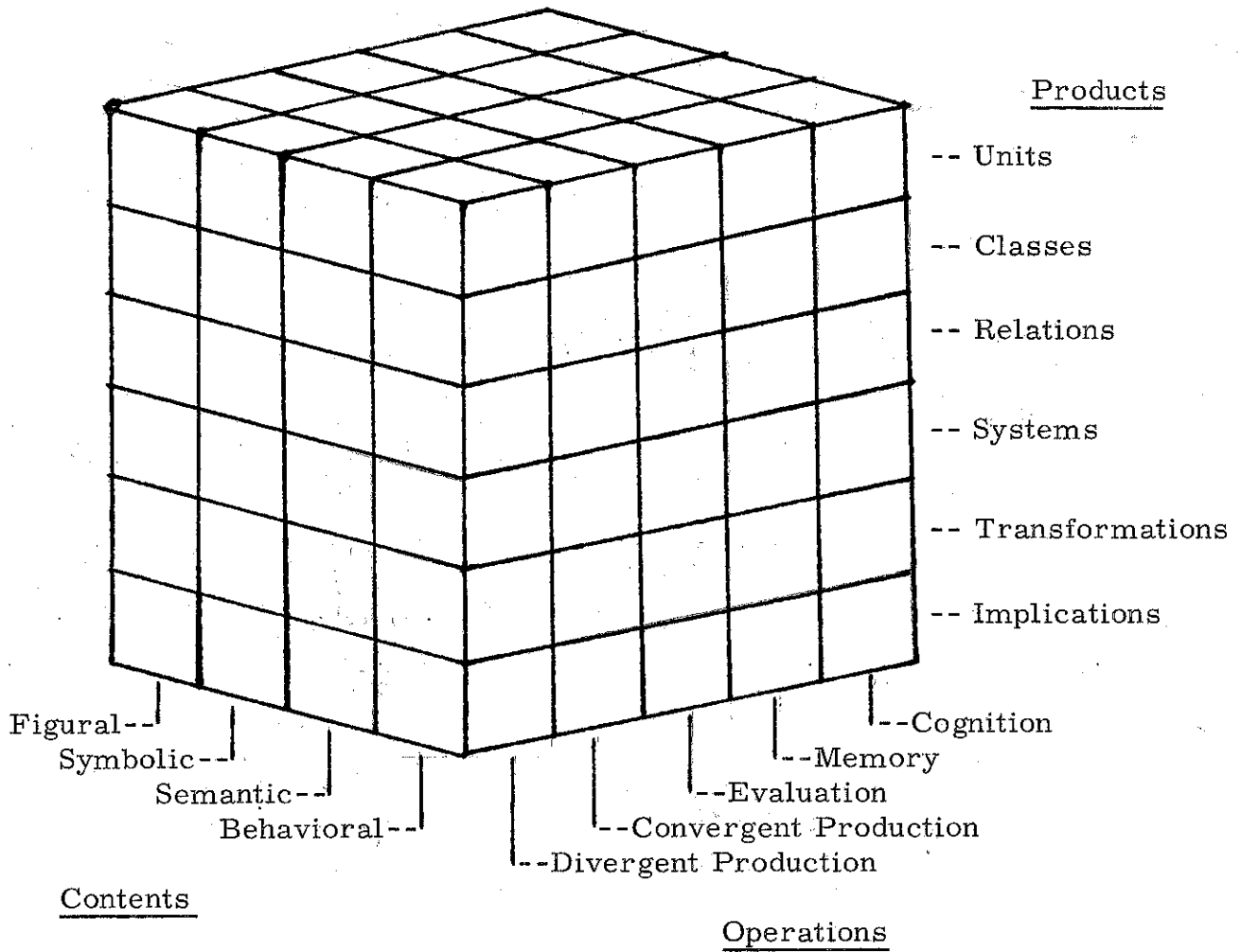


Fig. 2. --Structure of Intellect

Source: Guilford, Intelligence, Creativity, p. 10.

Each of these dimensions was subdivided further, with four kinds of contents, five kinds of operations, and six kinds of products, making a total of 120 possible factors of intellect. In some of the cells, there is more than one factor, such as in the figural cells.⁸

Contents. --Of the four possible kinds of contents, the figural content represents the form of the perceived elements or objects with their various properties. Semantic contents represent words and ideas where an abstract meaning is so associated that an external referent calls up an internally-associated stored word. Symbolic contents represent elements which have no natural meanings, such as numbers, syllables, words, and other kinds of code material. Behavioral contents represent both a manifestation of a response and a stimulus.⁹ There are no factor-analytical results which justify this category, but its inclusion was based on other sources of information. Thorndike proposed in 1927 that there was a "social intelligence distinct from abstract intelligence and from mechanical intelligence."¹⁰

Operations. --There are five subdivisions in the operations category. The first, cognition, is the primary process. Every other

⁸Guilford, Intelligence, Creativity, p. 11.

⁹Meeker, The Structure of Intellect, p. 22.

¹⁰J. P. Guilford, "Traits of Creativity," Creativity, edited by P. E. Vernon (Harmondsworth, 1970), p. 181.

activity depends upon perception and awareness of information in various forms. There are four modes of cognitive differentiation--visual, auditory, kinesthetic-tactile, and olfactory. In the school situation, most presentations and testing methods utilize the visual mode, with directions for the visual tasks given vocally.¹¹ Memory is universally and historically recognized as a primary mental function. Memorization is currently out of vogue in the schools, but it is extremely important in terms of measured achievement. The SOI does not differentiate with respect to the mode of input and lapsed time to the retrieval of items committed to memory, and there are no procedures for identification of memory weakness or deficits or for remediation.¹² A third operation in the SOI is that of evaluation--the reaching of decisions or making of judgments concerning criterion satisfaction of information.¹³ The most familiar SOI operation expected in students is that of convergent production. It has been dubbed "the school block" because it is high in the stimulus-response hierarchy and is almost synonymous with the assimilation of curriculum content. Convergent production is rigorous thinking in a domain which is so systematic, ordered, and determinate that there are rules or principles for converging on one

¹¹Meeker, The Structure of Intellect, pp. 14-16.

¹²Meeker, The Structure of Intellect, pp. 16-17.

¹³Meeker, The Structure of Intellect, p. 19.

right answer or on a recognized best or conventional answer.¹⁴ Sometimes called "closed thinking," convergent production is a more or less mechanical reproduction of things previously learned and application of old responses to new situations.¹⁵ In education, the emphasis has been on convergent thinking, and divergent thinking abilities have been discouraged outside of the arts. However, convergent thinking and divergent thinking are closely related and are interdependent facets of the intellect which interact in achievement.¹⁶

Divergent production is considered the most relevant operation in the SOI for creative thinking. Divergent thinking is that which goes in many directions, sometimes searching, sometimes seeking variety.¹⁷ The unique feature of it is that a variety of responses are produced with the product not completely determined by the given information.¹⁸ It tends to take place in situations where the problem has yet to be discovered, there is no set way to solve the problem, and the solution to the problem may include a range of appropriate answers.¹⁹

¹⁴Meeker, The Structure of Intellect, p. 19.

¹⁵Cropley, Creativity, p. 2.

¹⁶Cropley, Creativity, p. 31.

¹⁷Lytton, Creativity and Education, p. 32.

¹⁸Guilford, "Three Faces of Intellect," p. 117.

¹⁹Kneller, The Art and Science of Creativity, p. 39.

