

# AN ANALYSIS OF GIFTED EDUCATION CURRICULUM MODELS

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Much of gifted education as a field rests on the approaches that are used to serve gifted students in schools and other contexts. Consequently, the importance of programmatic and curriculum models cannot be overestimated. The purpose of this chapter is to systematically review existing program/curriculum models in the field and to determine the evidence for their use and their effectiveness with gifted populations. Although originally conceived as a study more than a decade ago, the models contained herein have been updated with more recent research support as it has become available and as related work on appropriate curriculum for the gifted has been conceptualized.

## History of Curriculum Models

The history of curriculum development for the gifted has been fraught with problems, similar to the general history of curriculum development in this country. Some of the most successful curriculum models for gifted learners have been developed

based on acceleration principles for advanced secondary students (VanTassel-Baska, 1998). Many educators worldwide perceive the International Baccalaureate (IB) program and the College Board's Advanced Placement (AP) program as representing the highest levels of academic attainment available. These programs are thought to provide important stepping stones to successful college work because they constitute the entry levels of such work. Thus, one approach to curriculum development for the gifted may be seen as a "design down" model, where all curricula at the K–12 level are organized to promote readiness for college and the process is both accelerated and shortened along the way for the most apt.

Alternatives to this viewpoint abound, however, and tend to focus on learning beyond, or in lieu of, traditional academics. Most of the curriculum models cited in this chapter ascribe to an enriched view of curriculum development for the gifted, a view that addresses a broader conception of giftedness, taking into account principles of creativity, motivation, and independence as crucial constructs to the development of high ability. These enrichment views also tend to see process skills, such as critical thinking and creative problem solving, as central to the learning enterprise, with content choices being more incidental. Evidence of student work through high-quality products and performances also is typically highly valued in these models.

Most of the enrichment-oriented approaches to curriculum development for the gifted emanated from the early work of Hollingworth (1926) and her curriculum template for New York City's self-contained classes. Strongly influenced by Deweyan progressivism, she organized curriculum units that allowed students to discover connections about how the world worked and what the role of creative people is in societal progress by having students study biographies, and to promote the role of group learning through discussion and conversation about ideas. In some respects, contemporary curricular development efforts fall short of Hollingworth's early work in scope, purpose, and delivery.

Accelerative approaches to learning owe much to the work of Terman and Oden (1947), Pressey (1949), and early developers of rapid learning classes that enabled bright students to progress at their own rates. Early educational examples of autodidacticism and tutorials also encouraged a view of learning that promoted independent interest and a self-modulated pace (VanTassel-Baska, 1995). Thus, current curriculum models are grounded in a history of research, development, and implementation of both accelerative and enrichment approaches, typically used in self-contained classes because the level of content instruction could be modified based on the group. Chief differentiation approaches, early in the history of this field, incorporated attention to differences between gifted and non-gifted populations. One might argue that today's views of differentiation tend to center far more on individual differences among the gifted than on the group difference paradigm for curricula employed both in and out of school.

## Definition of a Curricular Model: Subjects for Analysis

One of the issues in the field of gifted education rests with the differences between a program model and a curricular model. Several of the models that were researched in this study could be said to cut both ways: They met the criteria for a curricular model, but they also worked as a broad program framework. Others were clearly developed with curriculum as the organizing principle. The operational definition of a curricular model used for the study was one that had the following components:

- » *A framework for curriculum design and development:* The model had to provide a system for developing and designing an appropriate curriculum for the target population. As such, it had to identify elements of such a design and show how these elements interacted in a curriculum product.
- » *Transferable and usable in all content areas:* The model had to be utilitarian in that it was easily applied to all major areas of school-based learning.
- » *K–12 applicability:* The model had to be flexible with respect to the age groups to which it would be applied. The central elements would have to work for kindergarten-age gifted children, as well as high school students.
- » *Applicable across schools and grouping settings:* The model had to have relevance in multiple locations and learning settings. It would need to work in tutorials, as well as large classes.
- » *Incorporates differentiated features for the gifted/talented learner:* The model had to spell out ways in which it responded to the particular needs of the gifted for curriculum and instruction.

If models met this definition, they were included in the study. Obviously, some well-known curricula such as *Man: A Course of Study* (Bruner, 1970) would be excluded because it was not developed with the target population in mind. Other curricular models would be excluded because they focused in one subject area only, such as *Philosophy in the Classroom* (Lipman, Sharp, & Oscanyan, 1980) or *Junior Great Books*. Still others might be excluded because they were limited to particular grade levels, such as AP or IB programs. Originally, 20 models were identified and then sifted according to the definitional structure, yielding 11 models for continued analysis.

### *Criteria Used to Assess Model Effectiveness*

At a second stage of the process, the researchers were interested in comparing the selected curriculum models according to criteria found in the curriculum literature to be important indicators of effectiveness. These criteria, taken together,

constituted the basis for yielding the overall effectiveness of the model. The criteria employed were:

- » *Research evidence to support use (student learning impact)*: Studies have been conducted to document the effectiveness of the curriculum with target populations.
- » *Application to actual curriculum (products in use)*: The model has been translated into teaching segments.
- » *Quality of curriculum products based on the model*: The curriculum products based on the model have been evaluated by appropriate audiences and show evidence of curriculum design features (goals, objectives, activities, assessment, and resources).
- » *Teacher receptivity*: Teachers have commented positively on the curriculum in implementation.
- » *Teacher training component for use of the model*: The model has a defined training package so that practitioners can learn how to implement it.
- » *Ease of implementation*: The model shows evidence of feasible implementation.
- » *Evidence of application of model in practice*: The model can be seen employed in various schools.
- » *Sustainability*: The model has been in operation in schools for at least 3 years.
- » *Systemic (operational in respect to elements, input, output, interactions, and boundaries)*: The model is definable as a system.
- » *Alignment or relationship to national standards*: The model has a defined relationship to the national content standards (e.g., American Association for the Advancement of Science, 1989, 1993; International Reading Association & National Council of Teachers of English, 1996; National Research Council, 1996).
- » *Relationship to school-based core curricula*: The model has a defined relationship to other curricular emphases in schools.
- » *Comprehensiveness*: The model applies broadly to all areas and domains of curricula and to all types of gifted learners at all stages of development.
- » *Evidence of scope and sequence considerations*: The model has been applied using a progressive development of skills and concept approaches.
- » *Longitudinal evidence of effectiveness with gifted students*: The model has evidence of effectiveness over at least 3 years with a given student cohort.
- » *Evidence of use in teacher-developed curricula (planning and organizing on paper)*: The model shows evidence of being used to organize a new curriculum that is teacher-developed.

