The National Research Center on the Gifted and Talented

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The National Research Center on the Gifted and Talented: Instrument Bank for Educators and Researchers

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There is a great quote by Frank Kingdon: "Questions are the creative acts of intelligence." Asking the right questions makes the process of seeking answers easier because it becomes a focused journey. Educators and researchers always ask questions as they work with students, plan lessons, create theories, or design experiments. They want to know how students respond to curricula, what influences the achievement of gifted and talented students with learning disabilities, or how parents view academic programs and services. Throughout the design and implementation of The National Research Center on the Gifted and Talented (NRC/GT) research agenda, "question asking" and "question-seeking" were central to the process. We posed questions about identification, programming, professional development, special populations of students with abilities and disabilities, achievement and underachievement, classroom practices, and policies and procedures related to the education of gifted and talented children. These and other potential research topics emerged from the only federal legislation supporting gifted and talented education, Jacob K. Javits Gifted and Talented Students Education Act, priorities set by the United States Department of Education's Institute of Education Sciences, and two NRC/GT national needs assessments that tapped into suggestions from educators, researchers, and the larger education community. As we developed research questions and designed quantitative and qualitative students, we recognized the need to ensure that instruments were reliable, valid, responsive to specific research questions, and modes of data collection. There were many excellent published instruments reviewed in *Buros Mental Measurements Yearbooks* (2003), *Tests in Print* (1999), and *Tests* (2003). Our experiences with using potential instruments and knowledge of technical qualities helped us with the decision-making process. Sometimes, we had many options for instruments; other times, options were limited. Therefore, we designed instruments for administrators, teachers, students, and parents that required observations, reflections, closed-ended and open-ended responses, demographic data, and work samples. All created instruments were accessible through NRC/GT research monographs that detailed all phases of research studies. We received many requests for access to and use of NRC/GT instruments and always granted permission. Instruments were used to replicate studies, conduct Master's and dissertation theses, assess gifted and talented programs and strategies, and evaluate classroom practices.

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Inside

Developing Creativity in Gifted Children: The Central Importance of Motivation and Classroom Climate

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The Study of Giftedness and Creativity—Two Separate But Parallel Trajectories

Rationale

It is important to introduce researchers, curriculum developers, administrators, classroom teachers, and other groups who focus on gifted and talented populations to the Social Psychology of Creativity. Unusually high levels of intelligence or other hallmarks of giftedness do not necessarily predict creative behavior (Stein, 1968; Wallach, 1971). Yet many gifted children do have the requisite "ingredients" to become highly creative adult contributors to the arts and sciences. If these gifted students are to realize their creative potential, particular attention must be paid to the promotion and maintenance of their intrinsic motivation in the classroom.

The Study of Creativity

The empirical study of creativity has long been dominated by an emphasis on the individual difference variables that contribute to high levels of creative performance. Implicit in much of this work has been a focus on the internal determinants of creativity, to the exclusion of external factors such as the environmental circumstances conducive to creativity. Researchers interested in the psychology of creativity have typically chosen to decontextualize the creative process. Yet creativity does not come about in a vacuum. A large number of investigations carried out by social psychologists over the past two and one half decades have now established that there is a direct link between the motivational orientation brought by an individual to a task and the likelihood of creativity of performance on that task. And we now understand that the environment plays a large part in determining that motivational orientation.

The Study of Gifted and Talented Populations

As described by Renzulli (1986), the standard approach to the study of gifted persons has also generally reflected the notion that giftedness is a condition somehow magically bestowed. Recently, however, some researchers have advanced the argument that it makes more sense to shift the emphasis from *being gifted* to the question of how to *develop gifted behaviors* in children in the classroom (e.g., Feldhusen, 1995; Houtz, 2003; Renzulli 1986, 1999a, 2002; Sternberg, 1998, 2000; Torrance & Sisk, 1997; Treffinger, 1988; Treffinger, Isaksen, & Dorval, 1996; Treffinger, Young, Nassab, & Wittig, 2003). Social psychologists working to specify the environmental conditions most conducive to creativity have much in common with investigators whose goal it is to help foster gifted behaviors in children. The two fields have much to offer one another and it is high time that a systematic exchange of theories, models, research findings, and practical applications take place.