Guilford enumerated a number of mental abilities involved in creative thinking and grouped under divergent production. Word fluency is the ability to produce rapidly words fulfilling specified symbolic requirements. Ideational fluency is the divergent production of class ideas in a situation relatively free from restrictions. Semantic spontaneous flexibility is the production of a diversity of ideas, reckoned by how many classes of ideas are produced. Figural spontaneous flexibility is the tendency to perceive rapid alternations in perceived visual figures.²⁰ Associational fluency is a unique ability involving relations. The response produced completes a relationship to a given thing in a specified way. Expressional fluency pertains to the production of systems, such as the rapid formation of phrases or sentences.²¹ Symbolic adaptive flexibility is the ability, when dealing with symbolic material, to restructure a problem or a situation when necessary.²² The factor which was called originality has been redefined by Guilford as adaptive flexibility with semantic material, where there must be a shifting of meanings. The divergent production of semantic transformations (shifts or changes in meaning to come up with novel, unusual, clever, or farfetched ideas) represents a score for originality.²³

²⁰Kneller, The Art and Science of Creativity, pp. 39-40.

²¹Guilford, "Three Faces of Intellect," pp. 118-119.

²²Kneller, The Art and Science of Creativity, pp. 39-40.

²³Guilford, "Three Faces of Intellect," p. 121.

Elaboration is the ability to fill in details to complete a given outline or skeleton form.²⁴

To the mental abilities grouped under divergent production, Guilford added three more as being involved in creative thinking. Two of them, symbolic and semantic redefinition, belong to convergent thinking, and one, sensitivity to problems, belongs to evaluation. Symbolic redefinition is the ability to reorganize units in terms of their symbolic properties, assigning new use to elements. Semantic redefinition is the ability to shift the function of an object, or part of an object, and to use it in a new way. The ability to recognize that a problem exists is referred to as sensitivity to problems.²⁵

Products. --The output of the intellectual task is referred to as a product. There are six divisions of products in the SOI. The first organization of products is that of units, which represents any single item, one of a kind. A second organization of products is that of classes, which is the cognition of classes of figures, symbols or semantics, or memory for classes, or evaluation of these classes. Relations is the process of making connections between the content involved. Systems can be composed of figures, symbols, or semantics --or behaviors. Transformation, the ability in the SOI which was

²⁴Kneller, The Art and Science of Creativity, p. 40.

²⁵Kneller, The Art and Science of Creativity, pp. 40-41.

considered most relevant for creativity along with divergent production, represents the redefinition or modification of information into other information. The transfer may require visual, auditory, abstract, or motor flexibility. The sixth product, implications, is the ability to foresee consequences involved. It is the most abstract ability in the SOI.²⁶

The SOI model encompasses most of those abilities which define testable performances of human intellectual functioning. Through the use of a derived SOI profile, differential intellectual assessments of a student's ability can be made. Parameters of abilities for the student can be set, and the educator will be able to construct individual programs for development and remediation of the student.²⁷

Getzels and Jackson's Study

J. W. Getzels and P. W. Jackson, of the University of Chicago, did research to demonstrate the independence of the creativity and the intelligence domains. Their sample groups consisted of fifty-four students selected from 449 children who attended a private secondary school. These children were predominantly from middle class and professional homes; they had an average I. Q. of 132.²⁸ The students

²⁶Meeker, The Structure of Intellect, pp. 23-25.

²⁷Meeker, The Structure of Intellect, p. 183.

²⁸Lytton, Creativity and Education, p. 37.

were tested with a standard I. Q. test and five creativity measures. The students who ranked in the top 20 per cent on the creativity measures but below the top 20 per cent in I. Q. (n = 26) and the students who ranked in the top 20 per cent in I. Q. but below the top 20 per cent in creativity (n = 28) were formed into two experimental groups, referred to as the "high-creativity" group and the "high-intelligence" group, respectively.²⁹ The average I. Q. of the students in the high-creativity group was 127; for the students in the high-intelligence group, 150. This represented an average difference of 23 I. Q. points between the two groups. All of the students in this study were of above-average intelligence, which is considered a shortcoming of the study.³⁰

An attempt was made in this study to compare the two groups with respect to these questions:

1. What is the relative achievement (defined as learning in school) of the two groups?
2. Are the two groups equally preferred by teachers?
3. What is the relative need for achievement of the two groups?
4. What are the personal qualities the two groups prefer for themselves?
5. What is the relation between the personal qualities preferred by the two groups for themselves and the personal qualities they believe teachers would like to see in children?

²⁹Getzels and Jackson, "The Intelligent and the Creative Adolescent," pp. 191-192.

³⁰Cropley, Creativity, p. 23.

6. What is the relation between the personal qualities preferred by the two groups for themselves and the personal qualities they believe lead to "success" in adult life?
7. What is the nature of the fantasy productions of the two groups?
8. What are the career aspirations of the two groups?³¹

The study showed that the high-creativity group actually scored higher marks on achievement tests than the high-intelligence group, with no differences found in the need for achievement between the two groups. This superior performance could be classified as "over-achievement" on the part of the high-creativity group because of the I. Q. discrepancy, but Getzels and Jackson raised the "issue of whether it is motivational pathology or intellectual creativity that accounts for their superior scholastic achievement."³² The high-creativity student was found to rate a sense of humor as one of the primary qualities which he would like to have and to hold a self-image consistent with his own projected values, often not conforming to the teacher's values. He had a much greater interest in unconventional careers than the high-intelligence student, and he preferred the qualities in himself which he did not necessarily believe his teacher favored. These preferences could account for the fact that, in the study, the teachers were found to

³¹Getzels and Jackson, "The Intelligent and the Creative Adolescent," p. 191.

³²Getzels and Jackson, "The Intelligent and the Creative Adolescent," pp. 193-195.

prefer the high-intelligence students over the high-creativity students.³³ Getzels and Jackson found that the prime characteristic of the high-creativity student was his ability to restructure stereotyped objects with ease and rapidity.³⁴

Torrance's Research

E. Paul Torrance, working at the University of Minnesota, conducted a series of eight studies, six on the elementary level, two at the college level. He created a set of tests which are usable at several levels of education but focused mainly on the elementary level. His subjects were children of various levels of ability who attended public schools.³⁵ He found an average difference of 25 I. Q. points between the highly creative and the highly intelligent students identified in his study; there was no statistically significant difference in their scores on achievement measures, however.³⁶ In his studies on the college level, he found that the highly creative students surpassed the highly intelligent students on measures like creative applications and

³³Getzels and Jackson, "The Intelligent and the Creative Adolescent," pp. 195-196.

³⁴Getzels and Jackson, "The Intelligent and the Creative Adolescent," p. 199.

³⁵Razik, "Psychometric Measurement of Creativity," p. 161.

³⁶Torrance, "Education and Creativity," p. 54.

self-initiated learning. The highly creative students and the highly intelligent students were equal in overall academic achievement.³⁷

Other Studies of Creativity

K. Yamamoto did a study similar to Torrance's on the secondary school level. He selected the top 20 per cent of the students for creativity, then divided them into three groups on the basis of I. Q. scores. He found that the students who scored high on divergent thinking tests did as well on the Iowa Tests of Educational Development as did those in the high I. Q. group, despite a difference of as much as 20 I. Q. points. He did a further study to answer the question, "Do children who score high on tests of creativity do better on classroom achievement than children who score low on such tests, after differences in I. Q. have been allowed for?" His conclusion was that the differences in achievement between the highly creative and the uncreative children were not due to differences in I. Q.³⁸

M. A. Wallach and N. Kogan undertook a study to attempt to reconcile the findings of Getzels and Jackson with those of Torrance, Yamamoto, and others. They felt that the "distinction between creativity and intelligence had not been adequately supported by empirical

³⁷Cropley, Creativity, p. 27.

