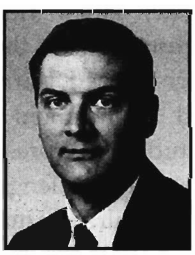
Optimal Development of Talent: Respond Educationally to Individual Differences in Personality

by David Lubinski and Camilla P. Benbow

School reform has permeated the educational system of the United States and has swept away much of the support and provisions for advanced students in U.S. schools. Current school reform initiatives are not attendant to the educational needs of this nation's most intellectually able students. In fact, most school reform is downright hostile to gifted children. Gregory Anrig, the late president of the Educational Testing Service, asserted that U.S. schools have devoted so much energy to bringing up the bottom that they have failed to challenge students at the top (Top Students 1991). Consequently, the achievement of the most able students in the United States not only lies significantly below their potential, but also lags far behind the achievement of their counterparts in other industrialized nations (IEA 1988; McKnight, Crosswhite, Dossey, Kifer, Swafford, Travers, and Cooney 1987). What can be

David Lubinski *is Associate Professor of Psychology at Iowa State University, where he directs its Psychometrics and Applied Individual Differences (PAID) division, and co-directs the Study of Mathematically Precocious Youth (SMPY).*



Camilla Persson Benbow *is Distinguished Professor and Chair of Psychology at Iowa State University, where she co-directs the Study of Mathematically Precocious Youth (SMPY) and the Office of Precollegiate Programs for Talented and Gifted (OPPTAG).*

done? How do we develop the talents of gifted children while maintaining equity? Based upon the long and celebrated history of individual differences research (Dawis 1992) from educational and vocational counseling (Brayfield 1950; Dawis and Lofquist 1984; Patterson 1938; Williamson 1939; 1965), we believe that optimal utilization of talent depends upon responding to individual differences in personalities. Specifically, children must be placed in educational environments that are congruent with, and build upon, their most salient abilities *and* preferences (Benbow and Lubinski 1994; in press; Lubinski and Benbow 1994; Lubinski, Benbow, and Sanders 1993; Stanley 1977). This approach, which is advocated by the Study of Mathematically Precocious Youth (SMPY) (Benbow and Lubinski 1994; in press; Stanley 1977), serves as the focus of this article.

We argue and present evidence that individuals possess certain attributes that make them differentially suited for excelling, with fulfillment, in contrasting educational and vocational tracks. That is, only a limited set of learning environments is educationally optimal for any one individual, even a gifted individual. Students, for example, put forth their best effort when they intrinsically enjoy what they are doing, and world-class achievement is most likely to develop when gifted individuals are allowed to pursue what they love at their desired pace. Indeed, learning can be optimized and achievement motivation enhanced if students are presented with tasks that are not only challenging (i.e., slightly above the level already mastered) but also personally meaningful to them (Lofquist and Dawis 1991).

This approach may appear to be at odds with providing broad educational experiences, an emphasis that many parents and educators embrace. Yet we do not see this as an either/or situation, but rather as a challenge to maintain an appropriate balance. Development of exceptional talent in engineering, for example, does not necessitate the removal of literature and philosophy from a mathematically talented student's curriculum. Nonetheless, there should be differential expectations on coursework concentrations and pace of mastering new content, and these expectations should be responsive to the strengths and relative weaknesses of students' abilities and preferences.

The idea is simple, but it goes against current practice. In our schools we tend to treat gifted students as a categorical type. People underappreciate the scope of individual differences among the gifted, across both preferences *and* abilities. Indeed, educators tend to provide the intellectually able with the "gifted program" treatment. Yet one school's gifted program cannot possibly meet all gifted students' needs. Rather, we must provide multiple options (Stanley 1977), which can then be used to tailor an educational program to the capabilities and preferences of each student. This philosophy—the SMPY philosophy—is analogous to many educational programs designed for children at the other end of the learning continuum (Thompson and Grabowski 1977).

Theoretical Basis

What is the basis for this approach to talent development? The conceptual framework for our philosophy draws on four theoretical perspectives (Dawis and Lofquist 1984; Stanley 1977; Tannenbaum 1983; Zuckerman 1977), while incorporating some of what is already known about the development of talent and personal preferences for contrasting educational/vocational paths (Benbow and Lubinski 1994; Lubinski and Benbow 1994). Primarily, our work at SMPY is based upon a well-established model of vocational adjustment—the Theory of Work Adjustment (TWA)—developed over the past 30 years (Dawis and Lofquist 1984; Lofquist and Dawis 1969; 1991). Although formulated to better understand adjustment in the world of work, this model can be readily extended to critical *antecedents* to vocational adjustment, such as choice of educational program. SMPY has, in fact, extended the model to explain just that—educational adjustment.

