

Who is Creative? Identifying Children's Creative Abilities

Anne S. Fishkin
Aileen S. Johnson

Some schools use measures of creative abilities in addition to measures of intellectual and academic abilities to identify children of varied talents. The question remains, to what extent can we identify children with high potential to be creatively productive when they have not yet demonstrated creative talent? Can we have confidence in such decisions? This article compares strengths and weaknesses of methods of assessing creativity and lists more than 60 standardized measures used to assess children's creativity. Procedures for using formal and informal measures in the decision-making process are also discussed.

Anne S. Fishkin, a research specialist in education at Marshall University Graduate College, South Charleston, West Virginia, is director of its Community Clinical Service Center. **Aileen S. Johnson** is professor and chair of the reading department at the University of Texas at Brownsville.

This article examines assessment instruments, measurement considerations, and factors that impact understanding of a child's demonstrated and potential creativity. Its purpose is to examine the major categories of standardized measures and also alternative measures that may be used to assess children's creativity, and discuss issues of assessing such complex behaviors. In addition, the authors list a variety of commonly used and promising methods of assessment and discuss appropriate practices to incorporate data from multiple measures in order to make eligibility decisions.

Applying a Definition of Creativity to Youth

It is important for researchers and educators to first clarify their theoretical position or understanding of creativity prior to selecting assessment instruments. Otherwise, they might select assessments that are inconsistent with their own implicit (Runco, 1993a) idea of creativity or inconsistent with needed adjustments to the students' curriculum (Hunsaker & Callahan, 1995). For example, an educator who implicitly views creativity as talent in the visual arts may plan a program in which children with budding literary or musical talent are overlooked. Likewise, a researcher's theoretical perspective and definition of creativity influences the behaviors and subjects selected for study as well as methods of data analysis.

Definitions of creativity reflect a host of diverse characteristics of creative adults and creative children. Many definitions recognize the complexity of creativity (e.g., Davis, 1997; Isaksen, 1987; Treffinger, 1987). Isaksen (1987) noted that creativity occurs in many people, in differing degrees and manners, and should be viewed as "a multi-faceted phenomenon rather than as a single unitary construct capable of precise definition" (p. 8).

MacKinnon (1961) proposed that clarity may be achieved when a researcher develops an operational definition of creative behavior from one or more of four perspectives: **personality**, **process**, **press** (situation), or **product**. Rhodes (1961/1987) indicated that it was only in the intertwining and unity of the strands of the **four P's** of creativity that the com-

plexity of creative behavior occurred. More recently, Murdock and Puccio (1993) recommended that researchers might enhance the generalizability of their findings by studying creative behavior in the combinations or interactions of the **four P's**. That is, they would reframe their questions to ask how at least one of the **four P's** would interact meaningfully with at least one other **P**. "For instance, when considering how person overlaps with press, a researcher can examine the ways in which motivation, abilities, or personality characteristics interact with physical environment, psychological atmosphere, or task demands" (p. 265). Other recent multidimensional models (e.g., Magyari-Beck, 1993; Hong & Milgram, 1996) and conceptualizations of creativity support its multi-faceted nature, apply to various disciplines, and allow multiple measurements of creative phenomena (Magyari-Beck, 1993; Murdock & Puccio, 1993; Rogers, 1998).

Creative behavior may be viewed as a process resulting in a product unique to the individual who produced it; this product also may be unique and valuable to society (Parnes, 1972). However, when the primary interest is to identify children with the potential to demonstrate significant adult creativity, we must examine evidence of less obviously identifiable creative acts. Fishkin (1998) has proposed the phrase, **germinal creativity**¹, as useful to describe children's budding creative potential. For example, a young child's possibly poorly skilled rendition of a creative idea may show promise of later full-flowered creativity. The child, however, may not yet have the skill to adequately express or fully communicate the unique idea. In addition, children who show such germinal creativity are likely to display creative behavior only on tasks in which they are interested.

In order to identify children with germinal creativity, those with the potential to be creatively productive adults, it is important to consider information derived from multiple sources. There are unsolved difficulties in determining a child's likelihood to be a creative producer during the developmental years, and greater uncertainty in predicting potential for future creative productivity. Broad parameters must be used to identify children's creativity, because creativity is a complex construct. Children's emerging creativity may not clearly correspond with creative behavior in mature, creatively productive adults. Most important, the degree to which children may exhibit their creativity can vary markedly depending upon numerous factors such as their developing skills, the response requirements of a task, and their interest in the task at a given time. Therefore, it is critical to deliberately examine a variety of methods to assess a child's creativity, and to use a combination of measures to make decisions.

Methods of Assessing Creativity

Methods of assessing creativity may be grouped into categories representing the **four P's**: process, personality, product, and press or situation (MacKinnon, 1961). We developed Table 1 to categorize the variety of instruments used to assess

¹This use of the term "germinal" differs from Besemer and O'Quin's (1987) term used to describe one of nine dimensions of a creative product.