³⁸Cropley, Creativity, p. 24.

evidence and that the correlations between measures of 'creativity' were generally lower than those between a typical test of 'creativity' and one of 'intelligence.'³⁹ They formed four groups--high creativity-high intelligence, high creativity-low intelligence, low creativity-high intelligence, and low creativity-low intelligence. They disguised their tests as games and had the classroom teacher give them during ordinary lesson time. They found an average correlation between the divergent tests of 0.4, among the intelligence and attainment measures of 0.5, and between the two sets of measures of 0.1.⁴⁰ From these correlation figures, they concluded that a satisfactory practical separation of creativity from intelligence had been established and that the definition of creativity denoted a mode of cognitive functioning that matters a great deal in the life of the child.⁴¹

Hudson researched the relationships between academic achievement and intellectual style; he found that divergent thinkers showed an overwhelming preference for arts subjects while convergent thinkers preferred science subjects. He concluded that a particular pattern of school achievement is indicated by the mode of thinking preferred.⁴²

³⁹Butcher, Human Intelligence, p. 104.

⁴⁰Lytton, Creativity and Education, pp. 38-39.

⁴¹Butcher, Human Intelligence, pp. 107-108.

⁴²Cropley, Creativity, p. 28.

Hason and Butcher repeated part of the Getzels' and Jackson study on an unselected population in Scotland. They found considerably higher correlations between divergent tests and I. Q. tests.⁴³

Cropley's study of 320 Canadian children indicated that the high intelligence-high creativity student surpassed the high intelligence-low creativity student in achievement. This and other studies suggest that the I. Q. score is an inadequate predictor of academic success when used alone; greater discrimination can be achieved through the use of creativity tests in addition to intelligence tests.⁴⁴

As more persons did research studies on facets of creative behavior, a phenomenon became apparent. This has been referred to as the threshold concept. McClelland is given credit for being the first to introduce the concept--there is an I. Q. threshold below which divergent processes cannot operate and above which divergent processes become independent.⁴⁵ John Anderson extended this concept, referring to it as "ability gradient." He conceived of ability levels in terms of thresholds, above which the demonstration of ability is determined by the presence of other factors. As applied to creativity, this meant that above a certain I. Q. point the creative thinking abilities became

⁴³Lytton, Creativity and Education, p. 38.

⁴⁴Cropley, Creativity, pp. 25-26.

⁴⁵Cropley, Creativity, p. 30.

the determiners of success.⁴⁶ Getzels and Jackson estimated that an I. Q. of at least 120 was necessary for high creativity, which would result in the highly-creative person being in the upper tenth of the population in intelligence.⁴⁷ Torrance confirmed the findings of Getzels and Jackson, that beyond about 120 I. Q. there was no correlation between I. Q. and creativity. Torrance extended this finding to the generalization that when gifted children are selected on the basis of I. Q. tests alone, 70 per cent of the more creative children are not included. Creative talent is found in children in the normal I. Q. range and even in the below-average group.⁴⁸

MacKinnon studied outstanding mathematicians, scientists, engineers, architects and writers. He established the failure of the conventional intelligence tests to predict adult achievement, finding that above a minimum level of I. Q., about 120, there was little or no relationship between I. Q. and achievement.⁴⁹

A different approach to the problem was taken by Kenneth Little; in 1958, he made a study of high school graduates in Wisconsin. After he had selected the upper 25 per cent of the class by their grades.

⁴⁶Torrance, "Education and Creativity," pp. 88-89.

⁴⁷Kneller, The Art and Science of Creativity, p. 9.

⁴⁸Razik, "Psychometric Measurement of Creativity," p. 161.

⁴⁹Hudson, The Ecology of Human Intelligence, p. 270.

and general intelligence, he asked the teachers to identify those students who were gifted in any field. Approximately 20 per cent of these specially gifted students were not included in the group which constituted the upper 25 per cent in scholastic achievement or general intelligence.⁵⁰

In 1959, S. J. Parnes and A. Meadow researched the effect of education for creativity on the performance of students. A group of students at the University of Buffalo was given a creative problem-solving course. The data indicated that when creative effectiveness is developed by education, the improvement endures. Their data also gave support to a theory of A. F. Osborn, who theorized that production quantity leads to quality, with the better ideas coming late in the total output of ideas.⁵¹

Summary of Research

The research studies included in this chapter are cumulative in the total picture of creativity. Guilford initiated the emphasis on creativity with his factor-analysis studies and his model of the Structure of Intellect into which creative abilities fit logically. He devised a set of tests for the measurement of creativity, as did Torrance who studied

⁵⁰Wolfe, "Diversity of Talent," p. 155.

⁵¹Parnes, "Education and Creativity," pp. 346-349.

the highly creative and the highly intelligent students at the elementary and college levels. These two sets of creativity tests were the basis for most of the research studies which others conducted.

Comparison studies of intelligence and creativity were conducted by Getzels and Jackson, Wallach and Kogan, Cropley, and Yamamoto. Those students who were high in measured creativity were also high in measured attainment, doing as well on the attainment tests as the students who were high in measured I. Q. The findings indicated that I. Q. scores alone are not sufficient for the prediction of creativity; a second finding is that intelligence and creativity are not the same thing but are separate factors in achievement.

Studies were made for verification of these findings by others. Yamamoto studied secondary school students as a follow-up to the work of Torrance. Hason and Butcher determined the correlations between divergent and convergent tests. McClelland formulated the threshold concept which had been suggested by Getzels and Jackson and confirmed by Torrance. These studies led to the conclusion that no correlation exists between I. Q. and creative ability above a minimum level of I. Q.

Little's study determined that 20 per cent of the more creative students were not included in the upper 25 per cent of students as

determined by grades and general intelligence. MacKinnon's study pointed out the failure of the I. Q. test to predict adult achievement, a confirmation of the findings to date of Terman's study. These studies have led to the finding that the use of the I. Q. score as the criterion for selecting the top students in school results in the exclusion of many talented students who may prove to be highly creative in later life.

The role of education for creativity was researched by Parnes and Meadow at the University of Buffalo. The findings of their study indicate that creativity can be modified or enhanced through education.

These research studies appear to have proven two findings. The first is that intelligence is a supportive cognitive trait which makes possible and implements the expression of creativity. The second is that creative persons are invariably more intelligent than non-creative persons, but intelligent persons are not always necessarily creative.

CHAPTER VII

A STUDY OF CREATIVITY AND ACCELERATED CLASSES IN THE RICHARDSON INDEPENDENT SCHOOL DISTRICT

Background for Study

A person who enters the teaching profession will encounter ability grouping of the students in many school systems. In some situations, the students are "tracked" into high, average, or low tracks. The students remain within the track throughout their school careers, having little contact with students of different levels of ability. In a more desirable situation, the students are in an individualized program in which they may be in an accelerated class for those subjects in which they excel and in heterogeneous or even basic classes for other subjects. The teacher who encounters such an ability-grouping system may find himself assuming that the students in the accelerated classes are superior in every respect. He will, as a matter of course, enrich the curriculum for these students. The students in the heterogeneous classes, who are assumed to be less able, will not receive the benefits of this enriched curriculum.

The teacher who has an understanding of the nature of creativity and the characteristics of the creative person will be less willing to accept the stereotype of group labels for his students. He will seek to

determine whether or not he has specially-gifted students who are not in the accelerated situation and will give these students the opportunities to develop their abilities.

Statement of Problem

This investigation deals with students in accelerated and heterogeneous classes. The selection of students for these classes in a manner that benefits the students, the use of a measure of creativity in the selection of students for the accelerated situation, and the method of grading the measure of creativity are the areas investigated.