## Methodology

The approach employed to carry out the study was organized around four phases. Phase I constituted the search for models that fit the definition described. Several comprehensive texts were reviewed for potential models. Moreover, additional searches were made in the broader literature. Once models were selected, Phase II constituted a review of both ERIC and Psychological Abstracts for research and program data about the models published from 1990 onward. The researchers determined that the models had to be contemporary and currently in use in order to be judged effective; therefore, models written about in roughly the last 20 years would be found in this limited year search. After such material was located for each model, it was decided to contact each model's developer to ensure that no available research or technical data had been overlooked. This phase of the study took 5 months, utilizing a written query followed up by a telephone call to nonrespondents. All developers were asked to corroborate the findings, using the same checklist of criteria described earlier. Three of the developers did not respond directly about their work. Several of the developers sent additional data and suggested changes in the rating of their work, based on this new information. The original developers' interpretations of the criteria for judgment of the work have been acknowledged in the text by the incorporation of key ideas and studies.

### *Limitations of the Study*

Although the curriculum study used established research procedures for investigation, there are clear limitations to the findings generated. No attempt was made to judge the technical adequacy of the various studies reported except where sample size or lack of comparison group was a clear problem. Consequently, meta-analytic techniques to arrive at effect sizes were not used, rendering the findings cautionary. A follow-up study still remains to be conducted on the seven models that have yielded research evidence to ascertain the integrity of the research designs and the power of the findings.

## Discussion

Each of the models is discussed in the following sections according to the criteria used to assess effectiveness. The two programmatic models are described first, those of Stanley and Renzulli, because both have defined the major program and curriculum efforts of the gifted education field since the mid-1970s, and both also represent the persistent programmatic division in the field between accelerative and enrichment approaches. Moreover, each of these models has more than a decade of research, development, and implementation behind it.

### *The Stanley Model of Talent Identification and Development*

The overall purpose of the Stanley model is to educate for individual development over the lifespan. Major principles of the model include (a) the use of a secure and difficult testing instrument that taps into high-level verbal and mathematical reasoning to identify students; (b) a diagnostic testing-prescriptive instructional approach (DT-PI) in teaching gifted students through special classes, allowing for an appropriate level of challenge in instruction; (c) the use of subject matter acceleration and fast-paced classes in core academic areas, as well as advocacy for various other forms of acceleration; and (d) curriculum flexibility in all schooling. The model has been developed at key university sites across the country with some adoptions by local school districts that have established fast-paced classes.

The Study of Mathematically Precocious Youth (SMPY) officially started in September of 1971 at Johns Hopkins University (JHU) and has been continued since 1986 at Iowa State University. From 1972 through 1979, SMPY pioneered the concept of searching for youth who reason exceptionally well mathematically (i.e., a talent search). In 1980, the talent search was extended to verbally gifted youth by others at JHU. For the students identified by the talent searchers, SMPY provided educational facilitation by utilizing acceleration or curricular flexibility and by developing fast-paced academic programs. Gifted students in seventh and eighth grade can participate in these talent searches by taking the SAT or the ACT. Almost 150,000 gifted students do so every year. These centers and other universities and organizations also offer residential and commuter academic programs in several disciplines to qualified students.

The research work of SMPY has been strong during the past four decades, with more than 300 published articles, chapters, and books about the model. Recent studies based on the SMPY longitudinal data highlight the creative output of the top 1% of the sample in comparison to less able cohorts, and the tilt of their profiles at seventh grade predicting future career clusters. Findings of these studies consistently have focused on the benefits of acceleration for continued advanced work in an area by precocious students (Stanley, Keating, & Fox, 1974), a clear rationale for the use of acceleration in intellectual development (Keating, 1976), and the long-term positive repeated impacts of accelerative opportunities (Benbow & Arjmand, 1990). Case study research also has been undertaken to demonstrate how these processes affect individual students (Brody & Stanley, 1991). Other studies have focused more specifically on student gains from fast-paced classes (Lynch, 1992). The use of the model has been extensive across all of the United States and in selected foreign countries. Curriculum materials have been developed by talent search staff at various sites and by individual teachers in the summer and academic year programs. Especially noteworthy are the curriculum guides for teaching Advanced Placement courses developed at the Talent Identification Program at Duke University. Strong use of articulated course mate-

rials are employed on the way to Advanced Placement coursework and testing in mathematics, science, and the verbal areas, including foreign language. These materials have been reviewed by practicing professionals and content specialists.

During the entirety of its years of operation, the model has been well received by parents and students who constitute the major client groups; schools have been less receptive based on their conservative attitudes toward accelerative practices and the emphasis on highly gifted students in subject areas.

The model does not have a formal training component, although selection of teachers is a rigorous process carried out carefully in each university and school setting. Content expertise and work with highly gifted secondary students are primary considerations for selection. The model is easy to understand but difficult to implement in schools based on prevailing philosophies. The application of the model that has been most successful is in afterschool and summer settings where students complete the equivalent of a high school honors class in 3 weeks.