*Manuscript submitted May, 1997.
Revision accepted July, 1998.*

Categories of Measures Used to Assess Creativity in School-Aged Children

Category	Uses	Strengths	Weaknesses
<i>Process</i> Divergent thinking	estimate creative potential; use recognized constructs (fluency, originality, flexibility, elaboration); used to measure effects of creativity training	yield quantifiable data; some measures use broad scoring categories, and have current norms; considerable validity evidence	influenced by other variables; measured under contrived circumstances; may not reflect personal commitment; scores may be interdependent
<i>Personality</i> (Self-Report) Self-Perception / Attitude	examine affect related to creativity, supplement data from other sources; different instruments assess traits or affective states	evidence of children's self-perception and feelings toward their own creativity	subjective; limited sensitivity to influences of creativity training over time; limited evidence of validity
<i>Personality</i> (Self-Report) Biographical / Interest	assess accomplishments and performance; trait measures	high predictive validity for adults; based on data representing observable behaviors	more useful with adolescents and adults
<i>Personality</i> (Report by others) Personality, Attitude, Biographical	examine affect related to creativity; used to measure effectiveness of creativity training; supplement data from other sources	may be standardized, group administered; frequently uses a forced choice or likert-type scale	information reflects opinions of persons who may not be well-acquainted with subject or unfamiliar with the construct; limited evidence of validity
<i>Products</i>	assess quality of self-initiated, complex product, nontest	assess products in varied domains	often lack a well-designed matrix, agreed-upon criteria, and interrater training/reliability
<i>Press</i> (Situation)	assess creativity of environment	research tool to study creativity of classroom	lack of well-researched instruments and procedures
<i>Combination Measures</i>	a single instrument incorporates divergent thinking, self-report, and ratings by others	input from diverse sources regarding the child's likelihood to be creative	available combination measure is based on few observations; has inadequate reliability
<i>Alternative Measures</i>	performance-based observations, product measures/scales, complex and open-ended behaviors	input from informal observations, portfolios, teacher anecdotes, etc., responsive to real world tasks	classroom opportunities for creative behavior are prerequisite; few validity studies of performance measures of creativity
<i>Personality or Attitude</i> Indirectly Related to Creativity	study changes in constructs such as self-concept, locus of control, leadership	reflect changes in divergent thinking resulting from creativity training	limited evidence of degree of relationship between personality/attitude and creativity; not normed
<i>Talent - Visual and</i> <i>Performing Arts</i>	identify giftedness in specific domain	domain specific; varied procedures, e.g., nominations, observations, portfolios	expertise of judges' and consistency of judgments may be variable
<i>Systems for Decision</i> <i>Making</i>	mechanisms to examine information from several of the above measures	eligibility decisions use data from multiple sources of information; utilizes a broad definition of creativity	time consuming, users often prefer a simpler solution, e.g., a single measure and narrow definition of creativity; users must be trained

Table 1

creative behaviors and to distinguish the characteristics, uses, strengths, and weaknesses often found in instruments representing each category. Measures in the personality category are further differentiated as self-report or as reported by others. Four additional categories of assessment methods are examined: combination measures, informal or alternative methods, personality measures associated with creativity, and methods used to assess talent. Unlike the preceding categories, a category labeled systems consists of procedures that enable practitioners to make appropriate eligibility decisions by using information from multiple assessments. Examples of a variety of instruments representing each category are listed in Table 2.

Standardized Measures of Creativity

Divergent Thinking Measures - Standardized Measures of Creative Process

Divergent thinking measures yield observable, quantifiable data representing the individual's likelihood of responding cre-

atively to real life situations (Runco, 1991; Torrance, 1987). These products or ideas as responses to divergent thinking test items are restricted to the behaviors being elicited. Thus, they are not as fully representative of the individual's creativity as a finished creative product of by artist, scientist, or even a young child. Moreover, performance elicited by divergent thinking measures is unlikely to reflect a high degree of personal commitment that is typical for self-initiated products.

Many of the early measures were developed and normed in the 1960s before the advent of better psychometric procedures (Hong & Milgram, 1991; Michael & Wright, 1989; Runco, 1993a). One of these, the *Torrance Tests of Creative Thinking* (TTCT, Torrance, 1990; Torrance & Ball, 1984) is the most extensively researched (Cramond, 1994, 1998; Davis, 1997), and provides adequate updated norms. In addition, both the TTCT and the *Wallach-Kogan* (Wallach & Kogan, 1965) have shown evidence of long-term predictive validity with measures of adult productivity as much as 18 to 22 years later (Milgram & Hong, 1993; Torrance & Safter, 1989).

Measures of divergent thinking have been criticized for

Some Measures Used to Assess Creativity in School-Aged Children

Author, Publication Date (Earliest and Most Recent), Instrument Title, Review Source² (a, b, c, d)

Process - Divergent Thinking Measures

- Getzels & Jackson (1962) *Creativity and intelligence* (Davis, 1989)
 Guilford, Gershon, Gardner, & Merrifield (1971; 1976) *Creativity Tests for Children* (Davis, 1989) ^{a, b, c}
 Hoepfner & Hemenway (1973) *Monitor Tests of Creative Potential* (Davis, 1989)
 Jellen & Urban (1986) *Test for Creative Thinking-Drawing Products* (Davis, 1989)
 Meeker et al. (1975; 1985) *Structure of Intellect Learning Abilities Test-Creativity Subtests* ^{a, b}
 Schaefer (1971a) *Similes* ^{a, b}
 Torrance (1966, 1990) *Torrance Tests of Creative Thinking: Verbal and Figural* ^{a, b}
 Torrance I (1981) *Thinking Creatively in Actions and Movement* ^{a, b}
 Torrance et al. (1973; 1990) *Thinking Creatively With Sounds and Words* ^{a, b}
 Wallach & Kogan (1965) *Modes of thinking in young children* (Davis, 1992; Milgram & Hong, 1993; Runco, 1993)

Attitude, Personality, or Biographical Measures

Self-Perception or Attitude - Self-Report

- Fishkin (1990) *How Many Ideas?* (10 item creative self-concept scale in Fishkin, 1990)
 Gough & Heilbrun (1983) *Adjective Check List* (Domino Key of ACL, Domino, 1994; Davis, 1992) ^{a, b}
 Khatena & Torrance (1976) *Khatena-Torrance Creative Perception Inventory* ^{a, b}
 Kirschenbaum (1989) *Creative Behavior Inventory* (Callahan, 1991) ^b
 Piechowski & Cunningham (1985) *Overexcitability Questionnaire* (Piirto, 1994)
 Rimm (1980) *Group Inventory for Finding Creative Talent* ^{a, b}
 Schaefer (1971b) *Creativity Attitude Survey* (Callahan, 1991; Davis, 1989) ^{a, b}
 Torrance et al. (1988) *Style of Learning and Thinking* ^a
 Torrance (no date) *Creative Motivation Scale* (the youth scale, *What Makes Me Run*, norms Grades 3-8, used by the Creative Scholars Program [G. Lewis, personal communication, January 26, 1996])