The sample group of students in this study reside in the Richardson Independent School District, which makes provision for students to be selected for enriched learning activities in accelerated classes. The criteria for admission to these classes is stated as being teacher recommendations only. In this study, an attempt is being made to determine if;

1. teacher recommendations are sufficient criteria for selection of students for the accelerated classes;
2. students are included in the accelerated classes who were high in measured I. Q., but low in measured creativity;
3. students are excluded from the accelerated classes who would have been included if measures of creativity had been included in the criteria for selection; and
4. The measure of creativity would provide an adequate discrimination between students if the tests were graded for fluency alone.

Methods of Procedure

The methods of procedure used in this study represent a synthesis of the methods used by other researchers in the area of creativity. The comparison method of grouping employed by Wallach and Kogan and Cropley was followed. The sample group of students was from the public schools, as in the studies done by Torrance, Yamamoto, Hason and Butcher, and Cropley. The measure of creativity employed was the Christensen-Guilford Fluency Tests, developed in conjunction with Guilford's work on the Structure of Intellect. The scoring method used for the fluency grading followed the instructions given in the manual which accompanied the tests. The scoring for originality was that employed by Cropley who had revised the weights suggested by Torrance. Thus, this study does not duplicate any one study which has preceded it, but it follows the accepted patterns of that research which has been done.

Sample Group

The sample group in this study consisted of the students in four ninth-grade English classes at Lake Highlands Junior High School: two were accelerated classes and two were heterogeneous classes. All of the students were Caucasian and resided in an upper middle-class, affluent neighborhood in Dallas, Texas. These students could be considered test-wise and motivated to succeed in a test situation. They were all in a college-preparation curriculum. The purpose for the

test had been discussed with the students by the classroom teacher; the students had willingly accepted the challenge to do the best they could.

The sample group included 52 males and 53 females, for a total of 105 students. The students in Periods 1 and 2 were in the heterogeneous classes, and the students in Periods 4 and 6 were in the accelerated classes. The number of students in each class is shown in Table I.

TABLE I
NUMBER OF STUDENTS IN STUDY

Class	Males	Females	Total
Period 1	12	13	25
Period 2	15	9	24
Period 4	16	13	29
Period 6	9	18	27
Total	52	53	105

The students in this sample were of average or above I. Q., with a total range of 54 I. Q. points. The intelligence test used to obtain the I. Q. scores was the Short Form Test of Academic Aptitude, administered to the students in the Fall of 1972. The mean I. Q. of all of the students was 116.6, with the means for each sex and each class being shown in Table II.

TABLE II
MEAN I. Q. OF STUDENTS IN STUDY

Class	Males	Females	Total
Period 1	103.5	112.0	107.9
Period 2	110.1	104.2	107.9
Period 4	124.1	122.6	123.4
Period 6	129.4	122.7	124.9
Total	116.3	116.9	

Since there is a school district policy against the release of information about the I. Q. scores of students, the names of the students were removed from each set of papers and the counselor penciled in the sex of the student and the I. Q. score. A means of identification for the papers was necessary. Therefore, the tests for each class period were arranged in descending order on the basis of the I. Q. scores. A number was then assigned to each paper, using the class period number and the number representing the rank in that class according to I. Q. score. The identification of the students in each class, their scores on the I. Q. measure and on the fluency tests, scored for both fluency and originality, are shown in the Appendix, in Tables XV through XVIII.

A study of these tables indicates that there was a similar range of I. Q. in the four classes, with ranges in the two heterogeneous

classes of 33 and 40 points and in the accelerated classes of 34 and 48 points. Obviously, I. Q. scores were not the factor for selection of students for the accelerated classes since students with average I. Q. 's were included also; however, only two of the students included in the upper grouping of students according to I. Q. were not in the accelerated classes. This indicates that I. Q. or class grades or achievement scores must have been a factor in the teacher's recommendations.

Measuring Instrument

The measuring instrument used in this study was the Christensen-Guilford Fluency Tests, which were designed for grades seven through twelve and adults. They were administered to the sample group in the Spring of 1973.

These tests measured four types of fluency with verbal materials. Designed to measure divergent thinking, they required the student to produce words rapidly to meet the criteria given for each test. In the Word Fluency test, the students had to produce words which contained a specific letter. In the Associational Fluency test, words similar in meaning to a given word had to be produced. The Ideational Fluency test required the production of the names of things in certain classes, such as fluids suitable for drinking. The Expressional Fluency test required the production of four-word sentences, with each word to

begin with a specified letter, the order of which could not be changed. Each test was strictly timed. The students were allowed two minutes for each part, with the exception of the Ideational Fluency test which allowed three minutes for each part.

Tests of divergent thinking are necessarily open-ended. This requires the use of judgment in scoring as to the acceptability of the answers, thereby introducing scorer unreliability. The scoring guides for the tests give the rationale and extensive examples of acceptable responses.¹ Scorer reliability was not given in the manuals for the tests, but other investigators using these tests have obtained coefficients around 0.90.²

Validity of the tests was of the construct, not predictive, type. It was based on factor-analysis studies which identified the existence of verbal fluency as a basic dimension of human ability and which shed light on the nature of creative thinking.³ The reliabilities of the tests range from 0.62 to 0.77 and are based on the split-half method. Table XIX in the Appendix gives the norms and statistical data for the four tests. These norms were based on a sample group of average I. Q.

¹Oscar Krisen Buros, "Christensen-Guilford Fluency Tests," The Sixth Mental Measurements Yearbook, Entry 544 (Highland Park, 1965), p. 848.

²Anastasi, Psychological Testing, p. 378.

³Buros, "Christensen-Guilford Fluency Tests," p. 848.

(I. Q. 's of 95 to 119) boys and girls and a mixed-sex group of high I. Q. (I. Q. 's of 120 and above) students, all of whom were in the ninth grade.⁴

Scoring the Creativity Tests

The instructions for the administration of the fluency tests included a statement, for each test, that the score would be the total number of acceptable answers given during the limited time allowed. The students were told that misspellings would not count against them and that no moral judgments would be made of the answers given. Quantity, not quality, was the criterion to be used in scoring the tests.

The fluency method of scoring the tests for quantity was followed, but the scorer became aware that this lacked discrimination between the merely fluent student and the more original student. The student who listed the words, "too, to, two, tea, it, at, etc.," on Part II of the Word Fluency test which called for words containing the letter "T," received the same score as the student who listed "totalitarian, contest, consistent, topple, kitten, antidisestablishmentarianism, etc." For this reason, the scorer went through the very time-consuming process of re-scoring the tests for originality.

⁴Sheridan Psychological Services, Inc., "Manual for the Christensen-Guilford Fluency Tests," 3rd ed., mimeographed manual (Orange, California, n. d.).

In order to score the tests for originality, the scorer had to tally the answers given by all of the students in the sample, allot weights for each response according to the frequency with which the response was given, and rescore using the weighted totals. The method of allotting the weights for the responses was that employed by Cropley. For the sample group used in this study, the following weights were allotted:

- 0--responses given by more than 16 students in the sample.
- 1--responses given by 7 to 16 of the students in the sample.
- 2--responses given by 3 to 6 of the students in the sample.
- 3--responses given by 2 of the students in the sample.
- 4--responses given by only 1 of the students in the sample.

For comparison purposes, a composite score was necessary for each student's set of tests. The scores made on each of the four tests were standardized by being converted into T-scores. The four scores were then added and divided by four, giving one standardized score for fluency. The same process was followed to arrive at a composite score for originality for each student. This gave two bases for comparison of the student's divergent thinking abilities. Table III shows the mean score and standard deviation for each fluency test and for each method of scoring. The increase in the mean scores and in the standard deviations when the tests were scored for originality is caused by the fact that the weighting process had a multiplicative effect, to some extent.