The SMPY model has proven to be highly sustainable, exhibiting strong replication capacity. Even in countries that do not conduct talent searches, students from those countries routinely attend summer programs at talent search universities in the United States.

Because the model is content-based, it aligns well with the new Common Core State Standards (CCSS) in mathematics and English/language arts. The model also aligns well to the Next Generation Science Standards (NGSS). SMPY represents core curricula on an accelerated and streamlined level. The model is not totally comprehensive in that it addresses students in grades 3–12 who reason exceptionally well mathematically and verbally. Some studies on spatially gifted students at those levels also have been conducted and have been recommended, based on contemporary research on the helpfulness of knowing a student's spatial ability (Wai, Lubinski, & Benbow, 2009). Curriculum areas are comprehensive, including all of the 26 Advanced Placement course strands. Scope and sequence work has been articulated for grades 7–12 in some areas of learning. Northwestern University has developed a guide for educational options for grades 5–12 while Duke University has designed curriculum modules for online use that focus on topics that relate to the underlying abilities assessed on the SAT and other instruments calibrated to provide off-level assessment. A recent review of the data from talent search university summer programs continues to mount an impressive argument for the benefits that accrue to students in academic, social, and emotional areas of learning (Olszewski-Kubilius, 2006). A review of longitudinal studies on acceleration continues to demonstrate the positive results of accelerative practices and the lack of negative consequences, such as knowledge gaps or loss of interest (Swiatek, 2000).

Longitudinal data, collected during the past 20 years on 300 highly gifted students, have demonstrated the viability of the Stanley model in respect to the



benefits of accelerative study, early identification of a strong talent area, and the need for assistance in educational decision making (Lubinski & Benbow, 1994). A 50-year follow-up study (1972–2022) is in progress at Vanderbilt University with 6,000 students in the sample. This study already rivals Terman and Oden's (1947) longitudinal study with respect to its longevity and exceeds it with regard to understanding the talent development process at work.

In a recent 25-year follow-up study of these graduates, Park, Lubinski, & Benbow (2008) demonstrated that the talent search mechanism has been highly predictive of adult creative production at age 38. By analyzing the accomplishments of the top half of the top 1% in SAT scores and comparing them to those in the top 5%, they found significant differences in education levels, attendance at prestigious institutions, tenure levels at university, number of patents, number of books, and nature and extent of awards, favoring the most able students identified at age 13. Moreover, other analyses of this dataset have uncovered patterns of preferences for career fields that set the stage for outstanding accomplishment (Ferriman-Robertson, Smeets, Lubinski, & Benbow, 2013).

### *The Renzulli Schoolwide Enrichment Triad Model*

The Schoolwide Enrichment Model (SEM) evolved after 15 years of research and field testing by both educators and researchers (Renzulli, 1988). It combined the previously developed Enrichment Triad Model (Renzulli, 1977) with a more flexible approach to identifying high-potential students, the Revolving Door Identification Model (Renzulli, Reis, & Smith, 1981). This combination of services was initially field-tested in 11 school districts of various types (rural, suburban, and urban) and sizes. The field-tests resulted in the development of the SEM (Renzulli & Reis, 1985, 1997, 2014), which has been widely adopted throughout the country.

In the SEM, a talent pool of 15%–20% of above-average ability/high-potential students is identified through a variety of measures, including achievement tests, teacher nominations, assessments of potential for creativity and task commitment, as well as alternative pathways of entrance (e.g., self-nomination and parent nomination). High achievement test scores and IQ scores automatically include a student in the talent pool, enabling those students who are underachieving in their academic schoolwork to be considered.

Once students are identified for the talent pool, they are eligible for several kinds of services. First, interest and learning style assessments are used with talent pool students. Second, curriculum compacting is provided to all eligible students; that is, the regular curriculum is modified by eliminating portions of previously mastered content, and alternative work is substituted. Third, the SEM offers three types of enrichment experiences: Types I, II, and III. Type III enrichment usually



is more appropriate for students with higher levels of ability, interest, and task commitment.

Type I Enrichment consists of general exploratory experiences such as guest speakers, field trips, demonstrations, interest centers, and the use of audio-visual materials designed to expose students to new and exciting topics, ideas, and fields of knowledge not ordinarily covered in the regular curriculum. Type II Enrichment includes instructional methods and materials purposefully designed to promote the development of thinking, feeling, research, communication, and methodological processes. Type III Enrichment, the most advanced level of the model, is defined as investigative activities and artistic productions in which the learner assumes the role of a firsthand inquirer: thinking, feeling, and acting like a practicing professional, with involvement pursued at a level as advanced or professional as possible, given the student's level of development and age.

One comparative case study (Heal, 1989) examined the effects of SEM in relation to other enrichment models or strategies on students' perceptions of labeling. Other studies report results using within-model comparisons (Delisle, 1981; Reis, 1981) or the SEM program as compared to no intervention (Karafelis, 1986; Starko, 1986). Because control or comparison groups of students participating in alternate or comparison models were not used, it is difficult to attribute various results to participation in the SEM.

Evaluation studies have been conducted in 29 school districts on the perceptions of the model with parents, teachers, and administrators. Researchers documented positive change in teacher attitudes toward student work when the model is used.

Delcourt (1988) investigated characteristics related to creative/productive behavior in 18 high school students who consistently engaged in firsthand research on self-selected topics within or outside school. Starko (1986) also examined the effects of the SEM on student creative productivity. Results indicated that students who became involved in independent study projects in the SEM more often initiated their own creative products both in- and outside of school than did students in the comparison group. In addition, multiple creative products were linked to self-efficacy.

Several studies have examined the use of the model with underserved populations. Emerick (1988) investigated underachievement patterns of high-potential students. Baum (1985, 1988) examined highly able students with learning disabilities, identifying both characteristics and programmatic needs. Findings suggest positive effects of the model with these populations. Two authors (Ford, 1999; Johnson, 2000) have theorized about the use of the model with minority underachieving learners, suggesting its emphasis on creative thinking as an antidote to underachieving behavior.