Renzulli's Three-Ring Model

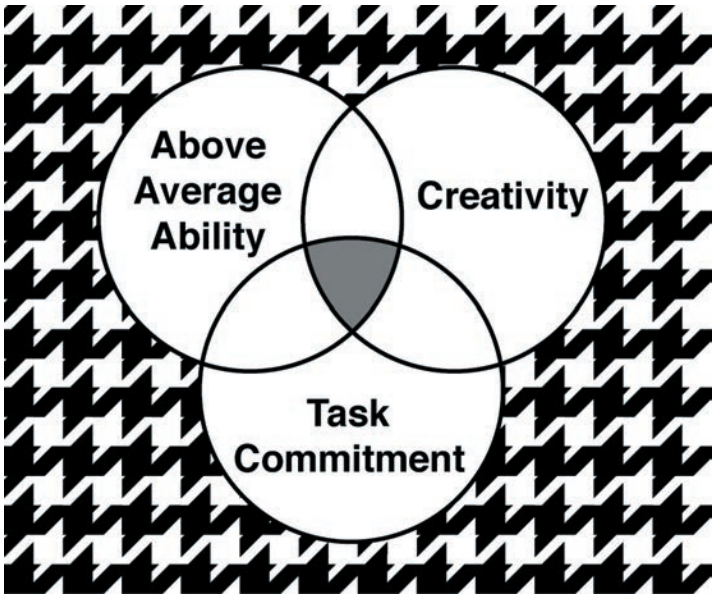
Historically, definitions and assessments of giftedness have been directly linked to tests of intelligence, most especially the IQ score (Renzulli, 1986). But are giftedness and intelligence as closely related as many of the experts would have us believe? There is growing concern that the prevailing conceptions of giftedness (and, as a result, our measurement techniques) are far too narrow. Renzulli (1986), for example, proposes that, at the very least, we must recognize two distinct categories of giftedness: schoolhouse giftedness and creative-productive giftedness (Renzulli, Smith, & Reis, 1982). Both types, he argues, are important and the two categories often interact. But it is not unusual for children (and persons of all ages) to demonstrate an "unevenness" in their giftedness profile—with their strengths in one of the two areas far outweighing their abilities in the other.

What Renzulli terms "schoolhouse giftedness" might also be thought of as test-taking or lesson-learning giftedness. This form of giftedness is fairly well served by standard IQ and other indices of cognitive ability. And because schoolhouse giftedness is relatively easy to recognize and test, it is high scores in this realm that is most often lead to students being identified as gifted and invited to participate in special programs. The hallmarks of what Renzulli terms creative-productive giftedness are often more difficult to recognize in students. Creative-productive giftedness results in the production of original material and tangible products that are intended to be shared with and to impact others (Renzulli, 2002). Research shows that this second type of giftedness is not all that closely tied to intelligence and traditional tests of IQ. While it is true that persons with relatively low levels of intelligence exhibit almost uniformly low levels of creativity, there is great variability in the creativity of individuals earning average to well-above-average intelligence scores. Simply stated, the IQ-creativity correlation is quite low (Stein, 1968; Wallach, 1971) and creative-productive giftedness is far too complex, far too multi-faceted, to be captured by a numerical score on a test of intelligence, aptitude, or achievement.

This recognition that creative-productive giftedness cannot always be quantified with a test score calls for a shift of emphasis among educators toward an exploration of "potential giftedness" and the concomitant question of how such potential might best be fostered. In psychological terms, the focus of attention must move away from an emphasis on giftedness as a stable *trait* toward an understanding that creative-productive giftedness may, in many respects, be better conceptualized as a situation-specific state. Creative-productive giftedness can be nurtured if conditions are right for an appropriate interaction to take place between the gifted student and the environment (Renzulli, 1986). But what are the conditions under which giftedness is most likely to blossom?

While no single criterion has been found to determine creative-productive giftedness, individuals who have achieved recognition because of their outstanding accomplishments and creative breakthroughs tend to possess a fairly well-defined set of three traits (Renzulli, 1986):

> Above average, although not necessarily superior, ability; task commitment, and creativity. Importantly, no one component of this three-part model can, on its own, make for high levels of accomplishment. Rather, it is the interaction between the three clusters that leads to creative-productive giftedness.



Somewhat similar componential models have also been suggested by Csikszentmihalyi (1996), Guilford (1967), Treffinger (1992), Sternberg (1985) and others.

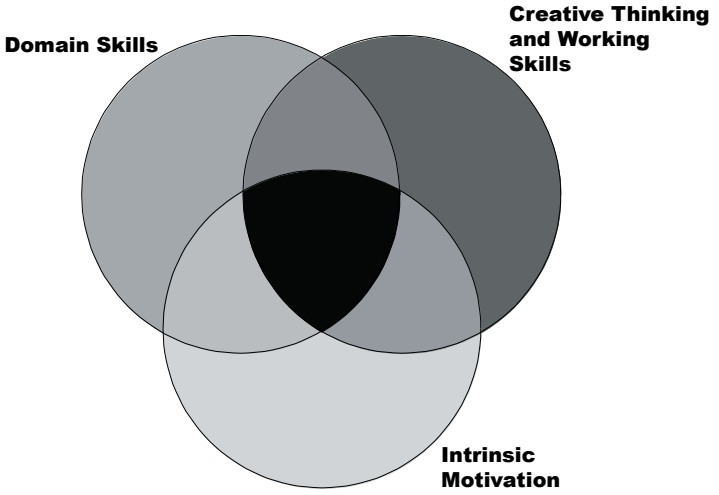
In the process of developing this model, Renzulli and colleagues conducted a large number of research studies that focused on various aspects of this three-part conceptualization and these findings have been summarized in a variety of venues (see (Renzulli, 1998, Renzulli & Reis, 1994). Work done by Winner (2000) and Gallagher (1990) reveals the intense drive and unusually high levels of intrinsic motivation often demonstrated by gifted children and there are a number of important parallels between Renzulli's theory and the biographical and autobiographical accounts of the lives and creative breakthroughs of eminent individuals representing a variety of fields (e.g., Bloom, 1985; Csikszentmihalyi, 1997; Gardner, 1993; Gruber, 1981; Renzulli, 2002). Across history, high levels of intelligence or especially developed skills in one or more areas have often not, in and of themselves, been sufficient for product-based creativity to flourish (Winner, 2000).