Current school reform initiatives are not attendant to the educational needs of this nation's most intellectually able.

According to TWA as it relates to educational adjustment, in order to ascertain the optimal learning environment for an individual, one must first parse the individual's academic personality *and* environment into two broad yet complementary subdomains. An individual's academic personality is primarily comprised of his or her (1) repertoire of abilities and specific skills and (2) personal preferences for content found in contrasting educational environments. On the other hand, different environmental contexts (i.e., educational curricula) are classified in terms of (1) their ability and/or skill requirements and (2) their capability to reinforce personal preferences. The optimal educational environments for an individual are those that engender two levels of correspondence: *satisfactoriness* and *satisfaction*. Satisfactoriness refers to correspondence between an individual's abilities and the ability requirements of a particular educational curriculum, whereas satisfaction denotes correspondence between an individual's preferences and the types of reinforcers provided by the environment. Good educational choices maximize both satisfactoriness and satisfaction and, consequently, the degree of commitment to one's chosen field.

An important implication of this model is that *both* abilities and preferences must be assessed *simultaneously* to ascertain the readiness of a given individual for a particular educational track. Similarly, components of the educational ecology—response requirements and reward systems—must be evaluated *simultaneously* to estimate whether both dimensions of correspondence are likely outcomes in that environment. Here it might be important to reiterate that optimal correspondence and, thus, personal fulfillment for any one individual, whether gifted or not, is likely to be found in only a few educational tracks. Individual differences function to differentially tailor people to enjoy and display competence in different subject matters.

Much has been said about the burden of multipotentiality for gifted individuals—namely, an overabundance of high flat ability/preference profiles. Yet, to our knowledge, the only empirical study ever designed to assess the prevalence of multipotentiality among the gifted population as a whole—not just those seeking help at counseling centers—seems to indicate that only a few gifted children have genuine multipotentiality issues (Achter, Lubinski, and Benbow in review). These investigators examined the ability, interest, *and* values profiles of more than 1,000 intellectually gifted (top 1 percent) adolescents, and found markedly differentiated profiles in *more than* 95 percent of their sample population.

It might be useful, at this point, to provide a practical illustration of TWA and its implications for talent development. Given the current popularity of and emphasis on engineering, we will focus on this educational choice. For the engineering disciplines, we know that the ability requirements involve especially high mathematical reasoning ability (Benbow and Arjmand 1990; Davis 1965; Green 1989; Krutetskii 1976; Kuhn 1970; Walberg, Strykowski, Rovai, and Hung 1984). Yet high spatial/mechanical reasoning abilities are also important, probably the second most critical personal attribute for satisfactoriness (Humphreys, Lubinski, and Yao 1993). High degrees of verbal ability are *relatively* less essential, but still important. In terms of preferences, investigative (scientific) and realistic (working with gadgets and things) are among the most salient vocational interests for gravitating toward educational environments in engineering, finding the content reinforcing for developing one's intellectual talent, and maintaining a commitment to it (Dawis 1991; Dawis and Lofquist 1984; Holland 1985; Lubinski and Benbow 1992; 1994; MacKinnon 1962; Roe 1953; Southern and Plant 1968). It should be emphasized that, in comparison to other physical sciences, engineering especially requires intense abilities and preferences for manipulating and working with sophisticated things and gadgets. In contrast, individuals with a pronounced need for people contact are not as readily reinforced in engineering, due to its content. Because these are the abilities and preferences important for academic adjustment in engineering, they must be assessed to ensure that they are in place for an individual considering this educational option (Lubinski et al. 1993).

It should be noted, however, that possessing this constellation of personal attributes (while rare) is still not sufficient for the manifestation of *exceptional* achievement in engineering, whether in school or professionally. That is even rarer. Truly exceptional achievement requires an intense commitment to the mastery of one's chosen discipline and substantial energy for work (Ericsson, Krampe, and Heizmann 1993; Simonton 1994). It also requires special encounters with the appropriate environment to facilitate the emergence of world-class achievement. We next turn our attention to this aspect, which is of unique importance for those working in the area of talent development.

Bloom (1985) noted, from his interviews with talented performers in a variety of disciplines, that special experiences—sometimes interventions—are important in their development. Moreover, in her analysis of Nobel laureates' careers, Zuckerman (1977) saw that their developmental paths fit well with the model of "the accumulation of advantage." That is, individuals who produce exceptional scientific advances almost universally show promise extremely early in their lives, and this evidenced precocity appears not only to respond to but also to create greater opportunities for intellectual development. For example, most Nobel laureates receive an advantage in graduate work by attending the most distinguished universities (10 universities produced 55 percent of the laureates) and by studying with the best minds of the day.