Compacting studies have sought to document the fact that gifted students are capable of rapidly progressing through regular school curriculum in order to spend time on Type III project work. Results demonstrate knowledge scores that were as high or higher on in-grade standardized tests than noncompacted peers (Reis & Purcell, 1993). Another study demonstrated that students ( $N = 336$ ) utilizing curriculum compacting strategies resulted in no decline in achievement test scores (Reis, Westberg, Kulikowich, & Purcell, 1998).

Two SEM longitudinal studies (Delcourt, 1988; Hébert, 1993) have been conducted with 18 and 9 students, respectively. These studies showed that students in the sample maintained similar or identical career goals from their plans in high school, remained in major fields of study in college, and were satisfied in current project work. Moreover, the Type III process appeared to serve as important training for later productivity.

The SEM model is widely used in some form in schools nationally and internationally. Annual summer training on the model is available at the University of Connecticut. Renzulli perceives that the model is closely linked to core curricula, offers a scope and sequence within Type II activities, and has the potential to be aligned with new national standards. Both teachers and selected students are especially enthusiastic about the model. A special volume of the *Journal for the Education of the Gifted* was devoted to Renzulli's work, including the model, in 1999. In 1994, *Gifted Child Quarterly* published an article reviewing research related to the SEM spanning a period of 15 years.

More recent work on the use of the SEM model has been in the area of reading and mathematics education in Title I schools. Research on effective math interventions (Gavin et al., 2007) has suggested that the use of math materials that emphasize real-world problem solving and use the strategies that support this approach enhance learning at the elementary levels in low-income settings. Research on reading achievement with low-income students (Reis, Eckert, McCoach, Jacobs, & Coyne, 2008) has suggested that differentiated tasks can enhance fluency. These curricular emphases, along with others, have been incorporated into the work of the Renzulli Academy in an elementary school in Hartford, CT. In 2012, Renzulli received a grant award from the Jack Kent Cooke Foundation to replicate his Renzulli Academy program at other sites throughout the country.

### *The Betts Autonomous Learner Model*

The Autonomous Learner Model for the Gifted and Talented was developed to meet the diverse cognitive, emotional, and social needs of gifted and talented students in grades K–12 (Betts & Knapp, 1980). As the needs of gifted and talented students are met, the students will develop into autonomous learners who

are responsible for the development, implementation, and evaluation of their own learning. The model is divided into five major dimensions: (a) orientation, (b) individual development, (c) enrichment activities, (d) seminars, and (e) in-depth study.

One of the criteria used for assessing the appropriateness of a curriculum model is the evidence of research to support its use with gifted and talented learners. To date, no research evidence of effectiveness has been shown with regard to this model's student learning impact or longitudinal effectiveness with gifted learners; however, several curricular units and guides have been produced as a result of the dissemination of its ideas. One article reviewed and described the model by presenting guidelines for developing a process-based scope and sequence, as well as independent study programs for gifted learners (Betts & Neihart, 1986). The model also has been included in a volume on work with twice-exceptional gifted learners as a strong framework for programming for this population (Kiesa, 2000).

Regardless of the paucity of research on this model, it is one of the most widely recognized and used in the United States (Betts, 1986). Teachers have commented positively on its implementation. The model has been employed at selected sites in the United States and in other countries. Formal teacher training occurs in 3- and 5-day segments annually. Its design suggests a 3-year timeline for model implementation. It does contain a degree of comprehensiveness in that the model applies broadly to all curricular domains and ages of learners; however, it does not incorporate any features of accelerated learning, thereby limiting one aspect of its comprehensiveness.

### *Gardner's Multiple Intelligences*

Multiple intelligences (MI) as a curricular approach was built on a multi-dimensional concept of intelligence (Gardner, 1983). Seven areas of intelligence were defined in the original published work, with an eighth intelligence added by Gardner in 1999. They are (a) verbal/linguistic, (b) logical/mathematical, (c) visual/spatial, (d) musical/rhythmic, (e) bodily/kinesthetic, (f) interpersonal, (g) intrapersonal, and (h) naturalistic.

Evidence of research based on multiple intelligences translated into practice has been documented (Brand, 2006; Latham, 1997; Smith, Odhiambo, & El Khateeb, 2000; Strahan, Summey, & Banks, 1996). Most of the research, however, lacks control groups; therefore, generalizations about the model are difficult to infer (Latham, 1997). Longitudinal evidence of effectiveness with gifted students over at least 3 years has not been documented, although some research has been conducted on incorporating multiple intelligences with other forms of curricular models (Maker, Nielson, & Rogers, 1994).

The multiple intelligences approach has been used in the formation of new schools, in identifying individual differences, for curriculum planning and development, and as a way to assess instructional strategies. A plethora of curricular materials has been produced and marketed based upon MI theory. This approach holds widespread appeal for many educators because it can be adapted for any learner, subject domain, or grade level. The model is not easy to implement and does require teacher training, financial resources, and time. Best-known project sites for the model are the Key School in Indianapolis, IN, and the Atlas Project in New York City. Although the model has been readily adapted to curricula, it remains primarily a conception of intelligence applied broadly to school settings as a way to promote talent development for all learners.

Developer concerns about application fidelity of the ideas and variability in implementation quality are strong, leading to a new project specifically designed to monitor implementation of MI in classrooms nationally where positive impacts have been reported (Gardner, 1999). Newer studies still lack quality control in data collection in order to make valid empirical inferences about the value of the model.