The capacity for creative thinking coupled with a single-minded determination to persevere until a solution is reached are also necessary ingredients (Amabile, 1996).

Renzulli presents compelling evidence to support this three-part model, yet absent from his writing is any mention of the empirical research spearheaded by social psychologist Teresa Amabile. While other researchers and theorists interested in gifted populations (e.g., Treffinger, Isaksen, and Feldhusen) have occasionally referenced studies carried out by Amabile and colleagues, very few attempts have been made to directly integrate this work that comes from the mainstream social psychological literature with research that specifically targets gifted students. By the same token, Amabile and her collaborators, myself included, have for 25 years or more been publishing findings that speak directly to models of creative production among gifted children, yet they too have failed to make the connection. It would appear that these two longstanding programs of research have evolved completely separately of one another. A melding of the two perspectives is long overdue.

Amabile's Creative Intersection

Like Renzulli, Amabile too offers a three-part model—this time focused specifically on the antecedents of creative performance. Amabile and colleagues (Amabile, 1996; Hennessey, 2003; Hennessey & Amabile, 1988) have long argued that it is a mistake to stop at the individual level of analysis: the person doing the creating. This work emphasizes the fact that the confluence of a variety of environmental and person variables are necessary for creativity. More formally, this research is built on a three-part conceptualization of creative performance. For a creative solution to be found or a creative idea or product generated, an individual must approach a problem with the appropriate domain skills (background knowledge), creativity skills (willingness to take risks, experiment, etc.) and task motivation. Under ideal circumstances, the coming together of these three factors forms what Amabile (1997) terms the "creative intersection."



While it is certainly possible to teach (and learn) domain skills and perhaps even creativity skills, motivational orientation is much more ephemeral. Motivational state is highly variable and largely situation-dependent. It is on this question of how the environment helps to shape motivational orientation that Amabile and colleagues have focused their attention. In this research and theorizing, the distinction is made between two types of motivation. Intrinsic motivation is the motivation to do something for its own sake, for the sheer pleasure and enjoyment of the task itself. Extrinsic motivation, on the other hand, is the motivation to do something for some external goal.

Empirical Investigations in the Classroom

The Intrinsic Motivation Principle of Creativity

Over 25 years of social psychological investigation into these motivational orientations have led to the Intrinsic Motivation Principle of Creativity:

- Intrinsic motivation is conducive to creativity, and extrinsic motivation is usually detrimental.

In a basic research paradigm designed to test this proposition, study participants are randomly assigned to either constraint or no-constraint conditions. For instance, individuals are either led to expect a reward for their participation or no reward is mentioned, and then they are asked to produce some sort of observable product

that can be assessed for level of creativity. Their motivational orientation (i.e., whether intrinsic or extrinsic) is also measured. Whether the targets of an investigation are preschoolers, fifth graders, or college students, the findings are consistent. Over the years, five environmental constraints have consistently proven to be sure-fire killers of intrinsic motivation and creativity (Amabile, 1983a, 1996; Hennessey, 1996): (a) Expected Reward (b) Expected Evaluation (c) Competition (d) Surveillance and (e) Time Limits.

A Recipe for the Typical American Classroom

Might this list of killers be just as well be labeled as a recipe for the typical American classroom? As unbelievable as it may seem, we have somehow managed to structure educational environments in such a way that intrinsic motivation and creativity are bound to suffer, if not be completely destroyed. The all-important question that must be addressed is how this situation can be turned around. How can teachers and administrators be helped to nurture the intrinsic motivation of their students? How can children be helped to develop an excitement about learning and the playfulness and the willingness to take risks that many researchers believe are crucial to creativity (e.g., Amabile, 1983a, 1996; Dansky & Silverman, 1975)?

Teacher Behavior in the Classroom

The key element seems to be the preservation of a sense of self-determination. Rewards, evaluations, or other extrinsic constraints that are perceived as informational, useful and informative as to the quality of one's performance rather than as controlling instruments of coercion can serve to increase task involvement and should not be expected to have detrimental effects. The expectation that one's performance will be evaluated or rewarded will only be detrimental if the interpersonal atmosphere of the setting causes the individual to feel intimidated or self-conscious. In situations where the individual feels in control of her own destiny, motivation and creativity need not suffer (Deci & Ryan, 1985).

When children experience the interpersonal context of the classroom as supporting of self-determination, they will be more intrinsically motivated (Deci, Nezlek, & Sheinman, 1981). Dozens of investigations conducted in both heterogeneous and gifted classrooms (e.g., Esquivel, 1995; Torrance, 1962) have revealed strong, positive correlations between teachers' orientations and their students' motivational outcomes. Moreover, teachers' orientations have been found to impact children's motivation within the first 6 to 8 weeks of the school and this influence remains strong throughout the year. Thus, it is the functional significance of one's environment (i.e., the individual's perception of the reward or evaluation as well as perceptions of the motivations of the teacher imposing these contingencies), rather than its objective properties, which affects motivational processes (see also deCharms, 1976; Ryan & Grolnick, 1986).