Tannenbaum (1983) postulated that great achievement results from a rare blend of superior general intellect, distinctive special aptitudes, the right combination of nonintellective traits, a challenging and supportive environment, *and* the smile of good fortune at crucial periods of life (e.g., the zeitgeist and chance factors). According to Tannenbaum, each of the five conditions is a necessary requisite for high achievement; none alone is sufficient to overcome inadequacies in the others. We have incorporated Tannenbaum's view into our theorizing on talent development. Specifically, we claim that, for the optimal development or actualization of talent to take place, not only must the individual possess the necessary personal attributes critical for success and satisfaction in the chosen educational track, but the person must also be provided with the opportunity to develop, seek out, and create an appropriate learning environment.[1] Certain quasi-thresholds across all components are vital, but not necessarily at comparable levels.

The practical implications of this perspective for talent development are that we must first identify the appropriate educational environment for the individual under consideration and, only then, attempt to arrange educational interventions congruent with the individual's abilities and preferences.

Acceleration: Enhancement of Satisfactoriness

There are many means for educational programs to enhance satisfactoriness. They tend to fall, however, into one of three broad categories: enrichment, acceleration, or homogeneous grouping. To provide a better fit between the individual's abilities and the learning environment, SMPY and others promote the use of acceleration alone or in combination with other enriching educational programs. The promoters of acceleration feel that the evidence is clear and has been clear for several decades: acceleration in subject matter and/or grade placement is a "best practice" (Benbow 1991; Boatman, Davis, and Benbow 1995), namely, an educational option included in a list of "what works" (U.S. Department of Education 1986). Because use of acceleration is often met with skepticism, despite an overwhelming volume of literature demonstrating its positive effects (Benbow 1991), we provide below a brief rationale for making acceleration a critical component of any talent-development initiative.

First, we shall discuss some of the practical benefits. Although it might be argued otherwise, but certainly not cogently so, acceleration is not a privileged intervention. Accelerated students do not receive services or participate in special opportunities that potentially might be beneficial to all students. In contrast, what acceleration provides gifted students is access to curricula at younger than typical ages. This "age" should approximately coincide with when the individual is ready for the advanced curricula. Acceleration also is cost-effective; it may actually save school dollars. Moreover, acceleration is often seen as an optimal method for serving gifted students living in rural or sparsely populated areas (Benbow, Argo, and Glass 1992; Howley 1989; Jones and Southern 1992). Further, acceleration may help talented individuals complete their education sooner as well as at a higher level. It may, therefore, add productive years to professional lives or afford opportunities to develop additional competencies and interests. Most importantly, however, acceleration rescues

[1]Explicating the following remarks is beyond the scope of this paper, but educators should be cognizant of the degree to which exceptional individuals actually seek out and create their environments. This is certainly apparent in Zuckerman's (1977) work. For the intellectually gifted, interventions frequently need only consist of providing the right kinds of learning *opportunities* for groups of "like-minded" (comparable abilities and preferences) peers. Psychological science has had a tendency to view students, as well as adults in the work force, as passive agents whose behaviors are products of their socialization environments. It appears, however, that many similar environments are *experienced* differently, depending on the dispositional attributes that individuals bring to them. Much evidence suggests that people gravitate toward dispositionally congruent environments, and shy away from settings discorrespondent with their basic abilities, skills, and preferences. See Scarr (1992; Scarr and McCartney 1983) for more detailed reading on this topic, and Scarr (in press) for implications for parents and policymakers.

gifted students from the boredom of insufficient challenges (Kulik and Kulik 1984; Stanley 1977).

More theoretically oriented justifications for acceleration should also be presented here, albeit briefly. First of all, acceleration is consistent with basic research findings that gifted students are precocious or developmentally advanced (Dark and Benbow 1990; 1991; 1994; Elkind 1988). Acceleration is also an educational practice consistent with theories of learning and achievement motivation (Benbow 1991). Learning is optimized, as is growth in achievement motivation, when the individual is presented tasks that match or slightly exceed capabilities (Dweck and Elliott 1983; Heckhausen 1982; Hunt 1961; Robinson 1983). Talent development proceeds from practice and mastery of increasingly more difficult and complex skills at an individual rate (Bloom and Sosniak 1981). Acceleration ensures that gifted students are presented with sufficiently difficult and complex tasks; and it is consistent with expectations derived from learning theory involving the concept of *shaping* (Lubinski and Thompson 1986; Thompson and Lubinski 1986).

