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Rooted in the writer's general concern with the teaching and evaluation of writing, this study attempts to determine whether verbally creative teachers are better able to identify verbally creative students than are less verbally creative teachers. A second aim was to determine whether the verbal creativity of the teacher is positively related to the verbal creativity of the student.

Using the Remote Associates Test (RAT) as a measuring instrument, fourteen Oregon State University and eight community college Freshman Composition teachers from three nearby community colleges were tested. Students of the three high- and three low-scoring university teachers and of all eight community college teachers were tested during the seventh week of the Fall term with the same instrument.

Students were ranked by teachers according to the teacher's

estimate of the student's verbal creativity and rankings were collected at the time of testing. Student scores in each section were trichotomized and comparative success of prediction was determined for high creative (HC) teachers and low creative (LC) teachers in predicting HC and LC students for both university and community college teachers. Analysis of variance and covariance was used to compare mean scores of students with HC and LC teachers and of student populations from the four schools after adjusting for age, sex, and G. P. A.

Findings of the study indicated that teacher RAT scores were high in comparison with other reported groups and that scores for university and community college teachers were essentially equal. HC teachers were no more able to identify HC students than were LC teachers. LC teachers tended to be better able to identify LC students, although not at the .10 level of confidence.

An F-test of the means of students with HC and LC university teachers was significant at the .10 level of confidence and may indicate a possibility that the verbal creativity of the teacher is positively related to the verbal creativity of students. Covariate analysis indicated that students of one community college were significantly more creative ($P < .05$) than those of the other three participating schools.

Findings of the study tend to support other studies of teacher ability to identify creativity and of the relationship of student creativity to teacher creativity. Together with previous studies, this study

seems to indicate that creative teachers do enhance student creativity, but probably not through recognition and reinforcement of creative effort. Differences in creativity of school populations suggest that institutional environment or curriculums may vary in their ability to attract and hold creative students.

A Study of the Ability of Verbally Creative
Teachers to Identify Verbally
Creative Students

by

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A STUDY OF THE ABILITY OF VERBALLY CREATIVE TEACHERS TO IDENTIFY VERBALLY CREATIVE STUDENTS

INTRODUCTION

The present chaotic state of writing instruction has prompted considerable academic controversy but remarkably little academic research. Students and teachers of English and the language arts have begun to question, not how writing can be taught, but whether it can be taught. New methods, materials, and techniques appear and disappear within the year. Perhaps nothing in the schools requires so much expended effort for so little apparent gain.

Amid the confusion, conflict of theory, intuitions, and hunches that provide a present basis for writing instruction, is a widespread belief that effective writing is, to some degree, creative. Furthermore, it is seemingly this creative and original aspect which is most admired and often praised by the writing teacher. Rare is the school that does not have at least one course in creative writing. Textbooks and journals increasingly emphasize divergent and non-directive activities ostensibly designed to encourage creative expression.

Apparently, curriculum designers, textbook writers, and numerous educational theorists believe that student creativity can be

recognized, rewarded, and thereby encouraged. That teachers do vary, however, and often to extreme degrees, in their evaluation of student writing is readily acknowledged by most writing teachers. Yet few teachers have admitted inability to recognize creative potential and fewer have questioned whether the recognition and enhancement of creative ability is even possible.

Because such theoretical confusion and contradictory practices and methodologies are of direct and personal concern to the writer, he has undertaken this study. While the findings herein may add in some small way to the ever-expanding literature of creativity and to better professional practices for the teachers and institutions concerned, the personal insights and understandings derived are no small part of its value.

Statement of the Problem

The current emphasis upon creative writing and expression, implying as it does that verbal creativity can be recognized and developed, suggests the general problem of identifying creative potential. Intuitively, one might suppose that the skillful writer, artist or musician is best able to recognize creative talent within his field, and that the verbal creativity of the teacher is directly related to his ability to identify the corresponding trait in students. The test of the latter assumption is the central problem of concern.

Secondary, but of no less importance, is the question as to whether the verbal creativity of the teacher, or such other variables as age, sex, or grades, are significantly related to the verbal creativity of the student. As a necessary antecedent to such investigation, certain inferences must be made as to the distribution of potential verbal creativity among the teachers, students, and institutions cooperating.

Scope and Limitations

While this investigation has been limited to 23 teachers and 547 students of Freshman Composition at Oregon State University and nearby community colleges, it is presumed that findings may be generalized to many other schools and teachers to the extent that populations are similar and that basic assumptions and definitions of the study are accepted. Generalization of these findings to schools, teachers, or students from other cultures, from low socio-economic levels, from bilingual backgrounds, or from other areas of competence might well be suspect.

The students and teachers from each institution who have cooperated in this study represent a sizable and probably typical cross-section of language arts teachers and first-term students. Since each institution tends to attract students particularly interested in the

specialized curriculum offered, variations in mean scores may well be affected by other population variables.

The necessity of using an easily administered and easily scored test with presumed validity and reliability for indicating creative potential has resulted in an assessment based upon only one of possibly many factors. Even though the one single factor may be of central importance in such an assessment, individual test scores may have little meaning. Group scores, particularly of large groups, should be more accurate.

Significance of and Need for the Study

Several immediate and practical benefits have already occurred from this study. Various cooperating teachers have reported that test results have suggested hitherto unrecognized abilities of certain students. In several instances the test triggered subsequent debate and investigation as to the meaning of creativity, whether it could be measured, and as to whether the test criterion was adequate.

Teachers, departments, and institutions cooperating may well benefit from considering the implications of data collected for this study. Findings of the study could provide useful insights for contemplated changes in teaching materials, teaching strategies, curricular emphases, and teacher selection and assignment. To the extent

that these findings may be generalized to other teachers, departments, and schools, similar benefits may accrue.

At the general or theoretical level of significance, this study can perhaps add certain inferences, or raise certain questions, as to whether a given dimension of creativity better enables one to identify the same dimension of creativity in another. Similarly, the study may add to the mounting evidence that creativity is an important factor in teacher selection and assignment.

Most previous studies attempting to determine whether teacher creativity is related to the creativity of their students have dichotomized the population of teachers. Studies of the predictive abilities of teachers have usually done the same. Resultant differences have been minimal and usually non-significant. By using teachers from the extremes of the distribution and by statistically occluding the middle third of the students, resultant differences have been magnified and findings should prove more convincing.

The congruence of findings of this study with other generally accepted studies of creativity should provide needed evidence as to the validity of the Remote Associates Test as a measuring instrument and as to its effective use.

Variations in creative potential between teacher groups, student groups, or institutional groups might well lead to further inquiry as to probable causes and appropriate strategies for attracting and

holding the creative student or teacher.

Furthermore, findings of this study could prompt re-examination and re-evaluation of traditional methods of evaluating and reporting student achievement.

Definitions and Assumptions

Any student or investigator interested in the extensive literature and research on creativity must be prepared to recognize semantic confusion and conceptual discrepancies. Theoreticians differ widely in their definitions, assumptions, and emphases. Investigators and measuring instruments reveal similar discrepancies. It is important, therefore, that any test criterion for creativity be an observable extension of the definition and a logically sufficient indicator of the factor of concern. Consequently, the logical validity of the test (to be discussed more fully in Chapter 3) was of central concern, both in selecting the test and in the design of the study.

Mednick's (1962) definition of the creative process provided the theoretical basis for the Remote Associates Test. He defines creativity as:

. . . the forming of associative elements into new combinations which either meet specified requirements or are in some way useful. The more mutually remote the elements of the association, the more creative the process or solution (p. 221).

What is most appealing about Mednick's definition is that it

provides a plausible basis for the writing process. Its most essential difference from other popular conceptions and definitions is in its recognition of the degree to which external requirements may be imposed on originality.

By extension, then, verbal creativity may be defined as that speech or writing that is both original and appropriate to audience, occasion, and intended effect. Uniqueness of phraseology, structure, or form is necessary but not sufficient. The creative speaker or writer must satisfy the demands of the situation by using words with appropriate semantic content and the structures and forms effective to his purpose.

Basic to this study is the assumption that all individuals are, to varying degrees, creative. Environmental and motivational factors, however, may suppress or repress both the expression and recognition of creative activity.

For the purposes of this study, it is assumed that the Remote Associates Test provides a reasonably accurate means of assessing the potential verbal creativity of both students and teachers. Presumably, the test measures an ability that is common to, or is present to a greater degree, in verbally creative individuals.

As with most tests, group scores are assumed to be much more reliable than individual scores since many factors may adversely

affect the individual being tested but few serve to help him. For the same reason, high scores may be assumed to be more accurate than low.