TABLE III
MEAN SCORE AND STANDARD DEVIATION
FOR THE FOUR FLUENCY TESTS

Test	Scoring Method	Mean Score	Standard Deviation
Word Fluency	Fluency	38.5	10.4
Word Fluency	Originality	61.5	23.1
Associational Fluency	Fluency	12.7	4.9
Associational Fluency	Originality	10.9	9.0
Ideational Fluency	Fluency	60.3	15.2
Ideational Fluency	Originality	60.0	31.8
Expressional Fluency	Fluency	5.6	3.6
Expressional Fluency	Originality	22.6	14.1

Formation of Groupings

A separation between the upper group and the lower group is necessary to effect a discrimination. This separation of the groups was achieved by dividing the scores for all of the students in the sample into high, average, and low groups. The scores for I. Q., for fluency, and for originality were arranged, in turn, from high to low. The distribution was then split at half a standard deviation above and half a standard deviation below the mean. The average, or middle, group of scores was then discarded from consideration. Table XX in the Appendix lists the upper group of students ranked according to I. Q. scores. The mean I. Q. was 116.6, and the standard deviation was 12.052.

This made a division for the upper group of students at I. Q. score 122.6, and a lower division at I. Q. score 110.6. Table XXI in the Appendix lists the lower group of students as ranked by I. Q. scores.

The mean fluency score for the students was determined to be 50.3, with the upper group being those students who made a score of 54.2 or better. The upper group of students ranked by fluency score is listed in Table XXII in the Appendix. The mean minus one-half of the standard deviation made the upper limit for the lower group of students, as ranked by fluency scores, a score of 46.4. This group of students is listed in Table XXIII in the Appendix.

The tests were arranged by originality scores, and a third set of groupings was made. The mean score for originality was 49.9, with a standard deviation of 6.8. The upper group of students ranked by originality scores is shown in Table XXIV in the Appendix. The lower group of students ranked by originality scores is shown in Table XXV in the Appendix. The upper limit for this group was 46.5.

Findings

Those students who were in the upper I. Q. group, listed in Table XX in the Appendix, were compared with the students in the upper group when the tests were scored for fluency, listed in Table XXII in the Appendix. The students who were in both groups became members of a new group, which is listed in Table IV.

TABLE IV
STUDENTS IN HIGH I. Q. --HIGH FLUENCY GROUPINGS

Sex	Identification Number	Fluency Score	I. Q. Score
Female	4- 7	68.0	128
Female	6- 5	63.8	137
Male	6- 6	63.3	132
Female	6- 3	62.3	138
Male	4- 2	58.0	140
Male	6- 9	57.8	128
Female	6- 8	57.8	129
Male	6-16	57.8	124
Male	6- 4	57.0	137
Male	6-10	56.8	127
Male	6- 1	56.5	147
Female	6- 7	56.0	131
Male	4-11	55.8	126
Female	6-14	55.8	125
Male	4- 6	55.5	129
Male	4-12	55.3	126
Female	4-15	54.5	124
Female	4- 9	54.3	127
Male	4- 1	54.3	140

The high I. Q. --high fluency grouping listed in Table IV included a total of nineteen students which represented 18 per cent of the total sample.

It should be noted that all of these students are in the accelerated classes.

A comparison was also made between the students in the high I. Q. group and those in the high originality group, listed in Table XXIV in the Appendix. Those students in both groups were formed into a new group which is listed in Table V.

TABLE V
STUDENTS IN HIGH I. Q. --HIGH ORIGINALITY GROUPINGS

Sex	Identification Number	Originality Score	I. Q. Score
Female	4- 7	70.0	128
Female	6- 5	65.3	137
Male	6- 1	62.0	147
Male	6-11	60.5	126
Female	6- 8	59.5	129
Male	6- 6	58.8	132
Male	4- 2	58.0	140
Male	6-16	57.8	124
Male	6- 9	57.3	128
Male	6-10	57.0	127
Male	6- 4	56.8	137
Male	4-12	56.3	126
Female	6-14	56.0	125
Female	6- 3	55.5	138
Female	6-12	55.3	126
Male	4- 6	55.0	129
Male	2- 1	54.3	123
Male	4-14	53.8	125
Female	4- 9	53.5	127

A comparison of Tables IV and V reveals that in both cases there were nineteen students, but a closer inspection indicates that three students in the high group for fluency are not included in the high group for originality. Three other students moved into the high group when the tests were scored for originality. With one exception, all of the students listed in Table V were from the accelerated classes.

This student's paper was identified as 2- 1.

A second set of groupings was formed by comparing the students in the low I. Q. group, listed in Table XXI in the Appendix, with those in the low fluency group, listed in Table XXIII in the Appendix. A total of twenty-four students were in this new group, or 22.8 per cent of the sample. This listing is given in Table VI.

TABLE VI
STUDENTS IN LOW I. Q. -- LOW FLUENCY GROUPINGS

Sex	Identification Number	Fluency Score	I. Q. Score
Male	2-22	33.0	96
Male	1-22	33.3	99
Male	1-13	34.0	107
Male	1-23	36.5	99
Male	2-21	38.0	97
Female	2-18	38.3	100
Male	1-20	38.8	101
Female	2-12	39.0	108
Male	2-13	39.3	107
Male	1-18	39.5	102
Female	1-14	40.3	107
Male	4-28	40.3	109
Male	1-12	41.0	109
Female	1-16	42.0	105
Male	1-24	42.0	96
Female	2-20	43.0	98
Male	2-11	43.0	108
Male	2-17	43.8	102
Female	1-19	43.8	101
Female	2-23	44.0	94
Female	1-15	44.3	106
Female	1-11	44.3	110
Female	1-21	44.8	101
Male	1-10	46.3	110

The other grouping in this set was a comparison of those students in the low I. Q. group and the low originality group, listed in Table XXV in the Appendix. This group included twenty-five students, or 23.8 per cent of the sample. This listing is shown in Table VII.

TABLE VII
STUDENTS IN LOW I. Q. -- LOW ORIGINALITY GROUPINGS

Sex	Identification Number	Originality Score	I. Q. Score
Male	1-22	37.0	99
Male	2-22	38.0	96
Male	2-12	38.8	108
Male	1-18	39.5	102
Female	2-18	40.0	100
Male	1-20	40.0	101
Male	2-21	40.5	97
Male	1-13	40.5	107
Male	1-23	40.8	99
Female	2-20	41.5	98
Male	1-24	41.8	96
Female	1-16	41.8	105
Female	1-19	42.0	101
Male	1-25	43.3	93
Female	1-21	43.3	101
Female	2-23	43.5	94
Female	1-11	44.3	110
Male	1-12	44.5	109
Male	2-17	44.5	102
Female	1-15	45.3	106
Male	2-11	45.3	108
Male	1-10	45.3	110
Female	1-14	45.5	107
Male	2-24	46.3	93
Male	4-28	46.3	109

A comparison between these two tables indicates that, with one exception, all of these students came from the two heterogeneous classes. A closer inspection shows that one student, 2-13, who was in the low fluency grouping was not included in the low group after the tests were scored for originality. However, three additional students were in the low group for originality as well as I. Q.

Another set of groupings was formed of those students who were in the high I. Q. group, listed in Table XX in the Appendix, and in the low fluency group, listed in Table XXIII in the Appendix, and in the low originality group, listed in Table XXV in the Appendix. There were two such students in the group for fluency, representing 1.9 per cent of the sample group. Table VIII lists these students.