Based on these studies and others like them, it appears that gifted and talented students who consistently approach their class work with high levels of skill may be especially impacted by the negative effects of extrinsic constraints that threaten perceptions of self-determination. Gifted children are often well aware of their unusual talents. Drawing on past experience, they can be relatively sure that they will outperform their more typically developing peers; and, as a result, they tend not to be especially dependent on the informational feedback that sometimes accompanies reward or evaluation contingencies. What many gifted students do need, however, is assistance in maintaining their intrinsic motivation.

Despite the fact that some widely accepted hallmarks of giftedness include the tendency to be highly motivated, have a long attention span and become entirely immersed in a problem (Winner, 1996a, 1997), research shows that gifted children often struggle with motivation in the classroom (Reis & McCoach, 2000). These motivational difficulties may stem from the fact that gifted students tend to be self-motivated, rather than teacher-motivated. They typically perform better with unstructured, flexible assignments and they prefer to select their own learning experiences, rather than being given a set task (Winner, 1996a, 1997).

Rather than being bolstered by their unusual abilities and talents, many gifted children appear to be particularly vulnerable to classroom environmental influences. Too often their enthusiasm and motivation are stifled by teachers invested in seeing that they conform to accepted practices, and they become easily bored. They often do not know how to set appropriate goals or to deal effectively with interpersonal situations or adults' high expectations. Taken together, these difficulties often result in underachievement in school, one of the most common problems faced by the gifted student population (Webb, Meckstroth, & Tolan, 1989; Winner, 1996b).

Gifted Children and the Creative Intersection

Given their obvious talents and intellectual superiority early in life, surprisingly few gifted children grow up to be creative adults (Winner, 1996a). At issue here is the fact that while much of the research and theorizing that has been done on creativity and the gifted has concentrated on the role played by these children's academic superiority in the creative process, a high level of intelligence is but one of the necessary ingredients for creative performance.

Researchers have tended to investigate only the largely innate, or at least largely immutable, differences between creative and uncreative or gifted and less academically talented students. The Creative Intersection Model presented here (Amabile, 1997), on the other hand, focuses on "creative situations"—the particular social and environmental conditions that can positively or negatively impact the creativity of most any individual.

How might the gifted child be characterized according to the intersection model? Hunsaker and Callahan (1995) report that the majority of schools have adopted definitions of and criteria for giftedness that include creativity; and it might seem reasonable to expect that where creative behavior is concerned, gifted children can be expected to fare particularly well. Yet the overwhelming majority of students identified as gifted have earned that designation because of above average general ability and knowledge (what Amabile terms domain-relevant skills) (Renzulli, 1986). Importantly, over 25 years of empirical research tell us that no amount of domain-relevant (or even creativity-relevant skills) can compensate for a lack of intrinsic motivation to perform an activity. Task motivation makes the difference between what an individual can and will do (Amabile, 1983b). It is task motivation that determines whether domain skills and creativity skills will be adequately and efficiently tapped in the service of creative performance.

While some research has revealed that intellectually gifted children can display strong levels of intrinsic motivation (Gallagher, 1990; Winner, 2000), educators must be careful not to take this tendency for granted. As reported earlier, studies show that gifted children often struggle with motivation in the classroom (Reis & McCoach, 2000). Teachers of the gifted must remember that their students' advanced intellectual capacities and problem solving skills will often not be enough to ensure that creativity will flourish within the classroom. It is essential to also consider students' motivation and to conceptualize their motivational orientation as both a relatively enduring trait and as a temporary situation-specific state. Intrinsic motivation is a most delicate and often fleeting entity. Even especially gifted students, who may be generally more highly intrinsically motivated toward what they do, can quickly fall prey to outside influences. Intrinsic motivation cannot be taught. It cannot be coerced, but it is easily squelched. Intrinsic interest must come from within the individual and some classroom environments are much more conducive to this happening than are others.

Relevance of the Research for Underrepresented Populations

Prominent researchers and theorists have spent the better part of their careers gathering evidence that refutes what has been termed the "instant-eminence model of giftedness." The argument they set forth is that giftedness in children is not an already developed capacity as many educators and psychologists would lead us to believe. Rather, it is a capacity that needs nurturance and environmental support to blossom. The essential problem is this: If the motivation of many privileged students whose gifts have long been recognized and nurtured by families and schools can fall prey to the undermining effects of environmental influences,

what about the motivational orientation of gifted students who might have the potential to make creative-productive contributions but who have not enjoyed the benefits of specially funded enrichment programs or high expectations from parents and teachers? Educators must be sensitized to these issues. They must question whether a gifted child who comes from an economically disadvantaged and/or minority background can be expected to attempt a creative solution to a problem or to maintain an interest in learning. Gifted students belonging to more marginalized groups are particularly in need of help if they are to find their own creative intersection.