While some slight variations in test conditions and extraneous factors necessarily occurred, it is assumed that none were of sufficient importance as to contaminate the study.

REVIEW OF THE LITERATURE

Early Studies

The process and conditions of creative thought and invention have stimulated philosophical discussion for more than 2,000 years (Ghiselin, 1952). Current systematic inquiry into the psychological basis of creativity and its identification, however, has been attributed to a single speech by J. P. Guilford (1950) to the American Psychological Association at Pennsylvania State College on September 5, 1950 (Razik, 1966b; Getzels and Madaus, 1969).

In his address, Guilford pointed out that intelligence tests contain very little that is of an obviously creative nature and suggested a number of other known factors or dimensions of the intellect. Not only did he postulate the distinctions between convergent and divergent thought and fluency and flexibility, but he suggested methods by which each factor could be identified. Soon to be refined into his well-known "Model of the Intellect" (Guilford, 1956, 1967, 1971a), Guilford's theoretical framework has structured research into mental functioning in much the same way as the periodic table of elements has aided chemistry.

The suggestion that intelligence tests were inadequate measures

of creativity immediately cast doubt upon the widespread use and interpretations of such tests in schools. In a landmark pioneering study of highly creative and highly intelligent students at the University of Chicago Laboratory School, Getzels and Jackson (1962) confirmed that intelligence tests were indeed poor predictors of creativity, as determined by tests suggested by Guilford and conceptually devised by themselves. Additionally, they found that students scoring high on measures of creativity achieved equally as well as less creative, but higher-IQ classmates on standard measures of achievement. Although these findings were later challenged by Flescher (1963) and Wallach and Kogan (1965), they served to generate intense interest and research activity.

An incidental finding of the Getzels and Jackson study was that teachers much preferred the high-IQ student to the high creative student. The investigators tentatively concluded that possible differences in the values and attitudes of creative students might be the reason. Using clinical and case-study procedures, Getzels and Jackson began to develop what is still an emerging profile of the creative personality.

In extensive studies of more than 15,000 children from nursery school through sixth grade, Torrance and his associates confirmed the major findings of Getzels and Jackson (Torrance, 1962; Razik, 1966b) and Yamamoto (1964a) using high school students, reached similar

conclusions. The Torrance studies added to the growing list of traits associated with the creative personality, and additional tests were devised and validated for detecting factors of divergent thinking, as postulated by Guilford.

In examining the relationship between IQ and creativity, Torrance noted that beyond a certain point, no relationship could be detected. He suggested that a "threshold" of intelligence, possibly around the 120-IQ level, was necessary for exercise of creative potential. Yamamoto (1964b) found some evidence to support the theory, but Flescher (1963), using an expanded test battery and different statistical procedures, found none. In a test of 292 entering freshmen at the University of Nevada, using the same measure employed in this study, no evidence was found of greater variance at the upper end of the American College Test (ACT) scores than at the lower end (Ginsburg and Whittemore, 1968).

Torrance, especially, was concerned with the question as to how creative potential, once identified, could best be nurtured within the school. Studies of teacher personalities and techniques convinced him that teacher control, classroom practices, and values did influence student creativity. Institutional and peer-group influences were also noted (Torrance, 1963).

Of tremendous impetus to early research in creativity were the University of Utah Research Conferences on the Identification of

Creative Scientific Talent, sponsored by the National Science Foundation (Taylor, 1955, 1957, 1959). Bringing together leading theoreticians and researchers for discussion, dialogue, and subsequent publication of proceedings, the conferences have helped to generate and disseminate many useful insights.

Research work conducted at the Institute of Personality Assessment and Research has also been invaluable in providing construct validity for tests and in detecting traits or characteristics of recognized creative individuals from various occupations. Barron's (1966) study of 56 professional writers and similar studies of architects, military officers, and other occupational groups have added many insights into the creative personality (Barron, 1963; MacKinnon, 1966, 1967a, b).

The Problem of Definition

From Plato to the present, no wholly adequate definition of creativity has been generally accepted. From time to time scholars have avoided the word, using in its place such terms as critical thinking, problem-solving, productive thinking, and giftedness. The resultant conceptual confusion has been a serious hindrance to investigators in communicating and interpreting findings. Initially, studies attempted to define creativity in terms of recognized outcomes or products; others concentrated upon the personal characteristics of

recognized creative people, while others studied the environmental factors from which, or in which, creativity occurred. Tests of creativity, therefore, reflect not only the basic concept, but also the domain of interest of the test maker.

Although many have noted the present confusion (Jackson and Messick, 1965; Razik, 1966a; Yamamoto, 1966; Treffinger, Renzulli and Feldhusen, 1971), it seems highly unlikely that any universal definition or test criterion will be adopted. While most theoreticians can be classified according to their approaches and domain of interest (Roweton, 1970), it is evident that each is quick to borrow and adapt ideas from those with different approaches.

It has been repeatedly observed that definitions of creativity have two characteristic requirements: originality and appropriateness (Jackson and Messick, 1965; Parnes and Noller, 1971). In a carefully written analysis, however, Gotz (1968) objects to the idea that the creative activity must be unique. He observes that "the hardest, least conspicuous, yet most necessary kind of creativity is that which takes place alongside or within the mode of conformity" (p. 269).

A tentative resolution to the problem of definition was suggested in an article by Parloff et al. (1968). Noting that studies within a given vocation tend to show that creative men share a unique set of personality features while studies across two or more vocational fields fail to confirm such similarities, they conjectured that personality

traits for creative adults and children may also differ. By implication, any definition of creativity may need to be defined in terms of specific variables.

Taft (1971), after reviewing a number of studies and test results, concluded that more than one kind of creativity could be inferred. One type, which he terms "hot," is characterized by impulsive, intuitional, unconventional, uninhibited, and emotional behavior, while the other, "cold," is manifested by logical, intellectual, unemotional, or socially controlled behavior.

For the present, however, no comprehensive or unifying definition is, or seems likely to be, accepted. To paraphrase what was once said of intelligence: Creativity is what creativity tests measure.

Identification and Testing

An ostensible aim of most of the early studies of creativity was to perfect tests with predictive value. Guilford (1950) had early suggested, and later researchers were to confirm, that IQ scores would not be a satisfactory correlate (Getzels and Jackson, 1962; Torrance, 1962; Yamamoto, 1964a).

Understandably, early tests were based upon the divergent thinking factors of associational, expressional, and ideational fluency, as proposed by Guilford. To establish concurrent validity of the tests, it was necessary to determine which subjects were indeed creative.

Through case studies, evidence of creative productivity, peer-group nominations and various other means, rough measures of test validity were established. Correlations with actual creative activity were often low, and later tests proved little better.

Nevertheless, tests with moderate scores of concurrent validity may have some predictive value. According to Guilford (1956), creative thinking may result from a combination of factors, and the necessary combination may vary from time to time. In a later article he noted that concurrent validity does not necessarily indicate the predictive validity of any mental test (Guilford, 1966).

In an attempt to establish construct validity, Barron (1966) and MacKinnon (1966) brought together people of recognized creative ability from various occupational groups. Through intensive interviews, case studies, testing, and Q-sort analysis, they developed personality profiles of the creative individual and were able to confirm some of the basic insights of Rogers (1961) and Maslow (1968).

Other researchers have attempted to explore the role of the preconscious and unconscious in the creative process, as formulated by Kubie (1958) and Kris (1965). Most promising of all has been work with the Preconscious Activity Scale.

While occasional studies have indicated remarkably high validities for various tests, scales, and inventories, succeeding studies, especially with different occupational or age groups, have seldom

confirmed such promising results (Parloff et al. (1968). Furthermore, even the most promising seldom correlate highly with one another.

In a recent study of 51 high school seniors using the Remote Associates Test (RAT), the Alpha Biographical Inventory (ABI), the verbal subtests of the Torrance battery, and the Henman-Nelson Intelligence Test, Belcher and Davis (1971) found a slight positive correlation between the Torrance tests and the ABI, but none with the RAT. The RAT did correlate moderately with the validating criteria of student-reported creative awards and achievements. The investigators suggested that the RAT might be too difficult for high school seniors.

In a comprehensive comparison and review of research on the Torrance Tests and the Wallach and Kogan battery, Crockenberg (1972) concludes that there is no reason to believe that whatever the tests measure is not identical to what IQ tests measure. After analyzing and comparing statistical studies of their reliability and predictive and discriminant validities, she concludes that the tests may not measure creativity at all.