TABLE VIII
STUDENTS IN HIGH I. Q. --LOW FLUENCY GROUPINGS

Sex	Identification Number	Fluency Score	I. Q. Score
Male	6- 2	42.3	146
Male	4- 5	45.3	130

Three students were in the high I. Q. --low originality grouping. This represents 2.9 per cent of the sample group. These students are listed in Table IX.

TABLE IX

STUDENTS IN HIGH I. Q. --LOW ORIGINALITY GROUPINGS

Sex	Identification Number	Originality Score	I. Q. Score
Male	6- 2	43.5	146
Male	4- 5	45.8	130
Female	6-15	46.0	125

A comparison between Tables VIII and IX reveals that one additional student, 6-15, was in this grouping.

The remaining set of tables is for students who were in the low I. Q. group, listed in Table XXI in the Appendix, and those in the high fluency group, listed in Table XXII in the Appendix, and in the high originality group, listed in Table XXIV in the Appendix. Table X gives the data for the low I. Q. --high fluency grouping.

TABLE X

STUDENTS IN LOW I. Q. --HIGH FLUENCY GROUPINGS

Sex	Identification Number	Fluency Score	I. Q. Score
Female	2-14	55.0	107
Female	2-15	54.3	106

Table XI has the data for the low I. Q. --high originality grouping. One additional student is included who was not listed in Table X.

TABLE XI
STUDENTS IN LOW I. Q. --HIGH ORIGINALITY GROUPINGS

Sex	Identification Number	Originality Score	I. Q. Score
Female	2-15	58.0	106
Male	4-29	55.3	106
Female	2-14	53.8	107

A matching of the upper group of students as ranked by fluency, listed in Table XXII in the Appendix, was made with that of the upper group as ranked by originality, listed in Table XXIV in the Appendix. This information is presented in Table XII on the following page. Both Tables XXII and XXIV included a total of thirty-eight students, but only thirty-one of these students were in both groupings. Of these thirty-one students, three remained in the same position, eleven moved upward (one student by as many as twenty-seven ranks), and seventeen of the students moved downward.

A close inspection of Table XII reveals that nine students are included in the groupings for high fluency and high originality who were not included in the membership of the accelerated classes. One of these students, 2-1, was not included in the grouping for high fluency but was included in the high originality grouping. These nine students, 1-2, 1-7, 2-1, 2-2, 2-4, 2-5, 2-10, 2-14, and 2-15, would perhaps benefit by being included in the membership of the accelerated classes.

TABLE XII

A COMPARISON OF THE STUDENTS IN THE HIGH
FLUENCY AND HIGH ORIGINALITY GROUPINGS

High Fluency Grouping	High Originality Grouping
2-10	4- 7
4- 7	2-10
4-16	6- 5
4-24	4-16
6-20	6- 1
6- 5	4-11
6- 6	4-25
1- 2	2- 5
6- 3	6- 8
1- 7	4-24
4-25	6- 6
4- 2	1- 2
6-16	6-20
6- 9	4- 2
6- 8	2-15
6- 4	6-16
* 6-17	6- 9
6-10	6-10
4-19	6- 4
6-18	4-12
6- 1	4-17 **
2- 4	6-14
* 6- 7	6- 3
6-14	6-12 **
4-11	4-29 **
4- 6	4- 6
4-23	6-18
4-12	4-26
2-14	1- 7
4-26	4-19
* 2- 2	4-21 **
* 4-15	2- 1 **
2-15	4-20 **
* 6-23	2- 4
2- 5	4-14 **
* 4-18	2-14
4- 9	4- 9
* 4- 1	4-23

* Not included in high group for originality.

** Not included in high group for fluency.

Ten students, who were members of the accelerated classes, were not included in the groupings for high I. Q., high fluency, or high originality. These ten students, 4-22, 4-27, 4-28, 6-19, 6-21, 6-22, 6-24, 6-25, 6-26, and 6-27, might benefit by being in the heterogeneous classes.

A second item which should be noted from an examination of Table XII is that seven additional students were included in the high originality grouping who were not in the high fluency grouping. Also, seven students were included in the high fluency grouping who were not in the high originality grouping. However, six of the seven students in each list were members of the accelerated classes. The two students who were identified as not being on both lists, 2-1 and 2-2, ranked at the top of their heterogeneous class in terms of measured I. Q. It would appear that had measures of I. Q. and creativity been included in the selection process for the accelerated classes, these two students would have been included.

For comparison of the contribution of the two abilities, convergent and divergent thinking, a nine-celled table was made showing the number of students in each of the I. Q. groups and each of the groups when the tests were scored for fluency. This information is presented in Table XIII. The students who were in the average, or middle, groups are included even though their scores were not used in the comparisons in this section.

TABLE XIII

NUMBER OF STUDENTS IN CELLS FOR FLUENCY AND I. Q.

	High Fluency	Average Fluency	Low Fluency	Total
High I. Q.	19	12	2	33
Average I. Q.	17	14	8	39
Low I. Q.	2	7	24	33
Total	38	33	34	105

A second nine-celled table was prepared using the numbers in each group when the tests were scored for originality. This information is given in Table XIV.

TABLE XIV

NUMBER OF STUDENTS IN CELLS FOR ORIGINALITY AND I. Q.

	High Originality	Average Originality	Low Originality	Total
High I. Q.	19	11	3	33
Average I. Q.	16	15	8	39
Low I. Q.	3	5	25	33
Total	38	31	36	105

In the high divergent cells in Tables XIII and XIV nearly all of the students were in the high or medium I. Q. cells. This is partially

because there were so few students in the sample with a low I. Q., but it could also be a verification of the threshold concept. Also, the exact reverse is evident in both tables for the low divergent cells, with the majority of the students being in the average and low I. Q. cells. This pattern appears to bear out the premise that "a high level of convergent thinking ability is associated with a high level of divergent thinking, and vice versa."⁵ A second result which should be noted is that, when the tests were graded for originality, there were two students in the low originality group who had been in the average fluency group, as shown in Table XIII.

SUMMARY AND CONCLUSIONS

The particular set of tests used in this study, when graded for fluency, revealed a discrimination between the students in this sample. Ten students who might have benefited by being in heterogeneous classes and nine students who could probably have made significant contributions in the accelerated situation were identified. The regrading of the tests for originality resulted in the identification of one student who might have been overlooked had the tests been scored for fluency alone.

⁵S. N. Bennett, "Divergent Thinking Abilities--A Validation Study," The British Journal of Educational Psychology, XLIII, Part 1 (February, 1973), p. 5.

I. Q. scores and teacher recommendations are inadequate for the selection of students for enriched curriculum where the students would be encouraged, as well as expected, to do work of an independent nature. The inclusion of a measure of divergent thinking would result in a significantly different selection of students for the accelerated classes.

Although the set of tests used in this study is considered to be in the developmental stage for selection and guidance purposes, the use of these tests in conjunction with a measure of I. Q. and teachers' recommendations would be helpful in the selection of students for accelerated classes. The grading of the tests for fluency alone would be adequate since the results obtained by the tedious regrading for originality were not sufficiently significant to necessitate the use of such a grading process.

This study, while certainly not definitive, may help to clarify some of the relationships between convergent and divergent thinking as it applies to students in a classroom situation. The results indicate that the procedure used for selection of students for accelerated classes should be revised.

CHAPTER VIII

CONCLUDING STATEMENT

This study is concerned with the identification of creative students in the classroom. Before the educator can properly identify the creative students, he must have an understanding of the nature of the creative person, the creative situation, the creative process, and the creative product. The educator needs to understand the relationship between creativity and the various psychologies so that he will be able to reconcile his private philosophy with the nature of the creative situation. With the knowledge that creativity can be modified by education, the educator will be able to adopt strategies and techniques into his method of teaching which will enable the students in his classes to attain the highest degree of achievement that is commensurate with their abilities.