### *The Purdue Three-Stage Enrichment Model for Elementary Gifted Learners and The Purdue Secondary Model for Gifted and Talented Youth*

The concept of a three-stage model, initiated by Feldhusen and his graduate students, was first introduced as a course design for university students in 1973. It evolved into the Three-Stage Model by 1979. It is primarily an ordered enrichment model that moves students from simple thinking experiences to complex independent activities (Feldhusen & Kolloff, 1986):

- » Stage I focuses on the development of divergent and convergent thinking skills,
- » Stage II provides development in creative problem solving, and
- » Stage III allows students to apply research skills in the development of independent study skills.

The Purdue Secondary Model is a comprehensive structure for programming services at the secondary level. It has 11 components supporting enrichment and acceleration options, with each component designed to act as a guide for organizing opportunities for secondary gifted students. They are (Feldhusen & Robinson-Wyman, 1986):

- » counseling services,
- » seminars,
- » Advanced Placement courses,

- » honors classes,
- » math/science acceleration,
- » foreign languages,
- » arts,
- » cultural experiences,
- » career education,
- » vocational programs, and
- » extraschool instruction.

Research has documented gains with regard to enhancement of creative thinking and self-concept using the Three-Stage Enrichment Model for Elementary Gifted Students (Kolloff & Feldhusen, 1984), and one study was conducted documenting limited long-term gains of the elementary program (Moon & Feldhusen, 1994; Moon, Feldhusen, & Dillon, 1994).

The application and implementation of either the elementary or secondary models are not conclusive, yet they appear to be sustainable (Moon & Feldhusen, 1994). Teacher training has accompanied the site implementation of both the elementary and secondary models; however, it is difficult to ascertain the degree of widespread application beyond Indiana. Neither model utilizes a scope and sequence, and neither may be viewed as a comprehensive model in terms of applying broadly to all areas of the curriculum, all types of gifted learners, or all stages of development.

### *The Kaplan Grid*

The Kaplan Grid is a model designed to facilitate the curriculum developer's task of deciding what constitutes a differentiated curriculum and how one can construct such a curriculum. The model uses the components of process, content, and product organized around a theme. *Content* is perceived to be the relationship between various displays of power and the needs and interests of individuals and groups, including societies (Kaplan, 1986). The *process* component utilizes productive thinking, research skills, and basic skills. The *product* component culminates the learning into a mode of communication.

Research evidence could not be found to support the effectiveness of this model with a target population. The quality of the curricular products that have been produced based upon this model has not been reported in the literature; however, there has been extensive implementation of the approach at both state and local levels.

Teacher training has been conducted throughout the United States, initially through the National/State Leadership Training Institute and now independently by the developer so that practitioners can learn how to implement it. Thousands

of teachers have developed their own curricula based upon the model. The grid is intended as a developmental framework for curriculum planning for gifted learners, but it does not contain a scope and sequence. Additionally, within the model itself, no provisions are explicitly made for accelerated learning.

### *The Maker Matrix*

The Maker Matrix, developed to categorize content, process, environmental, and product dimensions of an appropriate curriculum for the gifted, represents a set of descriptive criteria that may be used to develop classroom-based curricula (Maker, 1982). Additional work on the model primarily represents an enhancement of its problem-solving component. The Discover project is a process for assessing problem solving in multiple intelligences. The problem-solving matrix incorporates a continuum of five problem types for use within each of the intelligences (Maker et al., 1994):

- » Type I and II problems require convergent thinking;
- » Type III problems are structured but allow for a range of methods to solve them and have a range of acceptable answers;
- » Type IV problems are defined, but the learner selects a method for solving and establishing evaluation criteria for the solution; and
- » Type V problems are ill-structured, and the learner must define the problem, discover the method for solving the problem, and establish criteria for creating a solution.

The project typically is used by teachers for curricular planning and assessing a learner's problem-solving abilities.

Research on problem types currently is underway involving 12 classrooms in a variety of settings; however, to date, the results have not been published. A pilot study has shown that use of the matrix enhances the process of problem solving (Maker, Rogers, Nielson, & Bauerle, 1996). Studies to evaluate the long-term validity of the process are in progress.

School systems in several states have applied the matrix as a framework for organizing and developing classroom-level curricula. There is evidence of an individual teacher-developed curriculum, and teachers have been receptive to its use. Some training exists for its application. The sustainability of the matrix model for at least 3 years is not known. It is not comprehensive in nature, yet it does have a strong emphasis in its relationship to core subject domains.

### *The Meeker Structure of Intellect Model*

The Structure of Intellect model (SOI) for gifted education was based upon a theory of human intelligence called the Structure of Intellect developed by

Guilford (1967). SOI describes 90 kinds of cognitive functions organized into content, operation, and product abilities. SOI applies Guilford's theory into the areas of assessment and training. The model is definable as a system and applies broadly to all types of gifted learners at varying developmental stages, but due to its comprehensiveness and emphasis on cognition, only a few sites have actually implemented the model. Those sites have used it for identifying students or for training teachers to view intelligence as a nonfixed entity.

Studies of the model do not include effectiveness data (Meeker, 1976); rather, they primarily focus on findings for its use as identification criteria, as a means for organizing information about a gifted child, or as a means for overall program design. SOI has been used successfully in selected sites for identification with culturally diverse students (Hengen, 1983) and preschool screening for multiethnic disadvantaged gifted students (Bonne, 1985).

Although now dated, SOI offered a means of understanding students by delineating profiles of their intellectual abilities. It contained a teacher-training component that used teacher modules designed to train one SOI ability at a time. Training materials included mini-lesson plans for group teaching and self-help modules for individualized instruction with selected students (Meeker, 1969).

### *The Parallel Curriculum Model*

The Parallel Curriculum Model (PCM) is a model for curricular planning based upon the composite work of Tomlinson and colleagues (2002). The heuristic model employs four dimensions, or parallels, that can be used singly or in combination: the core curriculum, the curriculum of connections, the curriculum of practice, and the curriculum of identity.