The use of teacher ratings as measures of concurrent validity was another point of attack. Despite one study which found teacher ratings slightly more effective than student self-ratings in identifying creative students (Richards, Cline and Needham, 1964), and thus

challenging Getzels and Jackson's (1962) contention that teachers favor high-IQ students, more extensive studies have indicated that teacher ratings are an inefficient and inadequate method of identifying the potentially creative (Holland, 1959; Treffinger, Feldhusen and Thomas, 1970; Guilford, 1971b).

Nor have school grades been found any better for predictive value. Furthermore, according to White and Williams (1965), no relationship at the adult level has been found between grades and later success in scientific research work.

At the present time, then, any instrument purporting to detect creative potential is probably suspect. Much more evidence is needed to determine test validity and reliability. While some tests apparently do isolate a factor different from traditional measures of intelligence, extensive validation is needed to determine whether the isolated factor is indeed a part of, and an adequate sample of, the trait-universe of creativity. Extensive longitudinal studies of varied populations would help to provide such evidence.

Environmental Factors

It was early recognized that the creative person tended to need freedom and variety and that he might be unusually sensitive to organizational controls (C. W. Taylor, 1960). He could further be characterized as intelligent, emotionally mature, dominant,

adventurous, emotionally sensitive, introverted, radical, self-sufficient, tense, unsociable, depressive, and less subject to group standards than his non-creative counterpart (Drevdahl and Cattell, 1958). In short, he might well be the kind of student who would find school adjustment difficult.

The extensive Torrance studies were quick to confirm the stifling effect of the school environment. His conclusion, since echoed by many and better-publicized critics, was that fostering conformity rather than creativity seemed to be the principal goal of American education. Noting that teachers tend to be conservative and to resist innovations necessary for developing critical thinking, Torrance (1965) cited studies indicating that creative activities alone are insufficient for producing creative growth. Rather, the attitudes and values of the teacher and institution must reward creative behavior.

More recently, studies of three highly regarded colleges found that they lost a greater number of potentially creative students than they graduated. In the most highly regarded, more than half of those identified as highly creative left (Heist, 1968). A similar study at M. I. T. indicated that those who scored high on the creativity scales of the Omnibus Personality Inventory were more likely to leave than those who scored low (Cross, 1967).

Torrance (1966) attributes much of the stifling of potential creativity to the pervasive success-orientation of United States

middle-class culture. The student comes to believe that he must either succeed or not attempt ventures where failure is possible. Noting that children are often more concerned about the judgments of their classmates than of teachers and parents, he suggests that sharp drops in curves of creative development at about the fourth and seventh grades may be attributed to this concern for peer group approval.

Recent cross-cultural studies have revealed interesting discrepancies in creative development. Torrance notes that in the United States, girls, after about age ten, consistently perform better than boys on almost every kind of verbal test for creative thinking, but that this is not true for Negro and lower socio-economic class subcultures. Klausmeier and Wiersma (1964), in an extensive study of high-IQ fifth and seventh graders found marked differences in scores from different locales and concluded that community, rather than school factors might account for the variance. Mearig (1967), noting atypical results in a study of verbal creativity of students on the Isle of Skye, concluded that creativity tests are probably culturally biased.

The perceived as well as the actual environment may be similarly important. In a study of high and low creative scientists, Andrews (1965) noted that psychological climate affected the manifestation of creative ability. Although only a slight relationship could be found between the test (RAT) and performance ratings, performance

was consistently higher for those who perceived themselves as having more influence and more freedom of communication with superiors. He concluded that the nature of the environment should be a part of any theory of creative behavior.

Wallach and Kogan (1965) have suggested that the psychological climate engendered by most tests of creativity may itself adversely affect test performance by creating anxiety. Williams and Fleming (1969), in a test of this assumption, found no difference in results between a play atmosphere and a test situation. The value of their findings, however, may be open to question since they used 36 four-year-old children as subjects. More recently, Vernon (1971) reports that divergent test scores obtained under relaxed conditions generally correlate better with creative variables, teacher ratings, and creative interests than do scores obtained under traditional test conditions.

Influence of Teachers

As noted previously, current opinion holds that teachers are inept at recognizing creative talent. A current review of the problem of assessment notes that teachers vary considerably in their ability to rate pupils against a test criterion, even when they are provided with specific directions (Treffinger, Renzulli and Feldhusen, 1971).

By inference from the preceding paragraph, then, it is reasonable to assume that potentially creative students receive scant reward

and encouragement from their teachers. Rather, the teacher is likely to repress or discourage the creative student. For, as Razik (1966a) observed, creative students are not the most likable. They tend to resist group work; they often embarrass or disconcert teachers with wild, off-beat ideas; and they sometimes disrupt classes with humor, playfulness, and silly or eccentric behavior.

That the creativity of the teacher might be an important factor in encouraging creative growth of students was early discounted by Getzels and Jackson (1962). Recognizing the complexity of classroom interaction, they conjectured that some teachers probably encourage creativity without knowing it. Torrance (1963), on the other hand, regards teacher creativity as essential. "Without creative teachers," he maintains, "creative talent will go unrecognized, undeveloped, and unrewarded" (p. 10).

Various studies have attempted to resolve these discrepant views. Yamamoto (1963), in a complex study of Minneapolis fifth-grade teachers and pupils, found no significant difference in behavior patterns between creative and less creative teachers. Furthermore, no differential relationship could be detected between teacher creativity and pupil achievement and adjustment.

Similarly, Broome (1967) found no relationship between teacher creativity and differential achievement of 142 fifth-grade pupils on the

Minnesota Tests of Creative Thinking and vocabulary development, reading, and arithmetic reasoning subtests of the California Achievement Tests.

In an extensive and carefully executed study conducted in Indiana, however, where teacher personality traits and classroom behaviors were rated by trained observers and then compared with student intellectual and creative growth, Turner and Denny (1969) reported considerably different results. The warmth, spontaneity, and involvement of the teacher tended to produce a significant increase in student scores in Redefinition and Unusual Responses. Students with teachers characterized as "highly organized" tended to do poorly on the Ideational Fluency subtest and to demonstrate greater competence in convergent rather than divergent thought.

A similar study, previously cited, by Treffinger, Feldhusen and Thomas (1970) found teacher divergent thinking scores strongly and positively related to the scores obtained by their pupils on tests of divergent thinking, even though teachers with high-divergent scores were no more able to identify divergent thinking in students than were teachers with low-divergent scores.

Additional evidence that creative teachers may make a difference has been reported by Torrance, Tan and Allman (1970). In a follow-up study of 325 elementary education majors from the University of Minnesota, a self-reporting instrument was used to assess

techniques and practices six years after graduation. From the sample returned, it was concluded that the more creative teachers, as determined by previous tests in college, were less compulsive and used a wider variety of techniques than did the less creative teachers.

Despite the strong possibility of sample bias, the investigators concluded that creativity of teachers was an important quality and that creativity tests did have some predictive value.

Cicirelli (1969) used both the Torrance tests and the RAT in testing 13 university supervisors of student teachers. Past reports of the supervisors were analyzed and comments were categorized into 23 categories. Only one category, containing specific suggestions for improvement, correlated with all four creativity tests, and that only for less creative supervisors. A strong correlation of the RAT (.57) with total number of categories used by the supervisor on each rating was suggested as indicating a greater awareness of factors in the student teacher's performance. (Another interpretation, in this writer's opinion, is that the strong correlation might indicate greater linguistic fluency and flexibility.)

Whether the creativity of the teacher is a significant factor in the achievement and creative growth of students is thus a matter of some conjecture. The Turner and Denny study would suggest that personality factors, not necessarily associated with the creative person, tend to be translated into classroom practices which may

nurture creative growth. And despite the unsupported assertion of a recent study (Lynch, 1971) that prior research had indicated that it takes a creative person to recognize creativity in writing, this writer has been unable to find anything other than opinion of a very general nature to support such a claim.

Age, Sex, and Other Variables

That creative productivity probably has some biological basis is indicated by Lehman's (1953) comprehensive study, Age and Achievement. By examining biographical data of a great number of creative individuals and recognized leaders, he has developed peak productivity curves for various occupational groups. In nearly every field of endeavor, the peak tends to occur between ages 30 and 40, although some intriguing discrepancies are noted.

The relationship of age to the assessment of creative potential is somewhat more complex. Any discussion of such relationships necessarily must consider the relationship of age to verbal fluency. Torrance (1966) and others have noted that girls, by age ten, consistently perform better than boys on almost every kind of verbal test for creative thinking. In the United State culture, this superiority is maintained through the high school years, but tends to disappear in college.

