CHAPTER 11

ACADEMIC TALENT DEVELOPMENT: THEORY AND BEST PRACTICES

Françoys Gagné

INTRODUCTION

For most people, talent development is the implementation of specific resources aimed at fostering the growth of outstanding performances in specific occupational fields: natural and social sciences, technology, visual and performing arts, health and education, commerce, sports, and so forth. Considering this handbook focuses on the field of gifted education, this chapter similarly adopts as its focus the emergence of outstanding school achievements, from kindergarten forward. I analyze academic talent development (ATD) from two distinct perspectives: theoretical and practical. Each of these perspectives can be circumscribed by the following questions. Which personal and contextual causal influences contribute significantly to the emergence of excellence in school subjects? Which educational resources will maximize the transformation of outstanding aptitudes into academic excellence? These two questions will guide the contents of this chapter.

Circumscribing the Target Concept

Talent development is not a new concept in gifted education, but it gained some recent popularity as a label for many conceptual models aiming to explain the emergence of talents, as well as some programmatic resources. Indeed, a few decades ago, the talent development label was not included in the titles of books or chapters, or in subject indexes (e.g., Barbe & Renzulli, 1975; Passow, 1979). The term became increasingly common in the 1980s, helped possibly by the immense popularity of Benjamin Bloom's (1985) *Developing Talent in Young People*. Soon after, Renzulli and Reis (1991) ended a politically oriented article with the following statement: "Talent development is the 'business' of our field, and we must never lose sight of this goal, regardless of the direction that reform efforts might take" (p. 34). Unfortunately, they did not define that key term. In the 1990s, the number of publications that included talent development in their title grew steadily. For instance, the administrators of the Belin-Blank Center at the University of Iowa used it in the title of their series of proceedings from the biennial Wallace symposia (e.g., Colangelo & Assouline, 2001), and John Feldhusen (1992) named his theoretical model talent identification and development in education. A cursory look at the tables of contents and subject indexes of recent handbooks (Balchin, Hymer, & Matthews, 2009; Callahan & Hertberg-Davis, 2013; Colangelo & Davis, 2003; Dixon & Moon, 2006; Kerr, 2009; MacFarlane & Stambaugh, 2009; Plucker & Callahan, 2008; Renzulli, Gubbins, McMillen, Eckert, & Little, 2009; Shavinina, 2009; Sternberg & Davidson, 2005) confirms the term's more frequent use in academia. Some scholars have argued that the growing popularity of the term talent development marked a major paradigmatic change. For instance, Olszewski-Kubilius (2009) stated,

> In 1983, when I entered the field of gifted education, there was a paradigm shift occurring. People were beginning to use the term talent development and,

http://dx.doi.org/10.1037/0000038-011
APA Handbook of Giftedness and Talent, S. I. Pfeiffer (Editor-in-Chief)

> in fact, my center at Northwestern University was one of the first to incorporate the term into our title—The Center for Talent Development, or CTD. This was not just semantics, although it may have appeared so to outsiders, but indicative of an important conceptual shift in thinking among leaders in the field of gifted education and those who studied exceptional ability. (p. 81)

Unfortunately, Olszewski-Kubilius did not specify the nature of that conceptual shift. In a similar vein, Brody (2009) affirmed the following:

> More recently, we have seen a shift in our field away from a focus on "gifted education" to one on "talent development," with the new terminology reflecting a growing realization that using a measure of general intellectual ability as a sole predictor of achievement is not adequate. (pp. 93–94)

Again, we are left in the dark as to the exact relationship between the two halves of that sentence. Despite its increased use, the long-term developmental process that leads to academic excellence has remained without clear definitional and descriptive resource parameters until recently (see Gagné, 2011). This is my focus in the second half of this chapter.

Importance and Uniqueness of This Chapter

The title of this handbook implies that the labels *giftedness* and *talent* stand for two distinct concepts. Yet, according to most of its 43 chapters, this is not the case. In fact, most contributing authors share a somewhat common view typified by the following semantic and conceptual characteristics:
(a) Contributing authors avoid discussion of possible differentiated meanings between the labels giftedness and talent. (b) The label giftedness appears much more frequently than the label talent; in fact, as shown in many chapter titles, this handbook targets gifted students and gifted education almost exclusively. (c) This is the only chapter in which talented students appear as a distinct circumscribed subgroup. (d) The label talent rarely appears outside the term *talent development*, and those authors who use the term do not specify what the term talent means within that expression. (e) Educational professionals almost never add the qualifier academic to the expression talent development, unaware that the label applies equally well in most occupational fields, especially in arts and sports. (f) The label giftedness covers a large diversity of views and definitions about outstanding human abilities.