The PCM assumes that the *core curriculum* is the basis for all other curricula and it should be combined with any or all of the three other parallels. It is the foundational curriculum that is defined by a given discipline. National, state, and/or local school district standards should be reflected in this dimension. It establishes the basis of understanding within relevant subjects and grade levels. The second parallel, the *curriculum of connections*, supports students in discovering the interconnectedness among and between disciplines of knowledge. It builds from the core curriculum and has students exploring those connections for both intra- and interdisciplinary studies. The third parallel, the *curriculum of practice*, also derives from the core curriculum. Its purpose is to extend students' understandings and skills in a discipline through application. The curriculum of practice promotes student expertise as a practitioner of a given discipline. The last parallel, the *curriculum of identity*, serves to help students think about themselves within the context of a particular discipline—to see how it relates to their own lives. The curriculum of identity uses curriculum as a catalyst for self-definition



and self-understanding. The authors suggest that the level of intellectual demand in employing all or elements of the PCM should be matched to student needs.

To date, no research-based evidence of effectiveness has been shown with regard to this model's use with gifted or nongifted learners; however, several curricular units and guides have been produced as a result of a wide dissemination effort by the National Association for Gifted Children (NAGC). Additionally, the creation of curricular units currently is being designed by practitioners at various levels and guided by authors of the model. The model holds appeal for many educators because it can be adapted for any learner, subject domain, or grade level. The model, although flexible, is not easy to implement and does require a degree of teacher training. Professional development on the implementation of the PCM typically requires 2 days and may be adjusted depending on the needs of the employing school district. Implementation sessions have been offered for both regular classroom use, as well as a series of "trainer of trainer" offerings, sponsored by NAGC.

### *The Schlichter Models for Talents Unlimited Inc. and Talents Unlimited to the Secondary Power*

Talents Unlimited was based upon Guilford's (1967) research on the nature of intelligence. Taylor, Ghiselin, Wolfer, Loy, & Bourne (1964), also influenced by Guilford, authored the multiple talent theory, which precipitated the development of a model to be employed in helping teachers identify and nurture students' multiple talents. Talents Unlimited features four major components (Schlichter, 1986):

- » a description of specific skill abilities, or talents, in addition to academic ability that include productive thinking, communication, forecasting, decision making, and planning;
- » model instructional materials;
- » an in-service training program for teachers; and
- » an evaluation system for assessing students' thinking skills development.

Talents Unlimited Inc. is the K–6 model, and Talents Unlimited to the Secondary Power is a model for grades 7–12.

Research has documented gains using the model in developing students' creative and critical thinking (Schlichter & Palmer, 1993), and Rodd (1999) used action research to demonstrate the model's effectiveness in an English setting with young children. Additionally, there is evidence that the use of the model enhances academic skill development on standardized achievement tests (McLean & Chisson, 1980); however, no longitudinal studies have been conducted.

Staff development and teacher training constitute a strong component of the model. Teachers may become “certified” as Talents Unlimited trainers. Due to the strong emphasis on teacher training, Talents Unlimited has widespread applicable student use across the United States and worldwide. Part of its implementation success came as a result of funding and membership in the U.S. Department of Education’s National Diffusion Network.

The model has been used most effectively as a classroom-based approach with all learners, thus rendering it less differentiated for the gifted in practice than some of the other models.

### *Sternberg’s Triarchic Componential Model*

Sternberg’s Triarchic Componential Model is based upon an information processing theory of intelligence (Sternberg, 1981). In the model, three components represent the mental processes used in thinking. The executive process component is used in planning, decision making, and monitoring performance. The performance component processes are used in executing the executive problem-solving strategies within domains. The knowledge-acquisition component is used in acquiring, retaining, and transferring new information. The interaction and feedback between the individual and his or her environment within any given context allows cognitive development to occur.

An initial study has shown the effectiveness of the triarchic model with students learning psychology in a summer program (Sternberg & Clinkenbeard, 1995). More recent work has been conducted in studies using psychology as the curriculum base with larger samples of students. Students continue to show growth patterns when assessment protocols are linked to measuring ability profiles (Sternberg, Ferrari, Clinkenbeard, & Grigorenko, 1996). Primary to these studies is the validation of the Sternberg Triarchic Abilities Test (STAT) and its utility for finding students strong on specific triarchic components. Other studies (Grigorenko, Jarvin, & Sternberg, 2002; Sternberg, Torff, & Grigorenko, 1998a, 1998b) focus on the use of triarchic instructional processes in classrooms at the elementary and middle school levels. Results suggest slightly stronger effects for triarchic instruction over traditional and critical thinking approaches. Descriptions of teacher-created curricula and instructional instrumentation processes were limited but clearly are organized along discipline-specific lines of inquiry. Sustainability of the curriculum model beyond summer program implementation and pilot settings is not known.

There is not a packaged teacher training or staff development component, in part because the model is based upon a theory of intelligence rather than a deliberate curriculum framework. It is a systemic but not a comprehensive model with some applications in selected classrooms.

### *VanTassel-Baska's Integrated Curriculum Model*

The VanTassel-Baska (1986) Integrated Curriculum Model (ICM) was specifically developed for high-ability learners. It has three dimensions: (a) advanced content, (b) high-level process and product work, and (c) intra- and interdisciplinary concept development and understanding. VanTassel-Baska, with funding from the Jacob K. Javits Program, used the ICM to develop specific curricular frameworks and underlying units in language arts, social studies, and science.

Research has been conducted to support the effectiveness of these curricular units with gifted populations within a variety of educational settings. Specifically, significant growth gains in literary analysis and interpretation, persuasive writing, and linguistic competency in language arts have been demonstrated for experimental gifted classes using the developed curricular units in comparison to gifted groups not using them (VanTassel-Baska, Johnson, Hughes, & Boyce, 1996; VanTassel-Baska, Zuo, Avery, & Little, 2002). Other studies have shown that using the problem-based science units embedded in an exemplary science curriculum significantly enhances the capacity for integrating higher order process skills in science (VanTassel-Baska, Bass, Ries, Poland, & Avery, 1998), regardless of the grouping approach employed.