Mearig (1967) confirmed Torrance's observations in a

cross-culture study of students from Massena, New York, and the Isle of Skye off the west coast of Scotland. Whereas girls in the New York sample demonstrated definite superiority on the Torrance verbal measures, no such superiority could be found for Skye students. She suggested that differing sex roles and expectations of the two cultures caused the discrepancy. Further noting that Skye students of matched intelligence scored lower than their United States counterparts, she concluded that the Torrance tests were culturally bound.

In various studies in India, boys have repeatedly been found superior to girls on both the verbal and figural scales of the Torrance tests (Raina, 1969). The difference in cultural expectations and values, thus, appears to be a major factor in determining the kind of mental activity appropriate to the sex role. D. W. Taylor (1961) reaches a similar conclusion in noting that many more men than women are outstanding in creative thinking. It is somewhat paradoxical, however, that the creative male groups studied by Barron (1963) and MacKinnon (1967b) have tended to score high on femininity.

Studies at the Institute for Personality Assessment and Research of individuals and groups with known creative ability indicate that certain values are common to most creative individuals. The creative person tends to be more interested in theoretical and esthetic values than does his less-creative counterpart (MacKinnon, 1966).

The apparent relationship of values to creative endeavor has

prompted various studies of the homes and childhood experiences of creative people. That religious training may be an influence is indicated by studies noting the small incidence of Catholics and Fundamentalists engaged in creative scientific work.

The relationship of age and sex to creative productivity or assessment seems, therefore, to be only partly biological. The climate of expectations and values of the home, the church, the school, the peer group, and the culture probably serve to establish the permissible modes of mental functioning.

PLAN OF THE STUDY

A preliminary reading of literature relating to the identification of creative potential indicated that no known test was consistently able to identify creative potential for diverse populations. Several studies indicated that tests suitable for one age group or context might be inadequate for another (Parloff et al., 1968; Haag and David, 1969). Furthermore, correlations of test scores with teacher ratings were usually small, and little, if any, difference could be expected in differential abilities to recognize creative potential (Treffinger, Feldhusen and Thomas, 1970). In simplest terms, the problem became one of detecting slight variations with an imperfect instrument.

As finally executed, the research plan evolved from both opportunity and necessity. While limiting the study to Oregon State University freshmen would have been expedient, it would have severely restricted any possibility of generalizing findings. By incorporating equivalent populations from nearby community colleges, inevitable choices had to be made as to whether strict adherence to original research design outweighed the importance of incorporating data from a larger population; data which might, however, dilute or contaminate

findings. The very real possibility that both teacher and student populations of the community colleges might not be equivalent suggested that data should be differentially analyzed and that additional statistical tests be used to examine population variance.

The following overview summarizes the procedures eventually decided upon and used in this study.

Overview of Research Plan

Fourteen Oregon State University Freshman Composition teachers were administered the Remote Associates Test (RAT), Form 1, before or during the first week of the Fall term, 1971. During the seventh week of the term, the same test was then administered to students of the three high- and three low-scoring teachers, who had previously ranked students according to their estimates of the students' verbal creativity.

On the basis of test scores, each class section was trichotomized into high, average, and low groups. Success of prediction was determined by statistically comparing the successful predictions of high-scoring teachers with the successful predictions of low-scoring teachers for the high- and low-scoring groups of students.

Eight Freshman Composition teachers and their students from three nearby community colleges were similarly tested and predicted rankings compared with students' test rank. Because of the limited

number of teachers from each community college, those teachers were ranked high or low according to their comparative score with other teachers from the same school.

In addition to comparing the predictive abilities for high and low creative teachers, statistical tests were made to determine whether those students with creative teachers scored significantly higher in creativity than those with less creative teachers.

All needed data could therefore be secured by a preliminary testing and selection of teachers and a subsequent group test of students during a single class period.

Hypotheses to be Tested

The following hypotheses were formulated for testing:

- H₁: There will be a marked difference in verbal creativity between teachers.
- H₂: Verbally creative teachers will be better able to identify verbally creative students than will less verbally creative teachers.
- H₃: Verbally creative teachers will be better able to identify less verbally creative students than will less verbally creative teachers.
- H₄: Class sections of more verbally creative teachers will score higher in verbal creativity than will class sections of less verbally creative teachers.

Development of the Design

The basic design of the study grew from the recognition that creativity tests were far from perfect. Although various tests had repeatedly demonstrated that they could identify mental factors or abilities found to be more prevalent in specified creative groups, the tests seldom correlated well with one another. The lack of high or consistent test concurrent validity suggested that whatever factor was measured might be a necessary, but not sufficient, indicator of creative potential or that it was a variable which occurred with greater frequency in creative populations.

In either case, a large sample was indicated. And since expected differences would be small, a large sample would be even more necessary for statistical confidence in results.

Upon recognizing that little confidence could be placed in individual test scores or in group scores with only small mean differences, it was decided that comparisons of predictive ability would be made between groups rather than individuals and that groups designated as high or low in creative ability would be taken from the extremes of the distribution of test scores. Because of the practical limitations of time and money, it was arbitrarily decided to use only the three highest and three lowest scoring of the cooperating university Freshman Composition teachers.

The correspondingly small departments and enrollments at each of the three community colleges necessitated the use of all available data. Consequently, teachers from these institutions were designated high or low according to their rank in comparison with other cooperating teachers from the same school.

Because the test selected, as explained later, seemed best suited for a college or adult population and because previous studies had indicated that it was primarily a measure of verbal abilities, it was decided that the population sample would be limited to students and teachers of composition at the college level. To be certain that the same or equivalent abilities were being tested in both students and teachers, the same test was used for both.

Selection of Test

It was immediately recognized that any instrument selected should have demonstrated reliability and validity for identifying creative potential in groups similar to the sample population. It should further be suitable for group testing situations and be of sufficient intrinsic interest that subjects would willingly cooperate. Ease of scoring and objective scoring procedures were also deemed desirable for very practical reasons.

The Remote Associates Test (RAT) was selected as best meeting the above criteria. While recent studies have tended to cast doubt

upon early validation studies (Cropley, 1966; Haag and David, 1969; Worthen and Clark, 1971), other investigators have concluded that the test does measure certain verbal abilities related to the creative process (Taft and Rossiter, 1966; Ginsburg and Whittemore, 1968; Haag and David, 1969). Furthermore, the RAT had been used successfully in a number of studies involving college students and it was the only test found that met all of the stated criteria.

Description of Test

The RAT is a direct outgrowth of Mednick's definition of the creative process, as stated in Chapter 1. It is based upon an associative concept of mental functioning. The underlying process of mediation assumes the linking of diverse elements, especially symbols, by associating them with a common element (Mednick, 1962).

Each test item consists of three words, such as rat, blue, and cottage. The subject is required to supply a fourth word (e. g., cheese) which could serve as an associative connecting bond to all three words. The test has 30 items and a 40-minute time limit, although time is not considered to be an important factor (Mednick and Mednick, 1967).

It should be noted that the test originator early concluded that the RAT is culture-biased to the American culture (Mednick and Mednick, 1962). For the purposes of this study, therefore, only scores of those

subjects of North American parentage and for whom English was the first-learned language were included.

Logical Validity of Test

An earlier study by Maltzman, Raskin and Licht (1960), later supported by Freedman (1965) indicated that subjects could be trained by operant conditioning procedures to give more remote, or creative, associational responses to words. The RAT is essentially an out-growth of these early experiments.

Mednick (1962) determined that the word-associational behavior of creative individuals was less stereotyped and common than that of non-creative individuals. He theorized that any ability tending to link or associate mutually remote ideas would facilitate creativity. Thus, associative abilities were assumed to be basic to the creative process. Since creativity, in his view, involved an associative linking of elements to satisfy criteria imposed by the problem, the RAT differs from most other tests of creative potential in having predetermined correct answers.

It is this characteristic which has drawn strongest fire from critics. In the Guilford conceptualization of creativity, primary emphasis is given to divergent thought processes: those which move away from predetermined criteria of correctness. Critics tending to such a view are therefore likely to consider the RAT as a measure of

convergent rather than divergent thought (Taft and Rossiter, 1966; Worthen and Clark, 1971; Guilford, 1971b).

It should be noted, however, that Guilford has consistently maintained that creativity is a complex phenomenon dependent upon combinations of factors, and that the combination significant to the task might well change from time to time (Guilford, 1956). More recently he has cautioned that a common misconception is that all creativity is accounted for by divergent factors (Guilford, 1971b).

The RAT has also been criticized as a measure of creative potential for its almost exclusive reliance upon verbal skills. Various studies have found moderate to strong correlations with verbal IQ measures and with verbal subtests of other instruments (Cropley, 1966; Higgins, 1966; Taft and Rossiter, 1966; Belcher and Davis, 1971).