Autobiographical and Self-Report Interest Measures

- Davis & Rimm (1980) *Group Inventory for Finding Interests I & II* ^{a, b}
 Institute for Behavioral Research in Creativity (1978, 1990) *Biographical Inventory-Form U* ^{a, b} [most recent research version is the *Student Development System*]
 Milgram (1988) *Tel-Aviv Activities Inventory: Primary Grades* (Hong, Milgram, & Gorsky, 1995)
 Milgram (1973, 1990) *Tel-Aviv Activities and Accomplishments Inventory: Adolescent Form* (Hong, Whiston, & Milgram, 1993; Milgram, Dunn, & Price, 1993)
 Renzulli (1977) *Interestalyzer*
 Schaefer (1970) *Biographical Inventory-Creativity* (Callahan, 1991; Treffinger, 1995)

Attitude, Personality, or Biographical Measures

- Report by Others

- Eichenberger (1978) *Judging Criteria Instrument* (Callahan, 1991)
 Johnson (1979a) *Gifted and Talented Screening Form* (see Lavoie, 1984; Tallent, 1987) ^b
 Kingore (1990) *Kingore Observation Inventory* (Vaughn-Neely, no date)
 Ohio Department of Education (1992) Rating scales
 Renzulli et al. (1976) *Scales for Rating the Behavioral Characteristics of Superior Students* ^a
 Rimm (1976) *Preschool and Kindergarten Interest Descriptor* ^b
 Udall (1987) *Peer Nomination Form* (Cunningham, Callahan, Roberson, & Rapkin, 1994)

Assessment of Self-Initiated Creative Products

- [also see Systems below and discussion in text of consensual assessment procedures, as in Amabile, 1990]
 Besemer & O'Quin (1986) *Creative Product Semantic Scale*
 Besemer & Treffinger (1981) *Creative Product Analysis Matrix*
 Kingore (1993) *Portfolios: Enriching and assessing all students, identifying the gifted, grades K-6*
 Reis (1981) *Student Product Assessment Form* (Reis & Renzulli, 1991; Saylor, 1993)
 Treffinger (1988) *Student Invention Evaluation Kit*.

Press (or Situation)

- Branch (1975 dissertation) *Classroom Observation Checklist* (cited by Kaltsounis, & Honeywell, 1980)
 Denny (1969) *Classroom creativity observation schedule* (cited by Kaltsounis, & Honeywell, 1980) ^c
 Dunn et al. (1976, 1987) *Learning Style Inventory* (Treffinger, 1995) ^{a, b, c}
 Johnson (1979b) *Social Interaction and Creativity in Communication System* (Johnson, 1977) ^a
 Renzulli & Smith (1978) *Learning styles inventory: A measure of student preference for instructional techniques* (teacher form)
 Slosson (1986) *SCALE: Scales of Creativity and Learning Environment* ^{a, b}

Combination Measures

- Williams (1980) *Creativity Assessment Packet* ^{a, b}

Personality/Attitude Indirectly Related to Creativity

- Bialer-Cromwell (1961) *Locus of Control Scale* (Tetenbaum & Houtz, 1978)
 Colangelo et al. (1992) *Iowa Inventiveness Inventory* ^c
 Guglielmino (1977/1978). *Self-Directed Learning Readiness Scale: Version A*. (Carter, 1992; Saylor, 1993)
 Karnes & Chauvin (1984) *Leadership Skills Inventory* (Karnes, Meriweather & D'Llio, 1987; Saylor, 1993)
 Kirton (1976, 1987) *Kirton Adaptor-Innovator Scale* (for adults; recent research with youth, S. Keller-Mathers, personal communication, October, 1994) ^{b, c}
 Murphy & Meisgeier (1987) *Murphy-Meisgeier Type Indicator for Children* ^b
 Renzulli & Smith (1978) *Learning styles inventory: A measure of student preference for instructional techniques* (student form)
 Roets (1982, 1992) *Rating Scale for Leadership* (Piirto, 1994)
 Rydell-Rosen *AT20* (1966) (tolerance for ambiguity scale cited by Tetenbaum & Houtz, 1978)
 Sears (1975) *Sears Self-Concept Inventory* (Fishkin, 1990)

Talent in Visual and Performing Arts

Note: Nontest procedures as alternatives to standardized art tests, e.g. portfolios, work samples, and biographical inventories are essential components of identification procedures for talented students (Clark & Zimmerman, 1993).

- Gorder (1980) *Measures of Musical Divergent Production* (Davis, 1989)
 Gordon Primary *Measures of Music Audiation* (1979); *Intermediate Measures of Music Audiation* (1982) (Haroutounian, 1993) ^a
 Kulp & Tarter (1986) *The Creative Process Rating Scale* (Callahan, 1991; Davis, 1989)
 Parke & Byrnes (1984) *Detroit Public Schools Creativity Scales* (Byrnes et al., 1982; Callahan, 1991)
 Seashore, Lewis, & Saetveit (1960) *Seashore Measures of Musical Talents* (Abeel et al., 1994; Piirto, 1994) ^{a, b}
 Welsh (1980) *Barron-Welsh Art Scale* (Abeel et al., 1994) ^{a, b}

Systems for Decision Making

(see text for discussion of these procedures)

- Baldwin *Identification Matrix* (1984)
 Frasier *Talent Assessment Profile* (Frasier, 1994)
 Kranz (1978) *Multi-dimensional Screening Device for the Identification of Gifted/Talented Children* (Abeel et al., 1994; Clark, 1992)
 Lazear (1994) *Multiple intelligence approaches to assessment* (Lazear, 1994)
 Model for the Identification of: *Creative-Thinking Ability* (Ohio Department of Education, 1992)
 Profiling for creative problem solving (Isaksen et al., 1993)
 Renzulli Talent Pool (Renzulli, 1978)

Note: A complete list of references for Table 2, published in Johnson and Fishkin (1998), is available from A. S. Fishkin, Marshall University Graduate College, 100 Angus E. Peyton Drive, South Charleston, WV, 25303.