All educators are apt to come into contact with a system of ability grouping of students in the classroom. The educator will be called upon to make recommendations of those students who will benefit most from receiving instruction in the accelerated situation. The educator who is aware of the dimensions of the creative abilities of his students will be more able to make recommendations that will be most beneficial.

In this study, a measure of creativity was used to determine whether or not a discrimination between students could be made. The measure used, the Christensen-Guilford Fluency Tests, did indeed reveal a discrimination. Identification of students who might benefit from the accelerated classes was made, and identification of students who were in the accelerated classes but who might better have been in the heterogeneous classes was also made. The relationship between convergent thinking and divergent thinking which had been revealed in the research of others was borne out in this study.

This study clearly indicates that no measure of creativity should be used, alone, for selection purposes for the same reason that no measure of intelligence should be used, alone, for selection purposes. The structure of the human intellect is such that measurements of the mental abilities of students must include tests of both creativity and intelligence if the more gifted students are to be recognized and permitted to benefit from the accelerated class situation. The exclusion of divergent thinkers from the ranks of the specially gifted can no longer be tolerated. The contributions of the divergent thinkers can enrich the school class as well as the society.

APPENDIX

Table

- XV. I. Q. Score, Fluency Score, Originality Score and Identification of Pupils in Period 1
- XVI. I. Q. Score, Fluency Score, Originality Score and Identification of Pupils in Period 2
- XVII. I. Q. Score, Fluency Score, Originality Score and Identification of Pupils in Period 4
- XVIII. I. Q. Score, Fluency Score, Originality Score and Identification of Pupils in Period 6
- XIX. Statistics on Various Groups for the Four Tests
- XX. Upper Group of Students Ranked by I. Q. Scores
- XXI. Lower Group of Students Ranked by I. Q. Scores
- XXII. Upper Group of Students Ranked by Fluency Scores
- XXIII. Lower Group of Students Ranked by Fluency Scores
- XXIV. Upper Group of Students Ranked by Originality Scores
- XXV. Lower Group of Students Ranked by Originality Scores

TABLE XV

I. Q. SCORE, FLUENCY SCORE, ORIGINALITY SCORE
AND IDENTIFICATION OF PUPILS IN PERIOD 1

Sex	Identification Number	I. Q. Score	Fluency Score	Originality Score
Female	1- 1	126	52.8	48.5
Female	1- 2	120	62.5	58.8
Female	1- 3	119	47.5	48.0
Female	1- 4	117	48.8	45.5
Female	1- 5	116	46.5	45.0
Female	1- 6	115	50.0	50.3
Female	1- 7	113	62.0	54.8
Male	1- 8	112	40.3	42.0
Male	1- 9	111	42.5	44.8
Male	1-10	110	46.3	45.3
Female	1-11	110	44.3	45.5
Male	1-12	109	41.0	44.5
Male	1-13	107	34.0	40.5
Female	1-14	107	40.3	45.5
Female	1-15	106	44.3	45.3
Female	1-16	105	42.0	41.8
Male	1-17	103	52.3	47.8
Male	1-18	102	39.5	39.5
Female	1-19	101	43.8	42.0
Male	1-20	101	38.8	40.0
Female	1-21	101	44.8	43.3
Male	1-22	99	33.3	37.0
Male	1-23	99	36.5	40.8
Male	1-24	96	42.0	41.8
Male	1-25	93	49.0	43.3

TABLE XVI

I. Q. SCORE, FLUENCY SCORE, ORIGINALITY SCORE
AND IDENTIFICATION OF PUPILS IN PERIOD 2

Sex	Identification Number	I. Q. Score	Fluency Score	Originality Score
Male	2- 1	123	51.0	54.3
Male	2- 2	120	55.0	52.8
Male	2- 3	119	41.5	44.8
Male	2- 4	119	56.0	54.0
Male	2- 5	116	54.3	59.8
Female	2- 6	116	50.8	51.5
Male	2- 7	116	41.8	43.8
Male	2- 8	114	45.3	45.0
Male	2- 9	114	38.3	42.3
Female	2-10	113	70.8	66.0
Male	2-11	108	43.0	45.3
Male	2-12	108	39.0	38.8
Male	2-13	107	39.3	47.0
Female	2-14	107	55.0	53.8
Female	2-15	106	54.3	58.0
Female	2-16	105	48.0	47.3
Male	2-17	102	43.8	44.5
Female	2-18	100	38.3	40.0
Female	2-19	99	50.8	48.8
Female	2-20	98	43.0	41.5
Male	2-21	97	38.0	40.5
Male	2-22	96	33.0	38.0
Female	2-23	94	44.0	43.5
Male	2-24	93	46.8	46.3

TABLE XVII

I. Q. SCORE, FLUENCY SCORE, ORIGINALITY SCORE
AND IDENTIFICATION OF PUPILS IN PERIOD 4

Sex	Identification Number	I. Q. Score	Fluency Score	Originality Score
Male	4- 1	140	54.3	50.8
Male	4- 2	140	58.0	58.0
Male	4- 3	131	52.0	52.0
Female	4- 4	131	51.8	52.5
Male	4- 5	130	45.3	45.8
Male	4- 6	129	55.5	55.0
Female	4- 7	128	68.0	70.0
Female	4- 8	128	47.0	52.0
Female	4- 9	127	54.3	53.5
Male	4-10	127	51.5	50.8
Male	4-11	126	55.8	60.5
Male	4-12	126	55.3	56.3
Female	4-13	126	50.5	48.3
Male	4-14	125	48.5	53.8
Female	4-15	124	54.5	50.3
Female	4-16	121	65.3	62.5
Male	4-17	121	52.5	56.3
Female	4-18	121	54.3	48.8
Male	4-19	120	56.5	54.5
Female	4-20	120	49.0	54.0
Male	4-21	119	52.0	54.5
Male	4-22	119	48.5	49.8
Female	4-23	118	55.3	53.5
Male	4-24	118	64.5	59.0
Female	4-25	117	59.8	60.0
Female	4-26	117	55.0	55.0
Female	4-27	116	49.3	47.0
Male	4-28	109	40.3	46.3
Male	4-29	106	47.8	55.3

TABLE XVIII

I. Q. SCORE, FLUENCY SCORE, ORIGINALITY SCORE
AND IDENTIFICATION OF PUPILS IN PERIOD 6

Sex	Identification Number	I. Q. Score	Fluency Score	Originality Score
Male	6- 1	147	56.5	62.0
Male	6- 2	146	42.3	43.5
Female	6- 3	138	62.3	55.5
Male	6- 4	137	57.0	56.8
Female	6- 5	137	63.8	65.3
Male	6- 6	132	63.3	58.8
Female	6- 7	131	56.0	52.0
Female	6- 8	129	57.8	59.5
Male	6- 9	128	57.8	57.3
Male	6-10	127	56.8	57.0
Female	6-11	127	50.0	53.0
Female	6-12	126	54.0	55.3
Female	6-13	126	51.0	52.8
Female	6-14	125	55.8	56.0
Female	6-15	125	53.5	46.0
Male	6-16	124	57.8	57.8
Female	6-17	121	56.8	53.0
Female	6-18	121	56.5	55.0
Female	6-19	120	53.0	49.5
Female	6-20	120	63.8	58.5
Female	6-21	119	52.0	52.3
Female	6-22	118	54.0	50.0
Female	6-23	113	54.3	49.0
Female	6-24	113	53.3	48.0
Male	6-25	113	46.0	47.0
Male	6-26	111	44.5	49.3
Female	6-27	99	53.8	48.8

TABLE XIX
 STATISTICS ON VARIOUS GROUPS
 FOR THE FOUR TESTS*

	Mean	S. D.	Reliability
Word Fluency			
Boys	44.7	9.67	0.67
Girls	47.7	9.95	0.75
High I. Q.	47.9	10.16	0.74
Associational Fluency			
Boys	10.4	3.68	0.57
Girls	11.0	3.66	0.62
High I. Q.	11.9	3.68	0.63
Ideational Fluency			
Boys	49.1	13.71	0.77
Girls	56.2	12.31	0.68
High I. Q.	55.6	12.79	0.69
Expressional Gluency			
Boys	25.8	11.67	0.66
Girls	29.1	11.75	0.67
High I. Q.	30.8	12.38	0.67

Alternate-forms estimate

N's for boys, 229; for girls, 228; for high-I. Q. group, 206.