Such criticism may well be justified. Mednick himself suggests that various people may have different cognitive styles. Some may tend to visualize associations, while others tend to verbalize. Such differences, he suggests, may account for differing results in creativity tests (Mednick, 1962).

While the RAT may well be criticized as a too-narrow measure of creativity, there is little to suggest that it is inadequate for the purpose of this study. It is self-evident that verbal productivity in the classroom is expected to conform to pre-existent standards of

relevance and "correctness" while other contexts of creative endeavor may impose few if any such constraints.

That the test is primarily a measure of verbal skills and is related to verbal intelligence should probably be considered as positive factors for this study. Its failure to show strong correlations with figural tests of creativity, with tests of divergent productivity, or with non-verbal IQ measures indicate that the test measures a narrowly defined ability. The kind of creativity expected or observable in the language arts classroom, however, is seldom figural, tends more to convergent than divergent processes, and is primarily verbal. It is logical to assume, therefore, that the selectivity of the test would result in scores less influenced by extraneous factors, unobservable by the teacher.

Construct and Predictive Validity

In an early attempt to provide criterion validity for a preliminary form of the RAT, 20 students at the College of Architecture of the University of California at Berkeley were rated by their instructors who had been advising and evaluating them for at least one year. Faculty ratings of creativity correlated .70 ($P < .01$) with student scores on the RAT (Mednick and Halpern, 1962).

A second study of 43 psychology graduate students at Northwestern and the University of Michigan resulted in a correlation of .55

($P < .005$) between RAT scores and ratings on a creativity scale by their faculty research advisors. Faculty advisors were not aware of RAT scores and made their ratings one to two years after tests were administered. Correlations with the Miller Analogies Test and grade point average were .41 and -.11 respectively (Mednick and Mednick, 1967).

Datta (1964) found a correlation of .31 between RAT scores and ratings for creativity by the immediate supervisors of American-born quality-control engineers in a large corporation. She suggested that the moderate correlation might indicate that the test criterion was not as important a behavioral component for professional engineers as for others.

Andrews (1965) found only a small relationship between test performance and creativity ratings for a group of scientists, but he noted that certain psychological variables definitely affected manifestation of creative ability. For those high in status, self-confidence, influence, and motivation, he found a correlation of .37 between RAT scores and performance ratings.

A recently reported study of 51 high school seniors found only a slight correlation (.19 for males, .27 for females) between RAT scores and self-reported creative awards and achievements. The scores may be somewhat questionable, since the investigators reported that the test might be too difficult for high school students (Belcher and

Davis, 1971). No indication was reported as to the relative availability of such awards and achievements nor as to the mode of creativity acceptable as a criterion.

An interesting, though statistically disappointing, attempt to establish construct validity for the RAT was reported by Higgins (1967). Twenty top cartoonists and 15 syndicated news analysts were sent identical covering letters asking them to take the test. Seventeen artists and one news analyst completed and returned tests. Cartoonist scores ranged from 15 to 30 with a mean of 24.47, and standard deviation of 3.82, far higher than any group yet tested with the RAT. Higgins noted that cartoonist responses and comments were markedly more interested and interesting.

Test Reliability

Using the Spearman-Brown odd-even coefficient of correlation, a reliability factor of .91 was determined on a sample of 215 University of Michigan male undergraduates for Form 1 of the RAT, the form used in this study. A mean score of 17.1 and standard deviation of 5.28 was computed for the group. For 288 Bennington College women, a factor of .92 was similarly obtained, with a mean score of 18 and a standard deviation of 4.90. Although Form 2 of the test was not used in this study an alternate form correlation of .81 has been reported (Mednick and Mednick, 1967).

Relationship to Grades

As has sometimes been noted with other tests of creative potential, the RAT tends to show weak or negative correlations with grades. Mednick (1962) reported a negative correlation of $-.27$ ($P < .05$) with first two-year grade point averages for 74 subjects at a large Eastern technical college. A similar negative correlation of $-.34$ with reported GPA's was noted for 40 eminent architects interviewed at the Institute for Personality Assessment and Research at Berkeley. Mednick further reported on a study at the University of Michigan showing a tendency for students with high RAT scores to get better grades from teachers rated flexible than from teachers rated dogmatic.

Although Cropley (1966) found a positive correlation of $.398$ between RAT scores and academic average for 320 seventh grade Edmonton, Alberta, students, Ginsburg and Whittemore (1968) found a slight negative correlation with grades for 292 entering freshmen at the University of Nevada.

Weak or negative correlations with grades should not, however, be taken as evidence of test invalidity. As has been previously indicated, teachers have been found to be poor evaluators of creative talent and tend to value attitudes and behaviors not necessarily common to the creative person.

Procedures

Having tentatively selected the RAT as the test best suited for the intended study, sample copies of both forms, answer sheets, and the Examiner's Manual were obtained from the publisher for further examination and study. In order to form an opinion of the test's difficulty and intrinsic interest, the test was self-administered by the investigator.

Since other commitments precluded an immediate start on the study and because some consideration was being given to the use of high school seniors rather than college freshmen, additional copies of the test were obtained to administer on a trial basis.

Tryout of Test

After careful study of the Examiner's Manual, the test was administered to 13 seniors in a class taught by the writer at Corvallis High School. The subjects tested were deemed to be of average ability although of somewhat less than average reading ability. Scores ranged from 0 to 20 with a median of 11 and three scores of 0. No mean or standard deviation was computed.

Students had been assured that the test had no bearing on their grade and that they were free to do something else if they so desired. Several were greatly intrigued by various items, but numerous comments after the test indicated that they thought it too hard. Strangely

enough, two of the three high scorers voiced this opinion. One student who scored zero had answered 29 items, but had misunderstood the directions. The other two low scorers stopped almost immediately after beginning.

On the basis of this admittedly inconclusive evidence, it was decided that high school students would not be good subjects for the study.

Securing Cooperation of Teachers

During the ensuing summer, appointments were made with department chairmen of the cooperating institutions, the proposed study explained, and permission to seek teacher cooperation requested. Assurances were given that all teacher and student data would be kept confidential and that results of the study would be made available to interested schools, departments, and teachers.

In each case, response was gratifying. Permission to confer with teachers was granted, and in two instances the investigator was permitted to explain the study and request assistance at departmental meetings.

A personal conference was arranged with each teacher of Freshman Composition at the university and with each teacher indicating preliminary interest at the community colleges. The purpose and plan of the study were explained and the assurances noted above were repeated.

Again, response was highly gratifying. Only one teacher indicated a reluctance to cooperate, and that because of unique circumstances. Most teachers were eager to take the test during the initial interview, although several scheduled times to take it later. In one case, a test was monitored by the teacher's wife who became so intrigued with the test that she took it herself and enclosed the answer sheet with a note of explanation requesting that it be scored and that she be informed of her score. (Her score was quite high, it might be added.)

During the initial interview teachers were advised that they would be asked to rank students in each class according to their verbal creativity. No explanation other than the operational definition given in Chapter 1 was made. They were further requested not to alter teaching methods, exercises, or assignments for the purpose of influencing results of the study nor to use test items or techniques with students.

Teachers were immediately supplied with their test scores, but were not told the scores of other teachers nor how they compared with others who had taken the test. Each was permitted to examine the scores for various groups as reported in the Examiner's Manual.

Tryout with College Students

A second trial administration of the test was made with a

university Freshman Composition class during the seventh week of the summer term with the courteous assistance of an instructor who had just taken the test. Predicted rankings were also supplied by the instructor prior to administration.

For the 15 students taking the test, a range of 1 to 22 with a median of 14 was obtained. Again, students had been assured that the test had no bearing on grades. No apparent tension could be detected, but neither could any enthusiasm or overt curiosity.

An inspection of scores and rankings revealed that the teacher had ranked the six highest scoring, in descending order, 7, 3, 11, 2, 5, and 10. The fourth, fifth, and sixth were tie scores. The five lowest scores in ascending order, with fourth and fifth tied had been ranked 8, 15, 12, 13, and 6 respectively. While no statistical analysis was made, the variability of rankings suggested that teacher rankings might correctly place the student in the upper or lower third approximately 50 percent of the time.

Final Selection of Test Sample

Although the original intent of the study had been to select only teachers from the extremes on the basis of test scores, the relatively small staffs and enrollments of the community colleges necessitated the use of all community college teachers willing to cooperate. Only the three highest and three lowest scoring of the university Freshman

Composition teachers were asked to further cooperate. From an inspection of all teacher scores, it was evident that community college teachers fell well within the range of university teachers. Furthermore, each school had an equal number of teachers at or above the median and at or below.