Table 2

sampling only a narrow range of creative behaviors (Borland, 1989). However, reviews of research studies (Runco, 1993b; Torrance, 1987) and two meta-analyses (Rose & Lin, 1984; Pyryt, 1998) show that divergent thinking measures provide quantitative evidence of the effectiveness of varied creativity training programs.

Divergent production scores typically assess quantitative indicators of the theoretical constructs of fluency and originality, and sometimes also elaboration, flexibility, or examples of transformations (Meeker, Meeker, & Roid, 1985). Resulting scores are heavily dependent on the amount of ideational fluency (the total number of responses). Other promising systems of analyzing the scores assess the quality of the responses, e.g., the TTCT figural streamlined scoring procedures which includes abstractness of titles, resistance to

premature closure, and other creative strengths (Torrance & Ball, 1984) or the *Test for Creative Thinking-Drawing Production* (Jellen & Urban, 1986) which also assesses a variety of creative strengths. An alternative method, proposed by Hong and Milgram (1991) eliminates the confounding of the fluency and originality categories by scoring each item as either popular or original.

Attitude, Personality, Interest, and Biographical Measures

Attitudes and personality, like divergent thinking behaviors, are also observable and measurable. Information about a

² See a Mental Measurements Yearbook, b Test Critiques, c and/or Isaksen et al. (1994) for a review of the respective measures.

child's creativity can be obtained from ratings by teachers and others who have had sufficient opportunity to observe the child in situations when creative behavior may emerge (Ohio Department of Education, 1992; Renzulli, Smith, White, Callahan, & Hartman, 1976).

Self-report measures, such as inventories or autobiographical accounts of past creative accomplishments, or reflective statements may provide a broad perspective related to creative behavior. A typical self-report item might be, "I like to make up new games." Self-report measures that examine affective behaviors related to creativity include the *Group Inventory for Finding Talent* (Rimm, 1980), and the two self-rating scales of the *Khatena-Torrance Creative Perception Inventory*, *What Kind of Person Are You?* and *Something About Myself* which measure perception of the creative self for adolescents (Khatena & Torrance, 1990). Biographical inventories are commonly comprised of autobiographical statements of past creative accomplishments. In the case of very young children, anecdotal reports completed by parents are valuable sources of information. However, since young children are less likely to have sufficient opportunities to display significant creative achievements, biographical inventories are less useful for preschool and primary grade students than are ratings or alternative assessments of children's work.

Interest inventories may yield useful information related to a child's likelihood to be creative toward specific stimuli or within a given domain (Cohen & Gelbrich, 1998). Other personality constructs such as learning or thinking style also may influence creative productivity (Milgram, Dunn, & Price, 1993; Kirschenbaum & Armstrong, 1998). In addition, affective (emotional) states have been linked to creative production (Shaw, 1994).

Although there is general agreement on typical characteristics of creative people (Tardif & Sternberg, 1988), researchers who examine performance on creative and affective measures in relation to creativity training observe stronger effects for the divergent measures (see Johnson & Fishkin, 1998; Vaughn, Feldhusen, & Asher, 1991). The lack of significant effects of creativity training on related affective behaviors may be due to: lower sensitivity of affective measures; low reliability; or remoteness of content of the measures to creative behavior. Perhaps the instruments were insensitive to change because they measured stable personality traits whereas another instrument may have phrased test items which elicited a person's feelings at the time of response. For some purposes, researchers might prefer attitude or personality measures that are sensitive to changes in the individual's present state; however, those whose primary purpose is to identify creative youth would prefer measures that assess stable personality traits.

Assessment of Creative Products

Product assessment reflects an emerging trend in program evaluation and identification of students for creatively gifted programs. Product assessments typically use rating scales that require judgments of specific indicators of creativity. Concerns with product evaluation relate to the appropriateness of the judging criteria and the judges' competence for accurate assessment. A promising modification to product assessment is the "consensual assessment technique" (Amabile, in press) that uses judges who are familiar with the domain to independently evaluate products and then reach consensus.

Complex creative products have been assessed by product evaluation scales. Besemer and O'Quin (1987) developed procedures to assess sophisticated creative products in many domains. Their methods of rating complex creative products use three clearly defined criteria: novelty, resolution of the

problem to be solved, and synthesis/evaluation. *The Student Product Assessment Form* (Reis & Renzulli, 1991) provides ratings of the quality of a child's process of working, such as early statement of purpose and appropriateness of resources used. It also rates excellence of the final product on such variables as originality of the idea, quality beyond grade level, and time and effort invested in the work.

Alternative Assessment Procedures

Standardized measures have recently been supplemented and replaced by the use of informal, alternative (or authentic) methods of assessing student achievement. Performance assessment techniques are often recommended as alternatives to traditional fixed-response rating scales and to standardized tests of achievement (Aschbacher, 1991) and creativity (Baer, 1994). Performance assessment has been defined to consist of such measures of understanding and skill of higher-order, complex tasks as "direct writing assessments, open-ended written questions, hands-on experiments, performances or exhibits, and portfolios" (Aschbacher, 1991, p. 277). Other alternative or performance procedures have been developed to measure process and product in situations where students have generated complex and varied responses (Lazear, 1994; Piirto, 1994). These procedures include assessments of responses to real world tasks and check lists or other reliable informal measures to report children's actual performances (Jatko, 1995; Runco, 1993a).

Alternative assessments must be based upon sufficient and representative samples of the subject's work to insure reliability of such informal observational procedures. When evaluating students' work, accurate, stable, and consistent ratings require clear standards and knowledgeable judges (Amabile, in press; Baer, 1994). Children's creativity may be reliably evaluated by informal measures that sample a broad variety of behaviors and complex work (Frasier, 1994; Jatko, 1995; Ohio Department of Education, 1992; Runco, 1993a; Treffinger, 1987; 1995) if there have been enough opportunities to fully elicit creative production.