I. Q. 's for boys and girls: 95-119; for high-I. Q. group, 120⁺.

*Source: Sheridan Psychological Services, Inc., "Manual for the Christensen-Guilford Fluency Tests," p. 5.

TABLE XX

UPPER GROUP OF STUDENTS
RANKED BY I. Q. SCORES

Sex	Identification Number	I. Q. Score
Male	6- 1	147
Male	6- 2	146
Male	4- 1	140
Male	4- 2	140
Female	6- 3	138
Male	6- 4	137
Female	6- 5	137
Male	6- 6	132
Female	4- 4	131
Male	4- 3	131
Female	6- 7	131
Male	4- 5	130
Female	6- 8	129
Male	4- 6	129
Male	6- 9	128
Female	4- 7	128
Female	4- 8	128
Male	6-10	127
Female	6-11	127
Female	4- 9	127
Male	4-10	127
Female	6-12	126
Female	6-13	126
Male	4-11	126
Male	4-12	126
Female	4-13	126
Female	1- 1	126
Female	6-15	125
Female	6-14	125
Male	4-14	125
Male	6-16	124
Female	4-15	124
Male	2- 1	123

TABLE XXI
 LOWER GROUP OF STUDENTS
 RANKED BY I. Q. SCORES

Sex	Identification Number	I. Q. Score
Male	1-25	93
Male	2-24	93
Female	2-23	94
Male	1-24	96
Male	2-22	96
Male	2-21	97
Female	2-20	98
Male	1-23	99
Male	1-22	99
Female	2-19	99
Female	6-27	99
Female	2-18	100
Female	1-21	101
Male	1-20	101
Female	1-19	101
Male	1-18	102
Male	2-17	102
Male	1-17	103
Female	1-16	105
Female	2-16	105
Female	1-15	106
Female	2-15	106
Male	4-29	106
Female	1-14	107
Female	2-14	107
Male	2-13	107
Male	1-13	107
Female	2-12	108
Male	2-11	108
Male	4-28	109
Male	1-12	109
Female	1-11	110
Male	1-10	110

TABLE XXII

UPPER GROUP OF STUDENTS RANKED BY FLUENCY SCORES

Sex	Identification Number	Fluency Score
Female	2-10	70.8
Female	4- 7	68.0
Female	4-16	65.3
Male	4-24	64.5
Female	6-20	63.8
Female	6- 5	63.8
Male	6- 6	63.3
Female	1- 2	62.5
Female	6- 3	62.3
Female	1- 7	62.0
Female	4-25	59.8
Male	4- 2	58.0
Male	6-16	57.8
Male	6- 9	57.8
Female	6- 8	57.8
Male	6- 4	57.0
Female	6-17	56.8
Male	6-10	56.8
Male	4-19	56.5
Female	6-18	56.5
Male	6- 1	56.5
Male	2- 4	56.0
Female	6- 7	56.0
Female	6-14	55.8
Male	4-11	55.8
Male	4- 6	55.5
Female	4-23	55.3
Male	4-12	55.3
Female	2-14	55.0
Female	4-26	55.0
Male	2- 2	55.0
Female	4-15	54.5
Female	2-15	54.3
Female	6-23	54.3
Male	2- 5	54.3
Female	4-18	54.3
Female	4- 9	54.3
Male	4- 1	54.3

TABLE XXIII

LOWER GROUP OF STUDENTS RANKED BY FLUENCY SCORES

Sex	Identification Number	Fluency Score
Male	2-22	33.0
Male	1-22	33.3
Male	1-13	34.0
Male	1-23	36.5
Male	2-21	38.0
Male	2- 9	38.3
Female	2-18	38.3
Male	1-20	38.8
Male	2-12	39.0
Male	2-13	39.3
Male	1-18	39.5
Male	1- 8	40.3
Male	4-28	40.3
Female	1-14	40.3
Male	1-12	41.0
Male	2- 3	41.5
Male	2- 7	41.8
Female	1-16	42.0
Male	1-24	42.0
Male	6- 2	42.3
Male	1- 9	42.5
Male	2-11	43.0
Female	2-20	43.0
Male	2-17	43.8
Female	1-19	43.8
Female	2-23	44.0
Female	1-11	44.3
Female	1-15	44.3
Male	6-26	44.5
Female	1-21	44.8
Male	4- 5	45.3
Male	2- 8	45.3
Male	6-25	46.0
Male	1-10	46.3

TABLE XXIV

UPPER GROUP OF STUDENTS RANKED BY ORIGINALITY SCORES

Sex	Identification Number	Originality Score
Female	4- 7	70.0
Female	2-10	66.0
Female	6- 5	65.3
Female	4-16	62.5
Male	6- 1	62.0
Male	4-11	60.5
Female	4-25	60.0
Male	2- 5	59.8
Female	6- 8	59.5
Male	4-24	59.0
Male	6- 6	58.8
Female	1- 2	58.8
Female	6-20	58.5
Male	4- 2	58.0
Female	2-15	58.0
Male	6-16	57.8
Male	6- 9	57.3
Male	6-10	57.0
Male	6- 4	56.8
Male	4-12	56.3
Male	4-17	56.3
Female	6-14	56.0
Female	6- 3	55.5
Female	6-12	55.3
Male	4-29	55.3
Male	4- 6	55.0
Female	6-18	55.0
Female	4-26	55.0
Female	1- 7	54.8
Male	4-19	54.5
Male	4-21	54.5
Male	2- 1	54.3
Female	4-20	54.0
Male	2- 4	54.0
Male	4-14	53.8
Female	2-14	53.8
Female	4- 9	53.5
Female	4-23	53.5

TABLE XXV

LOWER GROUP OF STUDENTS RANKED BY ORIGINALITY SCORES

Sex	Identification Number	Originality Score
Male	1-22	37.0
Male	2-22	38.0
Male	2-12	38.8
Male	1-18	39.5
Female	2-18	40.0
Male	1-20	40.0
Male	2-21	40.5
Male	1-13	40.5
Male	1-23	40.8
Female	2-20	41.5
Male	1-24	41.8
Female	1-16	41.8
Female	1-19	42.0
Male	1- 8	42.0
Male	2- 9	42.3
Male	1-25	43.3
Female	1-21	43.3
Female	2-23	43.5
Male	6- 2	43.5
Male	2- 7	43.8
Male	2-17	44.5
Male	1-12	44.5
Male	1- 9	44.8
Male	2- 3	44.8
Male	2- 8	45.0
Female	1- 5	45.0
Female	1-15	45.3
Male	2-11	45.3
Male	1-10	45.3
Female	1-14	45.5
Female	1-11	45.5
Female	1- 4	45.5
Male	4- 5	45.8
Female	6-15	46.0
Male	2-24	46.3
Male	4-28	46.3

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