For practical considerations previously noted, only the three high- and three low-scoring teachers from OSU were selected for further cooperation. All teachers were notified as to further expectations, and tentative schedules were suggested for ranking and testing students. While teachers with more than one section were given the option of testing only one section, all chose to test them all.

Testing Students

In the initial interview, teachers were given the option of administering the test to their students according to previously prepared instructions or of having the investigator administer it. In all but one instance, teachers chose to administer the test.

Tests, answer sheets and instructions for administering the test were prepared. During the fifth week of the term, each teacher was personally contacted and a definite test date established. Teachers were requested to make their rankings and to make them available to the investigator at or before the time of testing. In two cases, teachers had forgotten or neglected to prepare rankings, and their

rankings were thus not available until several days following testing. Since student tests were collected from the teachers soon after administration but were not scored until rankings had been secured, it is not probable that rankings were appreciably affected as a result of the additional time.

Tests, answer sheets, and instructions were delivered prior to the scheduled test time and were collected from the teachers after the test had been administered. When immediate collection was impossible, teachers were requested to return tests and answer sheets to the departmental office for collection the following day. Informal inquiries of the teachers revealed generally positive reactions to the test. A few students voiced objections to the idea that creativity could be measured, especially by a "right-answer" test. One community college student (later found to have a high score) enclosed a letter attacking the test rationale. In general, teachers reported little or no hostility or tension, while several indicated that lively interest and discussion followed the test.

Students had been assured that all data would be kept confidential, but that their scores would be released back to their teacher if they so indicated. With few exceptions, most indicated that they would like to know their scores and wished them to be returned to the teacher. Almost all completed the section requesting personal data, such as

name, age, high school, place of birth, etc. A few females, however, omitted age data.

Scoring Tests

Tests were scored within one week after testing and scores were returned to the teacher for all students who had requested such return. Percentile scores for several other groups, as included in the Examiner's Manual, were included for student comparison.

As indicated by the test manual, credit was given for any item with multiple answers if one of them was correct. Although not specified by the manual, credit was also given for answers that contained the same root as the designated correct response. No credit was given for synonyms of the correct response nor for idiopathic responses that were somewhat plausible.

Approximately six months later, before data was recorded for computer processing, approximately one-third of the tests were rechecked and only one error was found.

Recording Data

All data was reduced to numerical form and was recorded on 80-column data sheets. Arrangements were then made through the OSU Computer Center to have data recorded and verified on IBM computer punch cards for later statistical processing.

Computer time and technical assistance were supplied through a \$250 grant for non-sponsored research by the Oregon State University Computer Center and the Department of Statistics.

Statistical Procedures

After consultation with Dr. Norbert Hartmann of the OSU Department of Statistics, the following statistical treatments were selected.

The Z-test was used to test the null hypotheses that there was no mean difference in the abilities of high creative (HC) teachers and low creative (LC) teachers to identify (1) high creative and (2) low creative students.

The one-way analysis of variance (F-test) was used to test the null hypothesis that the creativity test scores of students taught by HC teachers did not vary from the creativity test scores of students taught by LC teachers.

While no statistical test would support the hypothesis that marked differences would be found in verbal creativity between teachers, a comparison of means and standard deviations of OSU and community college teachers was made with reported means and standard deviations of other groups as reported in the Examiner's Manual.

To determine whether creativity was significantly related to the

age, sex, or GPA of the students, an intercorrelation matrix was computed. Analysis of covariance was then employed to determine whether the populations of the various schools differed significantly in a way that could not be accounted for by age, sex, or GPA.

FINDINGS OF THE STUDY

During August of 1972, data was processed by the Oregon State University Computer Center according to the procedures previously noted. Appropriate probability tables were consulted for computed values of the various statistical tests, and in several instances, additional tests of alternate hypotheses were made to verify or reject tentative conclusions.

Because OSU teachers had been selected upon a different basis from community college teachers and because the university and community college populations might possibly differ, statistical tests were run separately as well as for the combined populations.

Variability of Teachers

A comparison of the test scores of university teachers with community college teachers revealed no statistically significant difference. Scores for the total group of 23 teachers ranged from 12 to 25 with a median of 20. University teachers ranged from 12 to 24 with a mean of 18.9 and a standard deviation of 3.6. The nine community college teachers ranged from 13 to 25 with a mean of 20.0 and a standard deviation of 3.8. An F-ratio of .4635 indicated little likelihood of significant difference in the two groups.

Not surprisingly, both groups compare favorably with other reported groups. Among the highest group scores reported in the Examiner's Manual (Mednick and Mednick, 1967) are mean scores of 20.1 (S. D. = 4.00) for 81 University of Michigan Psychology graduate students; 19.32 (S. D. = 4.65) for 47 I. B. M. Systems Research Institute trainees; and 19.13 (S. D. = 5.13) for 370 research scientists.

Only six of the 23 teachers were female, with three from the University and three from the community colleges. Average age of all teachers was 35.6 with 36.0 for community college teachers and 37.5 for university teachers. University HC teachers averaged 36.3 with LC teachers slightly older at 39.3. Community college HC teachers were somewhat older at 42.3 and LC teachers were somewhat younger at 28.8. Although average age for female teachers was 43.0, their mean creativity score of 18.8 indicated that they were not significantly different from the total population in verbal creativity.

Predictive Ability of Teachers

An inspection of the data summarized in Table 1 indicates little difference in the comparative abilities of HC and LC teachers to identify potential creativity in the student. The three HC teachers correctly identified only 17 of 38 students scoring among the top third of their classroom groups while LC teachers were correct for 17 of 37 predictions. The Z-test of the resultant mean success ratio (.447 and

Table 1. Predictive Success of Teachers.

	School Teacher		HS Students			LC Students		
	no.	no.	Right	Wrong	Success ratio	Right	Wrong	Success ratio
<u>Oregon State University</u>								
HC teachers	1	01	13	12		10	15	
	1	02	1	5		3	3	
	1	03	<u>3</u>	<u>4</u>		<u>3</u>	<u>4</u>	
Subtotals			17	21	.447	16	22	.421
LC teachers	1	12	3	4		3	4	
	1	13	2	3		3	2	
	1	14	<u>12</u>	<u>13</u>		<u>16</u>	<u>9</u>	
Subtotals			17	20	.459	22	15	.595
<u>Community Colleges</u>								
HC teachers	2	15	6	4		5	5	
	2	16	4	5		5	4	
	3	19	5	7		6	6	
	4	22	<u>7</u>	<u>3</u>		<u>5</u>	<u>5</u>	
Subtotals			22	19	.537	21	20	.512
LC teachers	2	17	5	10		10	5	
	2	18	7	9		7	9	
	3	20	9	10		8	11	
	4	23	<u>6</u>	<u>11</u>		<u>8</u>	<u>9</u>	
Subtotals			27	40	.403	33	34	.493
<u>Combined</u>								
HC teachers			39	40	.493	37	42	.468
LC teachers			44	60	.423	55	49	.529

.459 respectively) yielded a score of .105, thus indicating a more than 80 percent probability that differences could be attributed to chance.

A similar comparison of the predictive success of HC and LC teachers for the community colleges and for all teachers combined produced Z-scores of 1.353 and .950 respectively. Neither score is significant, even at the .10 level of confidence.

A comparison of the abilities of HC and LC university teachers to identify LC students produced a Z-score of 1.503. Such a score would occur by chance less than 13 percent of the time and might tend to indicate a slightly greater ability for LC university teachers to recognize LC students. Parallel comparisons of community college teachers and the combined group failed to reveal similar differences.

To determine whether the predictive abilities of individual teachers might vary significantly within the groups of HC and LC teachers from the university and community colleges, a Chi-square analysis was performed on each group. The highest value obtained ($\chi^2 = 2.456$, d. f. = 2) was well under even the .10 level of significance ($\chi^2_{.10} = 4.605$, d. f. = 2). Thus individual variations in predictive abilities are as likely to have resulted from chance variation as from any specific competence.

In summary then, both HC and LC teachers seem equally adept (or inept) at recognizing creative potential. While scoring slightly better than chance, fewer than half of those students scoring in the upper third were correctly identified by their teachers.

While some possibility exists that LC teachers are better able to identify the LC student, any such ability is probably minimal and may well result from unrecognized factors or chance.

Relatedness of Students' to Teachers'
Verbal Creativity

To determine whether the verbal creativity of teachers might be significantly related to the verbal creativity of their students, a one-way analysis of variance (F-test) was used to compare the population means of students with HC and LC teachers. Ratios were computed for HC and LC teacher groups from OSU, the community colleges, and the combined groups (see Table 2).