A close examination of investigations into the psychology of creativity reveals that very little empirical work has been specifically targeted at either non-Western cultures or persons of color or other racial-minority or linguistic-minority groups within the U.S. and Europe. While Torrance (1978) and Renzulli (1973) have long argued for the consideration of LCD (Linguistically and Culturally Diverse) populations in the gifted and talented literature, it is only in recent years that a small but growing number of gifted and talented experts have systematically advocated for a consideration of all children: Rich and poor, native English speakers and bilinguals, Blacks, Hispanics, Asians, and Whites. For example, Renzulli questions whether it makes sense to take a program that has proven successful in an affluent suburb and impose it on an inner-city or rural school district (Renzulli & Reis, 1994). As an alternative, Renzulli has developed an all-inclusive School Enrichment Model (SEM) (Renzulli & Reis, 1994, 1997, 2002) that he believes can be readily adapted to any student population or school situation. SEM moves away from a strict adherence to an arbitrary "cut off" score or other entrance requirement and makes it possible to include a variety of students who might otherwise never have been considered gifted (or potentially gifted). As Renzulli explains, programs that rely on traditional identification procedures may not be serving the wrong students, but they are certainly excluding substantial numbers of especially able but underachieving pupils—students who, if given the right classroom circumstances, could also demonstrate stellar achievements and signs of giftedness (Renzulli, 1999b).

Practical Applications

Promoting Intrinsic Motivation and Creativity in Gifted Populations

In their present form, the majority of American classrooms, from preschools through high schools and colleges, are fraught with killers of intrinsic interest and creativity. Nowhere is this situation more dire than in the gifted and talented classroom or "pull-out" program where the promotion of students' intrinsic motivation and creativity of performance must be top priority. Modifications of curriculum or materials, modules aimed at creativity enhancement or lessons in techniques for brainstorming or "thinking outside the box" are not enough. Administrators, teachers, parents, and students must work together to change both individual classroom environments and the overall climate of their educational institutions. If gifted students are to be helped to find their creative intersection, significant and fundamental changes must be made to the way that educators think about teaching and learning.

Towards this end, a few researchers in the area of gifted and talented education have, in recent years, turned their attention to programs that can be individualized to meet a particular child's interests and needs. Rather than singling out only a few students who might demonstrate exceptional ability in one or more narrowly-defined, traditional subject areas, this alternative approach recognizes student strengths and talents along a wide variety of dimensions. Treffinger's (1986) individualized model or Feldhusen's (1992, 1995) program for talent identification and development are two primary examples of programs that strive to help students to reach higher levels of accomplishment and productivity, at their own pace and in their own way.

The suggested actions outlined below are based on 30 years of empirical data gathered by social psychologists interested in promoting intrinsic motivation and creativity in the classroom (for extensive reviews of the literature, see Hennessey, 2003; Hennessey & Amabile, 1988). While many of the earlier investigations in this genre tended to target White, middle-class, suburban school students, there is a growing body of evidence

to indicate that all children, both gifted and more typically developing, can benefit from these changes. And, in fact, the intrinsic motivation and creativity of economically disadvantaged children and culturally different students have been shown to be particularly vulnerable to classroom environmental factors (Lopez, 2003; Lopez, Esquivel, & Houtz, 1993). None of these suggested reforms necessitate large budgets or a major reallocation of funds. Instead, what are needed are a deep commitment to change and a willingness on the part of the entire educational community to band together to make the school environment conducive to the development of intrinsic motivation and creativity.

Suggested Steps

- Teachers must work diligently to create an interpersonal atmosphere that allows students to feel in control of their learning process.
- Teachers and administrators must step back and critically review the incentive systems that are currently in place.
- In situations where extrinsic incentives are being used, students must be helped to distance themselves from those constraints as much as possible.
- Students must be helped to become more proficient at recognizing their own strengths and weaknesses.

Clearly, these fundamental changes in attitude and behavior will not happen over night. But our experience as researchers tells us that teachers, parents, and students are hungry for the opportunity to view education in this new light. Our message that students' own intrinsic interest, curiosity, and excitement about learning must not take a back seat to concerns about grades or the need to outperform one's peers resonates with educators. And if given the license to effect these changes, we believe that schools can, in fact, make great strides towards fostering the intrinsic motivation and creativity of their gifted students as well as the general population.

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The complete research monographs and CD-Rom of all of the publications mentioned in this issue of the *NRC/GT Newsletter* are available. For further information visit our on-line Research-based Resources List at **www.gifted.uconn.edu/nrcgt/resource.html**

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The DISCOVER Project: Improving Assessment and Curriculum for Diverse Gifted Learners

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The world we have created is a product of our thinking;
it cannot be changed without changing our thinking.—Albert Einstein

Need for Changes in Beliefs

For over a century, educators have limited their beliefs about intelligence and superior abilities to research and theories from psychology, particularly from the research on "individual differences" even though this research has mainly been conducted on groups, especially those from advantaged and mainstream cultural backgrounds, with generalizations made based on averages and "standard" deviations rather than individual behavior (Ceci, 1996; Nielson, 1994). Ideas, results of empirical research, and theories from cultural anthropology, sociology, genetics, neuroscience, developmental psychology, education, and the new field of cognitive science must be integrated into our thought systems to form a more complete view of the multifaceted, multidimensional phenomenon we call giftedness.

A New Framework: From Theory to Practice

It is important to transfer theory and research into classrooms and communities by designing an assessment and curriculum model integrating the theoretical frameworks proposed by Ceci, Sternberg, (1997, 1999, 2002), and Gardner (1983, 1994), which are excellent examples of integrated perspectives. According to Ceci, a prerequisite for cognitively complex behavior in a given realm is the possession of a well differentiated yet integrated knowledge base that gets operated on by efficient cognitive processes: "The knowledge and beliefs we possess in a specific domain . . . provide the raw materials for the operation of various cognitive processes during moments of problem solving. . ." (1996, p. 22).