Assessments that include engaging materials and activities that are very similar to the child's actual working conditions are termed "ecologically valid" (Ramos-Ford & Gardner, 1997). For example, Jatko (1995) used a "whole classroom tryout technique" to give every child an equal opportunity to display creative traits such as eagerness, imagination, and ability to solve problems. Children selected to work on Future Problem Solving teams by this alternative approach performed as well as others selected for the gifted program by the school district's academic achievement criteria. The tryout procedure was consistent with the activities in the gifted program and was an "effective tool for increasing the number of economically disadvantaged children in the school system's talented and gifted program" (p.101).

Portfolio assessment procedures are increasingly recommended to document student performance in school and in extra-curricular activities. During the past decade, the use of portfolios to assess creativity and giftedness has become more widely accepted due to the development of explicit, well-defined procedures for their use (Johnsen & Ryser, 1997; Ohio Department of Education, 1992).

Recent performance assessments consistently assess the creativity and complexity of children's work (Plucker, Callahan, & Tomchin, 1996). However, Plucker et al. (1996) caution that the reliability, validity and appropriateness of norms of performance assessments are not sufficient for "high-stake

purposes such as identifying potentially talented students" (p. 87). Because such difficulties are common to measures of creativity and similar complex behaviors (e.g., Wakefield, 1987) any single procedure is an insufficient source of information about the child.

Assessment of Talent

This section briefly addresses issues and procedures useful in identifying youth who are talented in specific domains, e.g., writing, art, music, or dance. Examples of the student's work are typically reviewed by knowledgeable individuals (Davis, 1997). Authentic measures such as portfolios, work samples, and biographical information are essential components in identifying talent, for example in the visual arts. Indicators of interest, learning styles, motivation, and performance on divergent thinking measures have also been used to support the domain specific measures and provide additional data for the identification process (Clark & Zimmerman, 1993).

Nonstandardized observation and nomination measures are also used to identify children who are talented in the performing arts (Haroutounian, 1993). These procedures include nomination instruments similar to the music and drama scales of the *Scales for Rating the Behavioral Characteristics of Superior Students* (Renzulli et al., 1976) or assessments that use Gardner's (1983) multiple intelligences model (e.g., Lazear, 1994). Talent assessment instruments recommended by others (e.g., Abeel, Callahan, & Hunsaker, 1994; Davis, 1992; Piirto, 1994) are among the measures listed in Table 2.

Systems or Procedures for Identifying Creative Youth

Decision makers must select specific instruments and informal procedures, and also determine how to integrate the data to identify children who may show high creative potential. The use of a single creativity measure based on a restricted definition of giftedness will not adequately represent the child's range of creative behaviors. Similarly, systems that collect data from multiple measures while relying mainly on a *cut* score from one measure fail to effectively use all the available data to determine student eligibility for gifted or talented programs (Hunsaker, 1994). A system to assist educators to consider and to use the information from observations and scores from multiple measures is an equitable method for making decisions about children. Ample opportunities should be provided for creative behaviors to emerge, to be observed, and to be considered in determining children's potential for creative productivity (Frasier, 1994; Lazear, 1994; Ohio Department of Education, 1992; Renzulli, 1978).

Matrix systems assign numerical values to discrete scores obtained from multiple and varied measures. However, when matrix scores from diverse measures are combined to yield a simplified, single numerical score, problems frequently occur. Matrix procedures that compress the full range of scores from standardized tests to a simpler scale substantially reduce the sensitivity of the scale to distinguish among students. Moreover, this cumulative matrix score does not adequately reflect contributions of the different measures to indicate a child's specific and varied strengths (Borland, 1989). Indefensible identification and placement decisions are likely to result if the scores are compressed into a restricted range and information necessary for decision making is lost.

The *Frasier Talent Assessment Profile* (Frasier, 1994) is

a promising system that relies on teacher training in its screening phases to insure that teachers provide opportunities to elicit and to observe children's creativity and to consistently describe gifted behaviors in anecdotal records. Renzulli's (1978) approach to selecting students for a talent pool also assesses a child's intellectual, academic, and creative abilities. This approach uses data from standardized (formal) measures and informal parent, teacher, or self-ratings, performance assessments, and teacher observations.

Gardner's (1983) multiple intelligence perspective provides the structure for some commonly used authentic assessment procedures. These procedures use many methods for eliciting, observing, and systematically recording a wide range of children's complex behaviors. The multiple intelligences approach also suggests that teachers focus on describing children's interests and strengths (Lazear, 1994). *The Ohio Performance-Based Assessment for Gifted Identification* is another model that uses authentic assessments in the screening and eligibility phases of decision making including data from activities at home and at school such as participation in Future Problem Solving or Odyssey of the Mind (Ohio Department of Education, 1992).

Technical Issues in Creativity Assessment

Some issues pertinent to creativity assessment relate to reliability, validity, usability, and normative data (Treffinger, 1987). The unique technical concerns for measuring creative behaviors are discussed elsewhere (e.g., Johnson & Fishkin, 1998; Michael & Wright, 1989; Runco, 1993a). Given the complex nature of creative behavior that is commonly expressed in a variety of ways (e.g. by writers, musicians, dancers, engineers), it is not surprising that measures of these behaviors are seldom adequate as the primary basis for decisions about individuals. Creativity instruments have been criticized for weak evidence of reliability and validity and inadequate norms. For many of the instruments presented in Table 2, the norm population is poorly described, is not representative of the grade/age level nor of the specific subpopulation with whom the measure will be used, and is frequently not current. Norming procedures should be based upon a representative sample throughout the age/grade range (floor to ceiling) of each subtest (Michael & Wright, 1989). Despite these limitations, Wakefield (1987) stated that creativity instruments should be evaluated by the quality of existing creativity measures and should not be judged by the standards applied to intelligence or achievement tests.

Since instruments differ widely in the scores they yield, test users must also have sufficient knowledge of the meaning and value of available scores in order to select those scores most appropriate to their purposes. For example, Chase (1985) recommended that researchers use an average of the separate fluency, flexibility, and originality scores of the verbal TTCT to avoid the confounding effects that occur with such excessively high intercorrelations. However, these subscales are sufficiently reliable for diagnosticians and educators to interpret the pattern of a child's abilities on the individual subscale scores (Cramond, 1998).