No F-ratios were significant at the .05 level of confidence. The F-ratio of 2.71 for HC and LC university teachers is significant at the .10 level of confidence and indicates a possibility that the verbal creativity of the teacher is associated with the verbal creativity of his students. That similar significant differences were not detected for community college groups might logically be attributed to the different methods of teacher selection and designation employed with the consequent decreased mean differences between HC and LC teachers. It is possible, of course, that the smaller variance for community college groups can be attributed to some unrecognized variable or to chance.

Table 2. Between-group Variance for HC, LC, and Individual University Teachers.

School	Teacher Group or No.	N	Mean	F-Ratio
OSU	HC	114	14.09	$F_{1, 224} = 2.71^*$
	LC	111	12.95	
Community Colleges	HC	124	13.31	$F_{1, 321} = 0.10$
	LC	198	13.24	
All	HC	238	13.68	$F_{1, 546} = 1.23$
	LC	309	13.14	
OSU	01	75	14.03	$F_{5, 224} = 1.26$
	02	19	15.79	
	03	20	12.70	
	12	20	12.65	
	13	15	13.13	
	14	76	13.00	

* Significant at .10 level of confidence.

It should also be noted that any changes attributable to teacher influence would probably be quite small since tests were administered during the seventh week of the term. The diluting effect of combining community college and university groups might understandably result in a nonsignificant F-ratio of 1.23.

After considering the possibility that increased student creativity might logically have resulted from some unique personality factor, method, or set of teaching materials of only one or two teachers, a further analysis of variance was made for the six university teachers.

The F-ratio of 1.25 did not indicate a significant difference in mean scores between teacher groups.

It is quite possible, of course, that students with HC teachers were more creative to begin with. But since students were computer assigned and sample size was fairly large, this explanation seems improbable. Some effect may be attributable to the degree of teacher creativity and duration of teacher influence.

Age, Sex, and GPA Variables

To determine the degree to which verbal creativity was related to age, sex, and GPA, means and standard deviations were computed for each variable for both university and community college populations, and correlation matrices were computed for each group (Table 3).

Table 3. Correlation Matrices, Means, and Standard Deviations for Age, Sex, GPA, and Creativity of University and Community College Populations.

	Age	Sex	Est. H. S. GPA	RAT Score	Fall Term GPA
<u>University (n = 219)</u>					
Age	1.000	- .014	- .280	.003	- .091
Sex		1.000	.221	.219	.152
Est. H. S. GPA			1.000	.227	.502
RAT score				1.000	.157
Fall term GPA					1.000
Mean	18.21	1.452	3.24	13.56	2.64
S. D.	1.79	.499	.44	5.18	.69
<u>Community Colleges (n = 283)</u>					
Age	1.000	.057	- .163	.181	-
Sex		1.000	.290	.179	-
Est. H. S. GPA			1.000	.150	-
RAT score				1.000	-
Mean	21.53	1.396	2.77	13.31	-
S. D.	7.54	.490	.52	6.02	-

It should be noted that student sex was statistically tabulated as 1 for males and 2 for females. Thus the decimal fraction of the mean for sex indicates percentage of females (.45 for OSU sample). GPA, the third variable, is the self-reported estimate of the student's high school grade-point average. The fifth variable for the university group was the actual fall term GPA, as determined from university records. Since only "credit" or "no-credit" is recorded for the Freshman Composition class, this GPA reflects the student's achievement in other curricular areas of the university.

As can be seen from Table 3, the creativity (RAT) score correlates moderately with sex (higher for females) and with GPA. Its failure to correlate significantly with age of university student may be partially attributed to the very limited number of older students in the sample.

Variability of School Populations

From reviewing various studies in which multi-institutional populations had been tested for creativity and from conversations with students and teachers while collecting data, grew a strong conviction that institutional policies and procedures might be an important factor influencing student creativity. To test this assumption, an analysis of covariance test was used to test the null hypothesis that populations of the four schools did not differ significantly in verbal creativity after adjusting for the variables of age, sex, and GPA.

After statistical adjustment of the mean scores for age, sex, and GPA (Table 4), an adjusted mean creativity (RAT) score was computed for each school. The resultant F-ratio of the adjusted mean scores ($F_{3, 490} = 3.160$) was significant at the .05 level of confidence, thus indicating a strong probability that school number four has a significantly more creative population than other schools participating in the study.

Table 4. Means for Population Variables of Schools.

	School 1	School 2	School 3	School 4
Age	18.29	21.58	23.90	20.00
Sex	1.45	1.31	1.56	1.37
Est. HS GPA	3.24	2.72	2.73	2.91
RAT score	13.57	12.53	13.25	14.94
Adjusted mean score	13.42	12.94	12.78	15.20*

* $F_{3, 490} = 3.160$, significant at .05 level of confidence.

A re-inspection of the data failed to reveal any plausible reason for this significant inter-institutional variation. To determine whether students of one of the two teachers from the school were significantly higher than students from the other teacher, an F-test of the means (15.28, $n = 25$ and 14.76, $n = 46$) was performed. The resultant value ($F_{1, 70} = .1128$) indicated little probability of significant difference attributable to differing classroom methods, materials, or personality influences.

Since any further attempt to identify probable cause for inter-institutional variation is beyond the scope of this study, one can only speculate as to whether such variation results from institutional and curricular influences or from pre-existent but unrecognized geographic and demographic factors. It is also possible, of course, that both teachers from the school were unusually effective at developing creative potential in students or that unrecognized factors may have resulted in selecting an atypical sample.

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

In general, the findings of this study are compatible with and tend to support similar studies of creativity. Although based upon a restricted definition of creativity, these findings acquire added significance from both the design of the study and from the size of the sample populations.

Summary of Findings

As might be expected, the verbal creativity of composition teachers was found to be high and approximately comparable to mean scores for the highest groups reported. No apparent difference in verbal creativity could be detected between university and community college teachers.

Both HC and LC teachers demonstrated slightly better than chance predictive success in identifying HC and LC students. No significant difference in predictive abilities of teachers could be determined, although LC university teachers tended to be somewhat superior at identifying LC students.

A strong possibility, significant at the .10 level of confidence, was noted for a positive relationship between the verbal creativity of

university teachers and the potential verbal creativity of their students. Smaller and less significant findings were noted for community colleges, possibly due to the differing method of teacher selection employed in the study. Further statistical tests indicated that differences in potential verbal creativity were not primarily related to one teacher or class section.

Slight correlations were noted between test scores and age, sex, and GPA, although no single variable accounted for as much as six percent of the variance. The highest correlation, for university students, was .227 between test scores and estimated high school GPA.

Through covariate analysis, and after adjusting mean verbal creativity scores for age, sex, and GPA, students from one community college were found to be significantly higher in potential verbal creativity at the .05 level of confidence. Further analysis indicated no significant difference in the mean scores of students having different teachers. Superior creative potential was thus presumed to be characteristic of the population rather than resulting from the influence or practices of a particular teacher.

Implications of Findings

Despite the lip service paid to the recognition and encouragement of creative potential, this study indicates, as have various other studies, that teachers are highly ineffective judges of such talent.

Even when provided with a maximum opportunity to observe verbal behavior and presumably basing judgments on a somewhat narrowly defined concept, teachers apparently cannot assess creative potential, as measured by this study, with any degree of accuracy.

As this and previously cited studies seem to indicate, both creative and non-creative teachers are equally inept at recognizing and rewarding student creativity. Thus, as a teaching goal, the development and enhancement of creative potential cannot be objectively verified or evaluated. Unless or until teachers can be taught to recognize creative potential, student creativity can only be evaluated on a subjective or intuitive basis. Any reliance upon verbal creativity as an evaluative criterion, therefore, might well be considered suspect. As has been previously observed, teacher judgments may tend to be distorted by attitudes, personality traits, and values not common to the creative individual.

Although possibly suspect as a teaching objective, the development and encouragement of creative potential could and should be an institutional objective. As tentatively indicated by this and previous studies, the creativity of the teacher seems to be an important factor in enhancing student creativity, even though the creative teacher may be no more able, and possibly even less able, than his less creative counterpart to evaluate the creative efforts of his students. It is

quite possible, or even probable, that creativity is a part of the "hidden curriculum" which provides an important part of student learning.

By subconsciously observing, evaluating, and imitating the verbal behavior of the teacher, the student may well develop new modes of thinking and responding. The characteristic linguistic fluency and flexibility, original and divergent associations, and vivid awareness of sensory experience that might be considered typical of the verbally creative person are all qualities that students might well admire and emulate and are probably related to teacher effectiveness.