To make Ceci's, Sternberg's, and Gardner's ideas applicable in education and easily understandable to teachers, work on defining levels of content enabling students to see how facts and experiences are connected to "big ideas" (Maker & Nielson, 1995) was integrated with the early work of psychologist Mihalyi Csikszentmihalyi (Getzels & Csikszentmihalyi, 1976). Shirley Schiever and C. June Maker elaborated and extended this work to create a continuum of problem types that could be used to design assessments and curricula.

The framework of DISCOVER (Discovering Strengths and Capabilities while Observing Varied Ethnic Responses) was designed to create a better alignment between the definition of problem solving, its assessment, and its development in an educational context. In Csikszentmihalyi's early research, the ability (and willingness) to structure an open-ended or ill-structured problem, or "problem-finding," as it was later labeled, was the single trait that most accurately predicted the later creative achievements of artists. This research had a significant effect on the field of education for gifted students, leading to the development of numerous teaching models in which problem-finding was valued over the solving of already-defined problems or problems with known solutions (Gallagher, Stepien, & Rosenthal, 1992; Maker & Nielson, 1995). Using the DISCOVER Model, assessments and curricula include a balance of all types of problems, and incorporate all levels of content—from data to concepts, principles, and theories.

Since 1982, Maker focused on curriculum design and teaching and advocated the design of learning environments for gifted students that are learner centered, knowledge centered, assessment centered, and community centered (Bransford, Brown, & Cocking, 2000). DISCOVER was created to extend these principles and practices into schools with high concentrations of culturally and linguistically diverse, geographically isolated, and low income students—helping administrators, teachers, parents, and communities to adopt a "strength-based" instead of "deficit-based" view of students (Maker, 1993, 2001; Maker & King, 1996; Maker, Nielson, & Rogers, 1994; Maker, Rogers, Nielson, & Bauerle, 1996).

DISCOVER is one model for eliminating barriers and increasing facilitators in both identification and the design of curriculum and instruction for students from groups traditionally underrepresented in programs for the gifted. The definition of giftedness used in the DISCOVER framework is consistent with Ceci's Bioecological Theory of Cognitive Complexity (1996) and Sternberg's and Gardner's theories of intelligence. Observation is presented as an important basis for decision-making across assessment and curricular contexts and consistent with these theories.

Barriers and Facilitators: Assessment and Curriculum

Test makers and publishers continue to insist their instruments have no bias—yet those who score at the highest levels do not include equitable numbers of children from culturally and linguistically diverse groups, and programs for gifted students continue to be dominated by those from mainstream, middle and upper socioeconomic environments and backgrounds (Coleman & Gallagher, 1995; Ford & Harmon, 2001; Hunsaker, 1994; Gardner, 1995; Maker, 1996). A definite problem exists with the use of these instruments and the practices associated with them (Clasen, Middleton, & Connell, 1994; Cummins, 1984; Ford & Harmon, 2001). New instruments and procedures must be created, used, and tested.

Since intelligence and giftedness are complex constructs, and our world is in a constant state of change, programs and curricula also must be multi-dimensional and complex. Frameworks for program and curriculum development, as well as the practices that result, must be reframed so they are consistent with new beliefs, recent research, and new identification procedures. If learning is viewed as a transformation of an individual's knowledge and experiences rather than as an accumulation of new knowledge and experience, practices will be consistent with the latest information about how people learn (Bransford et al., 2000), and will be more culturally responsive to the changing faces of the children included in these programs.

The traditional and emerging paradigms (thought systems), that guide practice and research in education of the gifted, (Feldman, 1993; Treffinger, 1991) are quite different, and can be examined both to gain an important perspective on the reasons why certain groups have continued to be underrepresented in special programs and to generate alternatives with the potential to change this national problem. In the traditional paradigm, giftedness is seen as equal to a high IQ, stable and unchangeable, identified based on psychological tests, elitist in orientation, authoritarian or "top-down," school-oriented, ethnocentric, and expresses itself without special intervention. In the emerging paradigm, giftedness is perceived as having multiple forms, being developmental and process-oriented, based on performance, collaborative at all levels, and field-oriented. Excellence rather than elitism is the focus, diversity is central to its mission, and the context in which giftedness is assessed and developed is crucial to its expression. The traditional paradigm includes many barriers to the identification and provision of appropriate services for children from diverse groups, and examining this perspective carefully can help educators understand why certain groups remain underrepresented in special programs for the gifted. The emerging paradigm includes many facilitators—beliefs and practices that can help in identifying and providing appropriate services for underrepresented groups—so DISCOVER was designed from the viewpoint of the emerging paradigm. The aim of the teams of researchers and practitioners (Maker, 1996) was to minimize barriers and increase facilitators both for identification and programming.