Sources of Variability on Divergent Thinking Measures

The testing environment affects test scores and scores on divergent thinking measures are sensitive to such influences

(Torrance, 1987). Variations in instructions and other administration conditions, task unfamiliarity, and differences in the richness of cues in the testing environment have all been shown to affect optimal performance.

An individual's level of motivation, persistence, and self-confidence, and the perceived relevance of testing tasks to real life activity also may influence test scores. Other studies indicate that higher scores are attained when warm-up exercises set a climate for reflection and incubation of ideas (Torrance, 1987). Scores on a divergent production test are viewed as measures of a person's creative potential (Runco, 1993a). However, such scores on a one-time set of responses to a standardized task should not be construed as the upper limits of a person's native creativity. Even with individuals who possess the ability and skill to behave creatively, without motivation they are unlikely to do so (Torrance, 1979).

Validity and Reliability

"Validity of creativity assessment is the single most important consideration" when selecting a test (Michael & Wright, 1989, p. 34). Concurrent validity coefficients are generally lower for creativity measures than validity coefficients found in other domains, such as achievement or intelligence. However, this is not surprising given the many facets of creativity and the variety of definitions from which creativity measures are derived (Davis, 1997; Michael & Wright, 1989). Moreover, a threshold level of the relationship between creativity and intelligence has been interpreted to indicate that other variables contribute to these two constructs differently throughout the range of abilities (e.g., Davis, 1997; Haensley & Reynolds, 1989). For example, motivational influences, suprarational and intuitive thought, and different domains of talent contribute differentially at the highest ranges of creative abilities.

When tests are the major source of data to identify students for gifted programs, procedures must be in place to establish a high degree of consistency between multiple scorers of student performance. For example, consistent use of a single rater or a scoring service that maintains high inter-rater reliability would insure consistency of scores within a single study or school district (Rosenthal, DeMers, Stillwell, Graybeal, & Zins, 1983).

A Sampling of Varied Instruments

Table 2 presents a selection of 60 well-known and varied instruments. The list is limited to measures that have been used for creativity research with school-aged children. These include commercially published measures and a variety of instruments available in the public domain from journal articles, books, dissertations, or other sources of nonpublished tests. Most have been reviewed by at least one of the referenced sources: *Mental Measurements Yearbook*, (e.g., Kramer & Conoley, 1992); *Test Critique* (e.g., Keyser & Sweetland, 1992); Callahan (1991); Isaksen, Fierstien, Murdock, Puccio and Treffinger (1994); or Davis (1989). However, inclusion in this list should **not** be construed as a recommendation of any of these measures for identification of creative youth. Some are older measures, some may be outdated or without norms, and some are of limited validity. Despite such limitations, many have been useful for research purposes, and, in conjunction with other measures, some have been useful as one of several indicators to estimate a child's potential for creative productivity. The table provides a sampling of the

variety of measures available in each of the categories established in this review.

Conclusions

As is true for any situation requiring decisions regarding placement and programming, selection and use of assessment instruments and procedures should depend on the purpose of measuring child performance or achievement (Treffinger, 1987). Implicit and explicit definitions of creativity will greatly influence the user's decisions about procedures for assessing creativity (Hunsaker & Callahan, 1995; Runco, 1993a). The intended use of instruments influences selection of procedures and measures for eligibility decisions, research, or diagnostic purposes (see Cramond, 1998).

In conclusion, any single measure of creativity is rarely sufficient by itself. Hocevar and Bachelor (1989) recommended use of past activities and achievement, as evidenced in inventories or past products, as the most valid method of predicting future creativity for older subjects. Personality inventories, self-report instruments, and ratings by others (teachers, peers, or parents) are highly subjective measures whose results depend on accuracy of perceptions of the respondents, on their understanding of creativity and its manifestations, and on their willingness to give thoughtful responses. The validity of teacher ratings is greatly improved by providing adequate training (Frasier, 1994; Renzulli et al., 1976). However, because teachers and parents vary widely in their ability to evaluate students' creativity (Dawson, 1997), reliance on ratings as the only source of information is not recommended. A child's potential as a creative producer may be predicted by divergent thinking tasks (Runco, 1993a; Torrance & Safter, 1989), particularly when these measures are used to determine strengths of children who earn high scores rather than to exclude those who earn lower scores (Treffinger, 1987).

The use of one single measure to predict an individual's potential to engage in complex creative behavior is overly simplistic (Feldhusen & Goh, 1995; Hunsaker & Callahan, 1995). Responsible decisions to assess children's potential for creative behavior require a minimum of two measures, such as an attitude and a divergent thinking measure (Davis, 1989), or a divergent thinking and an alternative assessment procedure, that together show evidence of creative productivity (Ohio Department of Education, 1992). The most defensible identification practice is to use a systems approach based on information from multiple measures in order to make eligibility decisions.

Note: Many of these measures have been recommended only for research uses and may not be appropriate for identification purposes (see discussion in text).

SELECTED REFERENCES

- Abeel, L. B., Callahan, C. M., & Hunsaker, S. L. (1994). *The use of published instruments in the identification of gifted students*. (Monograph). Washington, DC: National Association for Gifted Children.
- Amabile, T. M. (in press). Within you, without you: The social psychology of creativity, and beyond. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity*. Cresskill, NJ: Hampton Press.
- Aschbacher, P. R. (1991). Performance assessment: State activity, interest, and concerns. *Applied Measurement in Education*, 4, 275-288.
- Baer, J. (1994). Performance assessments of creativity: Do they have long-term stability? *Roeper Review*, 17, 7-11.
- Besemer, S. P., & O'Quin, K. (1987). Creative product analysis: Testing a model by developing a judging instrument. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics*. (pp. 341-357). Buffalo, NY: Bearly Limited.
- Borland, J. H. (1989). *Planning and implementing programs for the gifted*. NY: Teachers College Press.
- Callahan, C. M. (1991). The assessment of creativity. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 219-236). Needham Heights, MA: Allyn & Bacon.