That school populations differ in creative potential in ways that cannot presently be accounted for should be a matter for further study. Conceivably, highly creative students might be considered poor admission risks by some institutions or departments, while others might give them preference. In any case, careful studies of the ability of various schools, disciplines, and occupational areas to attract and hold potentially creative students should provide valuable data for curricular and institutional change.

Recommendations for Further Study

Any investigator dealing with creativity must necessarily confront the twin problems of definition and criterion. At the philosophical level, a holistic concept of mental functioning that is both

plausible and testable would be of immense value in dispelling the fragmented and often contradictory views of human intelligence, creative thinking, and mental measurement. Lacking any such comprehensive theoretical construct, much more effort should be devoted to defining creative potential or behavior in terms of its mode of manifestation (occupation or activity) or of demographic characteristics.

Although a number of studies have recently been reported of attempts to increase teacher creativity and the teacher's ability to recognize creative potential, much more needs to be determined as to lasting or long-range effectiveness of such programs.

As stated previously, the attracting and holding power of career and occupational curriculums needs to be assessed, and the career or occupational aspirations of creative students need to be determined within every school.

While several studies have indicated differences in interactive techniques of creative and non-creative teachers, careful study of the "hidden curriculum" of the creative teacher should yield valuable insights as to how student and teacher behaviors interact.

Similar studies of the institutional roles, restrictions, and expectations (a further extension of the "hidden curriculum") should provide evidence as to the effectiveness of the institution in attracting and nurturing creative talent.

Alternate means of evaluating and reporting student achievement should be investigated as ways of encouraging and rewarding creative potential.

Intensive case-studies of teachers and institutions consistently successful in developing creative potential should provide useful models for emulation.

Additional data, preferably from long-term studies, should provide corroborative evidence as to the nature and degree of influence of creative teachers. To maximize effect for short-term studies, teachers from the extremes of the distribution should be used and should have the longest possible exposure to the student. Such studies could well be of significant value in providing a basis for teacher selection and assignment.

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APPENDICES

APPENDIX A

TEST AND SCORING KEY

The Remote Associates Test and scoring key are not included to prevent copyright infringement.

Examination copies of the test, scoring key, and Examiner's Manual are commercially available from Houghton-Mifflin Company, Boston, Massachusetts.

APPENDIX B

PERSONAL DATA, SAMPLE TEST ITEMS,
AND ANSWER SHEETI. Personal Data

INSTRUCTIONS: Please supply the information requested below as completely as possible. All data will remain confidential and will be used only for statistical analyses.

Name _____ Age _____ Sex _____
 Last First M. initial Yrs. --Mo. M or F

School _____ Instructor _____

Class _____ Course _____ Section _____
 Fresh, Soph. etc.

H. S. Graduate of _____
 School City State

Place of Birth _____
 City State

High school GPA (best estimate) _____ First-learned language _____

II. Sample Test Items

INSTRUCTIONS: Read the instructions and study the examples on the front of your test booklet. Write your answers to the sample items below. DO NOT WRITE OR MARK ON THE TEST BOOKLET. When you feel confident that you understand the nature of the test, you may proceed. Record your answers to pages 2 and 3 of the test on the back of this sheet.

THE EXAMPLES BELOW ARE THE SAME AS THOSE ON THE FRONT OF THE TEST BOOKLET.

cookies	sixteen	heart	-----
poke	go	molasses	-----
A. surprise	line	birthday	----- A.
B. base	snow	dance	----- B.

III. Answer Sheet

REMOTE ASSOCIATES TEST--Form _____ # _____

INSTRUCTIONS: Consider each of the thirty test items carefully at least once and record your answers below. You will have forty minutes to record your answers.

(page 2)

(page 3)

_____ 1	_____ 16	
_____ 2	_____ 17	
_____ 3	_____ 18	
_____ 4	_____ 19	
_____ 5	_____ 20	
_____ 6	_____ 21	DO NOT WRITE IN THIS SPACE
_____ 7	_____ 22	_____
_____ 8	_____ 23	_____
_____ 9	_____ 24	_____
_____ 10	_____ 25	_____
_____ 11	_____ 26	_____
_____ 12	_____ 27	
_____ 13	_____ 28	
_____ 14	_____ 29	
_____ 15	_____ 30	

Would you like your score on this test released back to your teacher? _____

May we consult your permanent record for composite G. P. A. or test scores for statistical analysis? _____

APPENDIX C

LETTER TO TEACHERS REQUESTING
FURTHER COOPERATION

Dear

Thank you very much for your cooperation in assisting me with my doctoral project,

You have been selected as one of six teachers from whom I would like further assistance.

During the next six or eight weeks, would you try to assess the "verbal creativity" of each of your students and his comparative rank in the class section?

At any time before the students are tested, I would like a rank-order of your assessments, with lower numbers indicating greatest verbal creativity.

I assume that you would prefer six to eight weeks of classes before testing in order to assess students accurately. If you have a specific week or date for testing that you would prefer, will you let me know as soon as possible?

Although I would prefer scores and rankings of all of your Wr. 121 classes, one class is adequate provided it is one in which you have had adequate opportunity to observe and evaluate students.

Thanks again for your cooperation.

Sincerely,

Charles E. Scharff

APPENDIX D

LETTER TO TEACHERS THANKING THEM FOR
COOPERATION AND TERMINATING
FURTHER OBLIGATIONS

Dear

Thank you very much for your cooperation in assisting me with my doctoral project.

After stratification of test scores, six of the fourteen O. S. U. teachers cooperating are being asked to further cooperate by permitting testing of students in their Wr. 121 classes.

Although you are not one of the six to be selected for further cooperation, your assistance in taking the test has helped to provide a useful statistical distribution.

If you would still like to administer the test to your students for any reason, I will be glad to supply tests and answer sheets, and to include the data collected as a part of my study.

Thanks again for your help.

Sincerely,

Charles E. Scharff

APPENDIX E

RETURN LETTER INTERPRETING TEST SCORES

FROM: Charles E. Scharff
TO: Cooperating teachers and students
SUBJECT: Interpretation of R. A. T. test scores

Attached you will find a listing of the raw scores (number right) for all students except those who indicated that they did not wish their scores released. There was little apparent difference in scores of those who did not wish their scores released from those who did.

Please caution students against attaching any great importance to individual scores. Although the test claims to measure "an ability considered to be fundamental to the creative thinking process," it could perhaps better be defined as measuring an ability which seems to be more prevalent among creative people. Several studies have indicated that the best single criterion for identifying the creative individual is to ask him whether he regards himself as creative. Thus, the student is probably the best judge as to the validity of his own test score.

The basic assumption underlying the testing is that those groups scoring higher on the test will contain more creative individuals than those scoring lower. All statistical processing will be done in terms of group, rather than individual, scores.

In response to several objections that the test specified one, or sometimes two, correct answers, it should be noted that the ratio of atypical answers is essentially the same for both creative and non-creative individuals.

It is quite possible that the test discriminates against certain dialect areas and possibly age groups. I expect to examine the data for such evidence.

As with most tests, the motivational state of the student is of some importance. Hostility, tension, physical ailments, and a host of other negative factors knowable only to the student, can seriously hamper performance. Very few factors, however, can help a student to score higher. Consequently, high scores are more likely to be reliable than are low scores.

As with several other measures of creativity, this test tends to correlate negatively with grades.

The enclosed copy of normative data for similar groups may be of some interest for comparison purposes. If you consider your score a fair and accurate measure of "something," the comparison may well be valid.

In conclusion, I would like to express my sincere appreciation to each of you for your cooperation in this study. I sincerely hope that my findings will justify your time and courtesy.

APPENDIX F

NORMATIVE DATA*

<u>Percentiles</u>	<u>UCLA freshmen</u>	<u>UCLA male freshmen</u>	<u>UCLA female freshmen</u>	<u>U. of Maryland</u>
99	28+	27+	29+	26+
95	26	24	26	22
90	24	23	24	21
85	22	22	23	19
80	21	21	22	18
75	20	20	21	17
70	20	19	20	17
65	19	18	19	16
60	18	18	19	16
55	17	17	18	15
50	17	16	17	14
45	16	15	17	14
40	15	14	16	13
35	14	13	15	12
30	14	12	14	12
25	13	12	14	11
20	12	11	13	10
15	11	10	12	09
10	09	08	10	08
05	07	06	08	07
01	03	02	04	05

*From Examiner's Manual, Remote Associates Test, p. 5.