Findings from a 6-year longitudinal study that examined the effects over time of using the William and Mary language arts units for gifted learners in a suburban school district suggest that gifted student learning in grades 3–5 was enhanced at significant and educationally important levels in critical reading and persuasive writing. Repeated exposure over a 2–3 year period demonstrated increasing achievement patterns, and the majority of stakeholders reported the curriculum to be beneficial and effective (Feng, VanTassel-Baska, Quek, Bai, & O'Neill, 2005). An earlier study had documented positive change in teacher attitude, student motivational response, and school and district change (VanTassel-Baska, Avery, Little, & Hughes, 2000) as a result of using the ICM science and language arts curricula over 3 years.

A subanalysis of the language arts data across settings suggested that it is successful with low-income students, can be used in all grouping paradigms, and that learning increases with multiple units employed (VanTassel-Baska et al., 2002).

Research on the use of the social studies units suggested that unit use significantly impacts critical thinking and content mastery, using comparison groups (Little, Feng, VanTassel-Baska, Rogers, & Avery, 2007). Moreover, positive changes in teacher behaviors for using differentiated strategies were noted in this study as well.

Teacher training and development in the use of specific teaching models is an integral component of the ICM model. Training workshops have been conducted in 30 states, and The College of William and Mary Center for Gifted Education offers training annually. There is a strong relationship to core subject domains,

as well as national standards alignment. The curricula based on the model was developed using the national standards work as a template. Alignment charts have been completed for national and state standards work in both language arts and science.

The ICM units are moderately comprehensive in that they span grades K–10 in language arts and K–8 in science. Social studies units are now available for grades 2–10 as well. Selected units of study in math are now available in grades 3–8. The ICM model has been used for specific school and district curriculum development and planning in Australia, Canada, New Zealand, Japan, Korea, and Taiwan, as well as selected districts in the United States and international schools abroad.

There is evidence of broad-based application, but some questions remain regarding the ease of implementation of the teaching units, and the fidelity of implementation by teachers remains an area of concern in many settings. Some districts use the units as models for developing their own curricula. The developer reported that 100 school districts are part of a National Curriculum Network using multiple content area units. Data on student impact have been collected from more than 150 classrooms nationally.

More recent Javits grants assessed the effectiveness of the ICM units in language arts at the elementary level and science at the primary level with low-income learners in Title I schools using critical thinking as one outcome variable of interest. In Project Athena, the language arts program, findings on both student learning and teacher learning appeared promising. Experimental students did significantly better than control students in both critical thinking and comprehension with all groups registering significant growth gains from using the curriculum regardless of ability, gender, or ethnic background (VanTassel-Baska, Bracken, Feng, & Brown, 2009). Experimental teachers scored significantly higher on both the frequency of use and effective use of differentiated strategies across 2 years. Growth gains for teacher use of differentiation strategies remained stagnant in the third year. Also of note, experimental teachers who had used the curriculum for 2 years and received commensurate training demonstrated significantly enhanced use of differentiated strategies over first-year experimental teachers (VanTassel-Baska et al., 2008).

As an outgrowth of Project Athena, *Jacob's Ladder*, a reading comprehension program intended to move students from lower order to higher order thinking skills in the language arts (VanTassel-Baska, Stambaugh, & French, 2004), was designed and developed for use in Title I schools. Supporting the implementation of the program was a series of workshops to aid teachers in implementation. Two studies support the use of *Jacob's Ladder* with students from low-income backgrounds (French, 2006; Stambaugh, 2007), suggesting growth in critical thinking and reading comprehension as well as enhancing interest in the reading process.

In another Javits grant that used the William and Mary language arts units, results suggested that enhanced learning also accrued for both teachers and students (Swanson, 2006).

Project Clarion, the primary science program, has produced important findings that relate to several areas of interest. Student learning gains have been strong, with students demonstrating critical thinking increases, science achievement increases, and science concept learning gains. Using quasi-experimental designs, the project has demonstrated significant and important learning gains in these dimensions with effect sizes ranging from .3–.6 (Kim et al., 2012). Additionally, teachers have demonstrated learning gains in using differentiation strategies in key areas that include critical thinking, creative thinking, and accommodation to individual differences (Stambaugh, Bland, & VanTassel-Baska, 2010; VanTassel-Baska, 2013a). Two other Javits grants also used the science units from Project Clarion with strong results, especially for enhancing the teaching of science at the primary levels.

Studies of effectiveness are ongoing in classrooms nationally. The curricula are reported to be used in all 50 states. Internationally, the model is being used in multiple countries as a model for design and development of quality curriculum for the gifted.

## Key Findings

An important part of the curricular model analysis also was to compare the models to one another, using the same criteria as the basis for comparison. Some models were more organizational than curricular in nature, which helps teachers get started on differentiation in their classroom; others were more programmatic in nature and were intended as a defining framework in schools. Examples of the former were the Kaplan Grid and the Maker Matrix, both heavily used by practitioners as designs for teacher-made materials. No studies of effectiveness have been conducted to date, however, to show the benefits of such models in practice with gifted learners. The Tannenbaum model, dropped at the second level of analysis, exemplified the programmatic framework model as a supraorganizer at the school level, but not at the level of curriculum units or courses of study. Regrettably, no studies or evidence of application were found.