- Chase, C. I. (1985). [Review of the test Torrance Tests of Creative Thinking]. In J. V. Mitchell (Ed.), *The ninth mental measurements yearbook: Vol. 2* (pp. 1630-1634). Lincoln, NE: Buros Institute of Mental Measurement.
- Clark, G., & Zimmerman, E. (1993). Issues and practices related to identification of gifted and talented students in the visual arts. *Spotlight, Newsletter of the Visual and Performing Arts Division of the National Association for Gifted Children*, 3 (2), 1-7.
- Cohen, L., & Gelbrich, J. (1998). Early childhood interests: Seeds of adult creativity. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Cramond, B. (1994). The Torrance Tests of Creative Thinking: From design through establishment of predictive validity. In R. F. Subotnik & K. D. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 229-254). Norwood, NJ: Ablex.
- Cramond, B. (1998). The Torrance Tests of Creative Thinking: Going beyond the scores. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Davis, G. A. (1989). Testing for creative potential. *Contemporary Educational Psychology*, 14, 257-274.
- Davis, G. A. (1992). *Creativity is forever* (3rd ed.). Dubuque, IA: Kendall/Hunt.
- Davis, G. A. (1997). Identifying creative students and measuring creativity. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed.). Boston: Allyn & Bacon.
- Dawson, V. L. (1997). In search of the wild bohemian: Challenges in the identification of the creatively gifted. *Roeper Review*, 19, 148-152.
- Feldhusen, J. F., & Goh, B. E. (1995). Assessing and accessing creativity: An integrative review of theory, research, and development. *Creativity Research Journal*, 8, 231-247.
- Fishkin, A. S. (1998). Issues in studying creativity in youth. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Frasier, M. M. (1994). *The Frasier Talent Assessment Profile (FTAP): A multiple criteria model for the identification and education of gifted students*. (University of Georgia, Torrance Center for Creative Studies).
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic.
- Haensley, P. A., & Reynolds, C. R. (1989). Creativity and intelligence. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 33-52). New York: Plenum.
- Haroutounian, J. (1993). Identifying talent in the performing arts. *Spotlight, Newsletter of the Visual and Performing Arts Division of the National Association for Gifted Children*, 3 (2), 1-7.
- Hoevear, D., & Bachelor, P. (1989). A taxonomy and critique of measurements used in the study of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds, (Eds.), *Handbook of creativity* (pp. 53-75). New York: Plenum.
- Hong, E., & Milgram, R. M. (1991). Original thinking in preschool children: A validation of ideational fluency measures. *Creativity Research Journal*, 4, 253-260.
- Hong, E., & Milgram, R. M. (1996). The structure of giftedness: The domain of literature as an exemplar. *Gifted Child Quarterly*, 40, 31-40.
- Hunsaker, S. L. (1994). Adjustments to traditional procedures for identifying underserved students: Successes and failures. *Exceptional Child*, 61, 72-76.
- Hunsaker, S. L., & Callahan, C. M. (1995). Creativity and giftedness: Published instrument uses and abuses. *Gifted Child Quarterly*, 39, 110-114.
- Isaksen, S. G. (1987). Introduction: An orientation to the frontiers of creativity research. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics* (pp. 1-26). Buffalo, NY: Bearly Limited.
- Isaksen, S. G., Firestien, R. L., Murdock, M. C., Puccio, G. J., & Treffinger, D. J. (1994). *The assessment of creativity: An occasional paper from the Creativity Based Information Resources Project*. Buffalo, NY: Center for Studies in Creativity.
- Jatko, B. P. (1995). Using a whole class tryout procedure for identifying economically disadvantaged students in three socioeconomically diverse schools. *Journal for the Education of the Gifted*, 19, 83-105.
- Jellen, H. G., & Urban, K. K. (1986). The TCT-DP (Test for Creative Thinking-Drawing Production): An instrument that can be applied to most age and ability groups. *Creative Child and Adult Quarterly*, 11, 138-155.
- Johnsen, S. K., & Ryser, G. K. (1997). The validity of portfolios in predicting performance in a gifted program. *Journal for the Education of the Gifted*, 20, 253-267.
- Johnson, A. S., & Fishkin, A. S. (1998). Assessment of cognitive and affective behaviors related to creativity. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Keyser, D. J., & Sweetland, R. C. (Eds.) (1992). *Test critiques (Vol. 9)*. Austin, TX: Pro-Ed.
- Khatena, J., & Torrance, E. P. (1990). *Manual for Khatena-Torrance Creative Perception Inventory*. Bensenville, IL: Scholastic Testing Service.
- Kirschenbaum, R. J., & Armstrong, D. (1998). Diagnostic assessment of creativity in students. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Kramer, J. J., & Conoley, J. C. (Eds.) (1992). *The eleventh mental measurement yearbook*. Lincoln, NE: University of Nebraska-Lincoln, Buros Institute of Mental Measurements.
- Lazear, D. (1994). *Multiple intelligence approaches to assessment: Solving the assessment conundrum*. Tucson, AZ: Zephyr Press.
- MacKinnon, D. W. (1961). The study of creativity. In D. W. MacKinnon (Ed.), *The creative person* (pp. 1-1 - 1-15) [Proceedings of Conference at the Tahoe Alumni Center, October, 1961]. Berkeley: Institute of Personality Assessment Research, University of California.
- Magyari-Beck, I. (1993). Creatology: A potential paradigm for an emerging discipline. In S. G. Isaksen, M. C. Murdock, R. L. Firestien, & D. J. Treffinger (Eds.), *Understanding and recognizing creativity: The emergence of a discipline* (pp. 48-82). Norwood, NJ: Ablex.