The DISCOVER Assessment

A fundamental belief in the equal distribution of abilities across diverse groups led to the creation of the DISCOVER Assessment. An emphasis on problem solving would be an important way to access the abilities of students from "at risk" populations. When testing a student's knowledge, often we are assessing exposure, not the ability to learn the information. The ability to learn the information is the key. Producing sophisticated products also is influenced by exposure to ways of organizing and presenting information. Emphasis on use of effective strategies has the potential to "level the playing field," enabling students who solve problems on a daily basis to demonstrate their abilities. "Little Claudia," a 5-year-old Mexican American girl, who was responsible for dressing her 2-year-old brother and making sure he was taken to daycare before she went to kindergarten class, had extensive practice in problem solving. However, she was not exposed to advanced knowledge through visits to museums or a home environment with many sources of information, nor was she given opportunities to produce sophisticated products through special courses, lessons, or other opportunities afforded to children from middle and upper socioeconomic status (SES) families. Many children from diverse economic, geographic, and cultural groups face challenges similar to Little Claudia's. Research on the DISCOVER assessment is showing that, without lowering standards or changing criteria, when DISCOVER is used to identify gifted and talented students, the ethnic, economic, and linguistic balance in the identified groups parallels the balance of these groups in the community (Maker, 1997; Nielson, 1994; Powers, 2003; Reid, Udall, Romanoff, & Algozzine, 1999).

Repeated assessments, revisions, feedback, and on-going data collection have resulted in a set of activities for each of four grade levels (K-2, 3-5, 6-8, 9-12), standardized procedures and directions, a behavior checklist to provide consistency in evaluations, and a "debriefing" process for increasing interrater reliability. Assessments are conducted in the familiar classroom environment. The students' teachers are the facilitators. The observers who assess children are other general classroom teachers; specialists in education of the gifted, bilingual education, or special education; preservice educators; counselors; community members; administrators; and other experts. Students, in groups of 4 to 5 peers, are encouraged to interact and meet the challenges presented. Bilingual observers and teachers present instructions and interact with children in the dominant language(s) of the students.

The DISCOVER assessment, however, cannot be separated from curriculum and teaching strategies, especially when they are designed to be interdependent. After a DISCOVER assessment is completed, administrators, teachers, parents (and the students themselves, especially at the high school level) receive information about the students' strengths (inter-individual and intra-individual) across the domains assessed, as well as very detailed reports of the problem solving behaviors observed during each activity. Problem solving behaviors are reported for each domain, core competencies within each domain, and for creativity and task commitment clusters. Teachers, parents, and students are assisted in the process of planning ways to build on student strengths as well as to compensate for weaknesses.

The DISCOVER Curriculum Model

In the DISCOVER Model "at-risk" students are viewed as being "at-promise" for success due to their problem solving strengths in diverse cognitive domains. When students' strengths are identified and teaching approaches developed so that strengths are used as vehicles for developing academic and real-life skills, students from all groups, including those considered to be "at-risk" experience greater success in school (Maker, 1992; Maker et al., 1996). Children and their teachers and caregivers develop more positive and realistic beliefs about their potential to succeed. When academic skills are taught within the context of real-world problem solving, these academic skills take on new meaning, and students perceive them as relevant.

A consistent message of school reform efforts is that students in America's schools must learn to think and solve problems rather than memorize facts and mindlessly apply algorithms. (National Academy of Sciences [NAS],

1996; National Council of Teachers of Mathematics [NCTM], 2000). A second consistent message is that a "constructivist" (rather than a "reductionist") approach is the most effective way to achieve the new national standards, and that certain key elements characterize this approach: (a) actively building new knowledge from experience and prior knowledge; (b) acquisition of higher-order thinking and problem-solving skills; (c) basic skills learned while undertaking higher-level, "real-world" tasks whose execution requires the integration of a number of skills; (d) information resources available to be accessed by the student at that point in time when they actually become useful in executing the task at hand; (e) fewer topics covered and explored in greater depth; and (f) students as active "architects" rather than passive recipients of knowledge (NAS, 1996; NCTM, 2000).

The DISCOVER curriculum is based on a constructivist philosophy, and involves using the principles of a good program for gifted students to enhance the learning and raise the standards for all students. Curricula and teaching strategies for gifted students are characterized by (a) integrated, interdisciplinary content; (b) higher-order thinking, appropriate pacing, self-directed learning, and complex problem solving processes; (c) development of unique products for real audiences; and (d) student interaction, interaction with experts, and learning environments with physical and psychological flexibility, openness, and safety. The environment is rich in resources, and the teacher usually acts as a guide rather than a dispenser of knowledge as the students make choices based on interest and ability (Maker, 1982; Maker & King, 1996; Maker & Nielson, 1995, 1996). These principles advocated for gifted programs characterize successful bilingual education programs (Cummins, 1984; Nieto, 1996; Ramirez, 1991; Tharp, 1989), effective schools (Heckman, 1996; Weissbourd, 1996), and early childhood programs incorporating developmentally appropriate practices (Bredkamp & Rosegrant, 1995; Maker & King, 1996). In addition to these principles, the DISCOVER curriculum model includes two other elements to broaden its applicability to students with diverse backgrounds and personal traits, including types of abilities. These two important elements are (a) arts integration, especially visual arts, music, creative dance/movement, and theater arts; and (b) development of a wide range of problem solving abilities.