Only seven models showed evidence of having been the focus of research studies. Of those, six of the models employed comparison groups where treatment might be attributed to the curricular or instructional approach employed. The Stanley, SEM, Feldhusen, ICM, Sternberg, and Talents Unlimited models all have some evidence of effectiveness with gifted populations in comparison to other treatments or no treatments. Although the Talents Unlimited Model has some

evidence of effectiveness, much of the research base is on nongifted populations. In recent years, there is also evidence that some of these models continue to be actively employed by schools, based on the work of the primary developer and his or her associates, with new curriculum being subjected to efficacy studies. The models that fit that description are the SEM and the ICM. The model for talent search and development originated by Stanley continues to provide important insights on the talent development process longitudinally, going well beyond the other models described in terms of greater utility to the field of gifted education beyond curriculum.

Evidence for the translation of these curricular models into effective practice varies considerably. Seven models have training packages that provide staff development for implementation, whereas only four models explicitly consider scope and sequence issues. Betts and Renzulli consider scope and sequence within their models. For Betts, it is in the movement from one stage to another; for Renzulli, it occurs within Type II activities. Stanley and ICM both have developed scope-and-sequence models linked to Advanced Placement work. More recent work has focused on the design of talent trajectories that suggest curricular interventions for gifted learners at different stages of development, cutting across the use of models (VanTassel-Baska, 2013b).

Data on curricular and instructional practices with the gifted clearly favor advanced work in the subject areas of language arts, science, and mathematics, although the approach to content acceleration may vary. Although both the Stanley and ICM models have elements of acceleration within them, only the Stanley model has empirically demonstrated the clear impact of accelerated study on learning over time.

Curricula organized around higher order processes and independent study have yielded few studies of student impacts, nor are the findings across studies consistent. Even longitudinal studies, such as those of Feldhusen and the SEM, have produced limited evidence of outcomes relevant to clear student gains. Limited sample size and other confounding variables, such as lack of comparison groups, also render these studies less credible.

## Conclusions

A strong body of research evidence exists supporting the use of advanced curricula in core areas of learning at an accelerated rate for high-ability learners. Some evidence also exists that more enrichment-oriented models are effective. This conclusion has not changed much in the past 30 years (Colangelo, Assouline, & Gross, 2004; Daurio, 1979). Moreover, meta-analytic studies continue to confirm the superior learning effects of acceleration over enrichment in tandem with

grouping the gifted (Kulik & Kulik, 1993; Rogers, 2002; Swiatek, 2000). In comparison to other strategies, such as independent study, various modes of grouping, and problem solving, acceleration not only shows performance gains but also has a powerful treatment effect, meaning that the gains are educationally, as well as statistically, significant (Walberg, 1991). Despite the lack of convincing research to support their use, several of the enrichment models enjoy widespread popularity and are used extensively in schools.

### *General Implications*

Several implications might be drawn from these findings, related to both research and practice in gifted education. Too frequently, it is assumed that if a model is written about and used enthusiastically, such popularity is sufficient for proclaiming its effectiveness. Nothing could be further from the truth. Research-based practice is critical to defensible gifted programs; therefore, practitioners must proceed carefully in deciding on curricula for use in gifted programs. The evidence strongly suggests that content-based accelerative approaches should be employed in any curriculum used in school-based programs for the gifted and that schools need to apply curricular models faithfully and thoroughly in order to realize their potential impacts over time.

In the area of research, it is clear that there is a limited base of coherent studies that can make claims about the efficacy of enriched approaches to curriculum for the gifted. Thus, an important direction for future research would be to conduct curricular intervention studies testing these models, as well as to replicate existing studies, in order to build a base of deeper understanding about what works well with gifted students in school programs. More research on differential student learning outcomes in gifted programs using different curricular approaches clearly needs to be undertaken.

### *Implications for Schools*

Decisions about curricular approaches and their implications for classrooms need to be made with a sense of what works for our best learners in schools. This chapter has delineated a set of criteria for considering the state of the art in curricular interventions for gifted learners. These criteria are important considerations for schools in making curricular decisions. The fundamental questions upon which schools need to focus are:

- » Do gifted students show evidence of learning as a result of the curricular approach? What is the nature and extent of the evidence and how credible is it?
- » Are differentiated classroom materials available to use in implementation?
- » Is training in the use of differentiated curricular materials available for school staff?



## Teacher Statement

I first read this chapter during a time when I was both working with elementary gifted and talented students and pursuing a master's degree in education with a specialization in gifted and talented education. This chapter was one of many assigned from the previous edition of this text for a graduate course that covered various instructional strategies and models implemented in gifted education programs.

I found the chapter to be helpful because it provided a clear and concise overview of the most widely used program and curriculum models in the field of gifted education. Specifically, it emphasized the research evidence for each of the models discussed and their effectiveness with gifted students. The evidence presented in this chapter contributed positively to my instructional decision-making process by influencing me to incorporate more accelerative curriculum and instructional strategies related to student ability and interests.

This chapter also emphasized the caution with which educators should embrace new models and theories. After reading this chapter, I became more aware of and interested in the research behind instructional strategies and curriculum materials I incorporate into teaching. It encouraged me to ask for more evidence of effectiveness with gifted students or appropriateness for meeting the needs of gifted students.

I recommend this chapter to all educators in the field of gifted education, as well as parents and others interested in the program and curricular models used in a community's gifted education program. The authors provide useful information about prominent models used in the field of gifted education as well as guidelines and procedures for evaluating other programs and curricular models that might be implemented with gifted students.

—Bess B. Worley II

### DISCUSSION QUESTIONS

1. Based on research evidence, what models appear to be most successful?
2. What models appear to work with special populations? Why?
3. What models lack research studies of effectiveness?
4. Why do you think the research base is so limited on curricular interventions with gifted students?
5. What features across models are critical to employ in a curriculum, according to your understanding of their characteristics and needs?
6. How can professional development in the field become more influential in helping curricular models become institutionalized?

## Teacher Resources

### Websites

*Schoolwide Enrichment Model*—<http://www.gifted.uconn.edu/sem>

*Integrated Curriculum Model (ICM), College of William and Mary, Center for Gifted Education*—<http://www.cfge.wm.edu>

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