Yet some would argue that, while acceleration may enhance the achievement motivation of gifted children, it may decrease the achievement motivation of their age-mates who become deprived of a role model due to the removal of gifted children from conventional classrooms. This belief is mistaken, however. Gifted students are not the academic role models of the more typical school students. Research has demonstrated that, academically, we pattern ourselves after individuals perceived to be similar to us, not those who demonstrate flawless performance (Bandura 1986). Nonaccelerated gifted students often do exhibit strong performance if they still can put forth the effort. One might even argue that removal of gifted pupils from regular classrooms could enhance achievement motivation of remaining students by increasing their academic self-efficacy (Kulik and Kulik 1982).

Although it is beyond the scope of this article, Benbow (1991) also reviewed some of the recent research in cognitive psychology to see if it could be a source of support for acceleration. Indeed it was. This research indicated that acceleration could have the potential of enhancing creativity, outstanding achievement, and higher-order thinking skills. Finally, but perhaps most interestingly, acceleration could even be seen as appropriate on social and emotional grounds—the very grounds often used to reject acceleration. Gifted students tend to be socially mature and to prefer older friends.

To summarize, acceleration can be justified on theoretical, practical, and empirical grounds. Yet its usage is not commensurate with the degree of empirical support it has gathered. This may be partly due to the fact that acceleration is a misnomer and is often misunderstood. Acceleration is simply deciding that competence rather than age—or mental age rather than chronological age—should be the criterion for determining when an individual obtains access to what subject matter or curricular experiences. It is simply developmental placement as endorsed by Elkind (1988).

What are the accelerative options? They include:

• early admittance to school (Proctor, Feldhusen and Black 1988);

• grade skipping (Feldhusen, Proctor, and Black 1986);

• early college entrances with or without the high school diploma (most high schools will award a high school diploma after completion of one year of college) (Brody and Stanley 1991; Eisenberg and George 1979; Janos, Robinson, and Lunneborg 1989; Robinson and Janos 1986; Stanley and Benbow 1983);

- a college early-entrance program such as Simon's Rock or the Texas Academy of Mathematics and Science (Stanley 1991);
- the International Baccalaureate (see description in Cox, Daniel, and Boston 1985);
- course-taking (e.g., Algebra 1) one or two years earlier than typical (Kolitch and Brody 1992);
- taking college courses on a part-time basis while in secondary school (Solano and George 1976);
- taking special fast-paced classes during the summer or academic year (Bartkovich and George 1980; Durden 1980; Lynch 1992; Stanley and Stanley 1986; Swiatek and Benbow 1991b; VanTassel-Baska 1983);
- completing two years of a subject in one year;
- compressing curricula;
- taking Advanced Placement (AP) courses and examinations (AP courses are college-level courses taught in high school, but may garner college credit for the student if final AP exam scores are sufficiently high) (Zak, Benbow, and Stanley 1983);
- individual tutoring in advanced subject matter (Stanley 1979);
- earning a master's degree simultaneously with the bachelor's degree;
- and joint B.A./M.D. or B.A./Ph.D. programs.

The goal is to develop a combination of accelerative options, enrichment, and out-of-school opportunities that reflects the best possible alternative for educating a specific child and, thereby, enhances satisfactoriness. Yet not only does acceleration enhance satisfactoriness, it also indirectly enhances satisfaction (Benbow, Lubinski, and Suchy in press).

Not allowing gifted children to accelerate appropriately, when they wish to, is simply educational malpractice.

Given the theory guiding this model of talent development, it would have been beneficial to have been able to provide an equally lengthy description of educational interventions aimed at enhancing TWA's satisfaction dimension commensurate with our discussion of satisfactoriness. Few are available. Educational and vocational counseling as part of academic programming is, however, one example, and is currently being systematically implemented by SMPY. Each student attending summer academic programs at Iowa State University has his or her abilities (mathematical, verbal, spatial, and mechanical) and preferences (vocational interests and values) assessed. Students are then counseled concerning the possible educational and vocational implications of their ability and preference profile. The aim is to inform parents and students and help them make better educational decisions. This approach seemed justified because it appears that salient features of adult vocational interest (Lubinski, Benbow, and Ryan 1995) and values (Schmidt, Lubinski, and Benbow under review) profiles are forecasted fairly well by age-13 assessments.