- Meeker, M., Meeker, R., & Roid, G. H. (1985). *Structure of Intellect Learning Abilities Test Manual*. Los Angeles: Western Psychological Services.
- Michael, W. B., & Wright, C. R. (1989) Psychometric issues in the assessment of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 33-52). New York: Plenum.
- Milgram, R. M., Dunn, R., & Price, G. E. (Eds.). (1993). *Teaching gifted and talented learners for learning style: An international perspective*. New York: Praeger.
- Milgram, R. M., & Hong, E. (1993). Creative thinking and creative performance in adolescents as predictors of creative attainments in adults: A follow-up study after 18 years. *Roeper Review*, 15, 135-139.
- Murdock, M. C., & Puccio, G. J. (1993). A contextual organizer for conducting creativity research. In S. G. Isaksen, M. C. Murdock, R. L. Firestien, & D. J. Treffinger (Eds.), *Understanding and recognizing creativity: The emergence of a discipline* (pp. 249-280). Norwood, NJ: Ablex.
- Ohio Department of Education (1992). *Model for the identification of creative-thinking ability*. Columbus, OH: Author.
- Parnes, S. J. (1972). *Creative potential and the educational experience*. In *Creativity: Unlocking human potential* (pp. 6-30). Buffalo, NY: D.O.K. (Reprinted from paper presented at the annual convention of the American Psychological Association, Washington, D.C., April, 1967).
- Piirto, J. (1994). *Talented children and adults: Their development and education*. New York: Merrill.
- Plucker, J. A., Callahan, C. M., & Tomchin, E. M. (1996). Where art thou, multiple intelligences? Alternative assessments for identifying talent in ethnically diverse and low income students. *Gifted Child Quarterly*, 40, 81-92.
- Pyryt, M. (1998). Effectiveness of training children's divergent thinking: A meta-analytic review. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Ramos-Ford, V., & Gardner, H. (1997). Giftedness from a multiple intelligences perspective. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed.). Boston: Allyn & Bacon.
- Reis, S. M., & Renzulli, J. S. (1991). The assessment of creative products in programs for gifted and talented students. *Gifted Child Quarterly*, 35, 128-134.
- Renzulli, J. S. (1978). What makes giftedness: Reexamining a definition. *Phi Delta Kappan*, 60, 180-84, 261.
- Renzulli, J. S., Smith, L. H., White, A. J., Callahan, C. M., & Hartman, R. K. (1976). *Scales for Rating the Behavioral Characteristics of Superior Students*. Mansfield Center, CT: Creative Learning Press.
- Rhodes, M. (1961/1987) An analysis of creativity. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics* (pp. 216-222). Buffalo, NY: Bearly Limited.
- Rimm, S.B. (1980). *Group Inventory for Finding Creative Talent*. Watertown, WI: Educational Assessment Service.
- Rogers, K. (1998). Is creativity quantitatively measurable? A paradigm for creativity research. In A. S. Fishkin, B. Cramond, & P. Olszewski-Kubilius (Eds.), *Investigating creativity in youth: Research and methods*. Cresskill, NJ: Hampton Press.
- Rose, L. H., & Lin, H. T. (1984). A meta-analysis of a long-term creativity training program. *Journal of Creative Behavior*, 18, 11-22.
- Rosenthal, A., DeMers, S. T., Stillwell, W., Graybeal, S., & Zins, J. (1983). Comparison of inter-rater reliability on the Torrance Tests of Creative Thinking for gifted and nongifted students. *Psychology in the Schools*, 20, 35-40.
- Runco, M.A. (1991). *Divergent thinking*. Norwood, NJ: Ablex Press.
- Runco, M. A. (1993a). Cognitive and psychometric issues in creativity research. In S. G. Isaksen, M. C. Murdock, M. L. Firestien, & D. J. Treffinger (Eds.), *Understanding and recognizing creativity: The emergence of a discipline*. (pp. 331-368). Norwood, NJ: Ablex.
- Runco, M. A. (1993b). Divergent thinking, creativity, and giftedness. *Gifted Child Quarterly*, 37, 16-22.
- Shaw, M. P. (1994). Affective components of scientific creativity. In M. P. Shaw & M. A. Runco (Eds.), *Creativity and affect*. (pp. 3-43). Norwood, NJ: Ablex.
- Tardif, T.Z., & Sternberg, R.J. (1988). What do we know about creativity? In R.J. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspective* (pp. 429-440). Cambridge, UK: Cambridge University Press.
- Torrance, E. P. (1979). *The search for satori and creativity*. Buffalo, NY: Creative Education Foundation.
- Torrance, E. P. (1987). Teaching for creativity. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics* (pp. 189-215). Buffalo, NY: Bearly Limited.
- Torrance, E. P. (1990). *Torrance Tests of Creative Thinking: Norms-technical manual (Streamlined) Forms A & B*. Bensenville, IL: Scholastic Testing Service.
- Torrance, E. P., & Ball, O. (1984). *Torrance Tests of Creative Thinking: Directions manual (Streamlined) Forms A & B*. Bensenville, IL: Scholastic Testing Service.
- Torrance, E. P., & Sauter, H. T. (1989). The long range predictive validity of the Just Suppose Test. *Journal of Creative Behavior*, 23, 219-223.
- Treffinger, D. J. (1987). Research on creativity assessment. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics*. (pp. 103-119). Buffalo, NY: Bearly Limited.
- Treffinger, D. J. (1995, July-September). Assessing creativity in educational settings. *Creative Learning Today* 5 (3), 2-5. (Available from Center for Creative Learning, 4152 Independence Court, Suite C-7, Sarasota, FL 34234).
- Vaughn, V.L., Feldhusen, J.F., & Asher, J.W. (1991). Meta-analyses and review of research on pull-out programs in gifted education. *Gifted Child Quarterly*, 35, 92-98.
- Wakefield, J. F. (1987, November). *The outlook for creativity tests*. Paper presented at Council for Exceptional Children's Topical Conference on the Future of Special Education, Orlando, FL.
- Wallach, M. A., & Kogan, N. (1965). *Modes of thinking in young children*. New York: Holt.