Recommendations

There are several recommendations related to the DISCOVER model. Policy-Makers are urged to implement pilot programs in which the progress (success in the program or in regular classrooms) of students identified by various instruments is monitored, analyze these data, and report the results to others using or considering these instruments. Program Coordinators are asked to include many types of screening and referral procedures (such as performance-based measures like DISCOVER) to supplement teacher referral as a first step in deciding which children to test or examine further. An example of a recommendation for Principals is to interview or find other ways to elicit teacher statements or information to identify the beliefs of teachers, determine whether their views are consistent with the traditional or emerging paradigm, and initiate discussions and study groups to examine consistencies or discrepancies, and devise ways to resolve discrepancies. Teachers are urged to try the DISCOVER curriculum approach regardless of whether the school district implements the assessment.

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Instrument Bank . . . (continued from page 1)

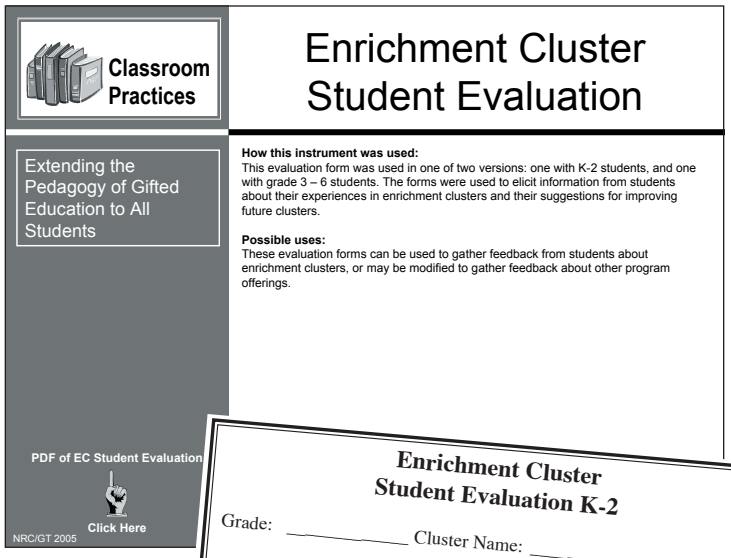
To enable more people access to instruments, we have created a NRC/GT Instrument Bank on a CD-Rom with 3 sections:

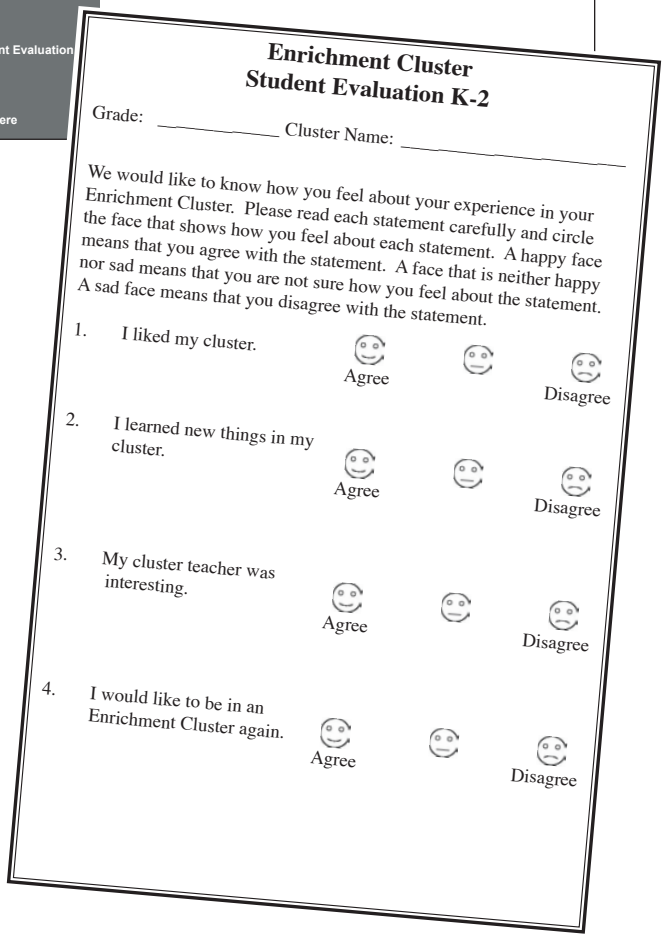
Section A: Identification
Section B: Special Populations
Section C: Classroom Practices

Each section includes the study's title, abstract, and the resulting implications, guidelines, conclusions, or recommendations. Details about the development of the instruments and reliability and validity studies also are available for many studies. Descriptions of how the instruments were used and suggestions for additional uses that may be appropriate for your own settings are provided.

The research study entitled *Extending the Pedagogy of Gifted Education to All Students* (Reis, Gentry, & Park, 1995) was designed to determine the impact of gifted education pedagogy with all students through a series of enrichment clusters. Enrichment clusters provide opportunities for students to come together to pursue advanced content through "inductive opportunities for multi-age, cross-grade student participation in open-ended investigations of student interests" (p. v). See recommendations resulting from this study and sample questions from the Enrichment Cluster Student Evaluation. The evaluation form may be used adopted or serve as a prototype for program offerings.

The NRC/GT Instrument Bank is a resource for your own questions about identifying and serving gifted and talented students. It also offers many prototypes for designing your own instruments responsive to local programs and services. It may be time to pose your own research and evaluation questions and the Instrument Bank will help you start the journey as you seek answers.





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