Empirical Support for the Talent Development Model

A frequent criticism of the U.S. educational system is that educators are far too eager to adopt new practices and procedures without carefully examining their research base. That is, we are attracted to fads (Dunnette 1966). The strength of the SMPY model of talent development *is* its research base, and a wealth of evidence to support its widespread adoption. A fair amount of this research comes from SMPY itself, which started at The Johns Hopkins University in 1971 and moved its principal aspects to Iowa State University in 1986.

SMPY is conducting a 50-year longitudinal study, involving 6,000 intellectually gifted individuals identified over 25 years and grouped into five cohorts (Lubinski and Benbow 1994). The long-term goal of this study is to develop a comprehensive, more refined understanding of the processes whereby precocious forms of intellectual talent develop into noteworthy forms of adult achievement and creative accomplishments. How various educational interventions or opportunities—such as acceleration and educational counseling—facilitate academic development and foster creativity are questions with special significance in SMPY's research. What are some findings?

Perhaps the most important finding is that it appears that we can identify at age 13 most students who have the potential to become our nation's great scientific achievers (Benbow 1992; Lubinski and Benbow 1992; 1994; Lubinski, Benbow, Eftekhari-Sanjani, and Jensen in preparation). Students labeled as mathematically talented on the basis of high SAT-M scores at age 13 do disproportionally enter careers in the math-science pipeline. Conversely, most students within the math-science pipeline in the elite graduate programs in the United States had, if they were tested then, high SAT-M scores at age 13 as well as later on. More specifically, we know that, among the gifted, those choosing to enter mathematics or the sciences as adults are those individuals who have especially strong mathematical reasoning and spatial abilities and investigative/realistic or theoretical interests and values, respectively (Lubinski et al. 1993). This holds for both genders and is consistent with the Theory of Work Adjustment.

We also have learned from longitudinal analyses that most mathematically talented students do seem to be successful in translating their potential into high academic achievement. At the end of high school and college, these students were high academic achievers (Benbow 1983; 1992; Benbow and Arjmand 1990; Lubinski and Benbow 1994). Moreover, there does not appear to be an ability threshold with respect to academic achievement. Longitudinal data have clearly demonstrated that those with the most ability tend to be the ones demonstrating the strongest record of academic achievement up to 10 years later (*cf.* Benbow 1992, for contrasts between the *top* quartile of the top one percent and the *bottom* quartile of the top one percent; Lubinski and Dawis 1992).

Although multiple studies have been conducted on the variety of acceleration options that SMPY has promoted with its participants (reviewed in Benbow 1991), we can summarize the results succinctly: when differences are found, they tend to favor the accelerates over the nonaccelerates irrespective of the mode of acceleration (Swiatek and Benbow 1991a; 1991b). In addition, students are satisfied with their acceleration in both the short- and long-term (Richardson and Benbow 1990; Swiatek and Benbow 1992). To our knowledge, not a single study has reported that acceleration produces long-term damage to gifted students. To the contrary, accelerated gifted students thrive, and those gifted students who are not accelerated exhibit lower achievement and more behavior problems, feel less comfortable in school, and have poorer attitudes (Benbow 1991).

Educational Malpractice

Gifted individuals will not achieve their potential unless provided with a challenging education—one at a pace commensurate with their ability level *and* pattern, *and* in areas that reinforce their personal preferences. Acceleration appears to be the method of choice for providing the necessary challenge (Benbow 1991), especially if used in conjunction with well-designed enrichment opportunities. Current reform efforts, however, seem bent on eliminating provisions or programs for the gifted, even if these interventions bear minimal costs. This can only result in loss of a precious resource within our society, given the positive outcomes of educational interventions (Kulik and Kulik 1982; 1984). As a nation, we can ill afford not to develop the talents of our most gifted children. We should devote at least as much attention to this as we do to athletics. What is the cost to society of the loss of an Edison, Ford, or Einstein? That cannot be determined. Yet we do know that the cost of providing future Edisons, Fords, or Einsteins with accelerative educational options is minimal and at no one else's detriment. Given the scientific evidence, we believe that not allowing gifted children to accelerate appropriately, when they wish to, is simply educational malpractice. It is akin to a physician electing not to use a scientifically proven medical treatment or drug because he or she did not personally believe in such therapy. If the patient died or suffered negative consequences because of this belief, the physician would be sued and certainly would lose in court. Are our schools opening themselves up for this possibility, too?

This review is based on previous work, most notably Benbow and Lubinski (1994 and in press).

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Never have I thought that I was the happy possessor of a "talent"; my sole concern has been to save myself by work and faith.

Les Mots (The Words), 1964

—Jean Paul Sartre
French philosopher and author, 1905–80