If you choose to keep on reading this chapter, you will discover a conceptual distinction that makes it unique within the handbook. Indeed, this chapter proposes a clear and operational conceptual differentiation between the labels giftedness and talent. Furthermore, it serves as the conceptual basis for a detailed and comprehensive theory of talent development, originally named the differentiating model of giftedness and talent[1] (DMGT; Gagné, 1985), and recently renamed the integrative model of talent development (IMTD; Gagné, 2013). An overview of the IMTD constitutes the first part of this chapter.

THE INTEGRATIVE MODEL OF TALENT DEVELOPMENT: FROM GENES TO GIFTEDNESS, THEN TO TALENT

Why do some students excel in school, whereas most of their peers obtain average or below-average performances? Ask a dozen educators, scholars, or parents, and you will probably get a dozen distinct answers. Most of us harbor a personal implicit theory about the causal origins of academic talent, and one of the main characteristics of these personal views is the tendency for each person to privilege one key "ingredient" of success over the candidates defended by other people. That key ingredient may reside in the family environment or the school environment, and it may be identified as an amount

[1]The D in DMGT initially represented the qualifier differentiated (e.g., Gagné, 1985, 2000). The author eventually chose differentiating as a more accurate representation of the model's goal.

of study, determination and will power, motivation and passion, cognitive aptitudes, and so forth. The IMTD aims to relativize the alleged strength of these "causal spotlights" of academic success and excellence by proposing a complex interaction of a diversity of causal factors, whose strength of influence changes not only over the course of the educational trajectory, but also from individual to individual. Taken individually, none of these factors has an overwhelming impact—except in very special circumstances—on the final educational outcome, but all play a daily role in the complex choreography of influences leading to the emergence—or non-emergence—of academic talent. I intend to demonstrate, through the IMTD, that cognitive aptitudes, anchored in individuals' biological and genetic foundations, act as building blocks for the numerous academic competencies acquired through formal education, and that this long-term developmental process is continually modulated by two large groups of influences: *intrapersonal catalysts* that define individuals' temperament, personality, needs, and desires, and *environmental catalysts* that are present in individuals' family, school, and social environments. The IMTD evolved (Gagné, 2013) from the DMGT, integrating another recent addition, the developmental model for natural abilities (DMNA). I will examine each of these models next according to their chronological appearance.

Overview of the Differentiating Model of Giftedness and Talent

The DMGT[2] defines talent development as the progressive transformation of outstanding natural abilities (i.e., gifts) into outstanding systematically developed competencies (i.e., talents). It brings together five components: gifts, talents, the talent development process, intrapersonal catalysts, and environmental catalysts. The first three components, called the *talent development trio*, constitute the core of the DMGT; their interaction summarizes the essence of the DMGT's conception of talent development, namely the progressive transformation of gifts into talents. These five components create the three blocks on the right in Figure 11.1.

Differentiating giftedness and talent. Scholars and practitioners almost unanimously acknowledge that the concept of giftedness subsumes two distinct realities: early emerging forms with strong biological roots and fully developed adult forms, which are expressed through associated pairs of terms (e.g., potential/realization, aptitude/achievement, promise/fulfillment). This dichotomy surfaces in countless popular expressions (e.g., "Education's goal is to maximize each student's potential," "Realizing one's potential is each person's lifelong challenge"). Similarly, the phenomenon of underachievement is usually described "as a discrepancy between expected performance (ability or potential) and actual performance (achievement)" (Siegle & McCoach, 2013, p. 377). The distinction between potential and achievement is strongly imbedded in our views of human abilities. It would reduce unnecessary conceptual ambiguity if we adopted distinct labels when referring to aptitudes as opposed to achievements. I associate each label to a separate concept, adopting the label gifted to convey the idea of a potential anchored in transmitted—or given—biological foundations. Two basic definitions were born that constitute the core of the DMGT framework.

- *Giftedness* designates the possession and use of biologically anchored and informally developed outstanding natural abilities or aptitudes (e.g., gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers.
- *Talent* designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of learning peers (those having accumulated a similar amount of learning time from either current or past training).

Note how the DMGT clearly separates the concepts of giftedness, potential, aptitude, and natural

[2]Readers will find more extensive descriptions, specific components, and detailed figures of the IMTD and the DMGT on the author's web site at http://gagnefrancoys.wixsite.com/dmgt-mddt.

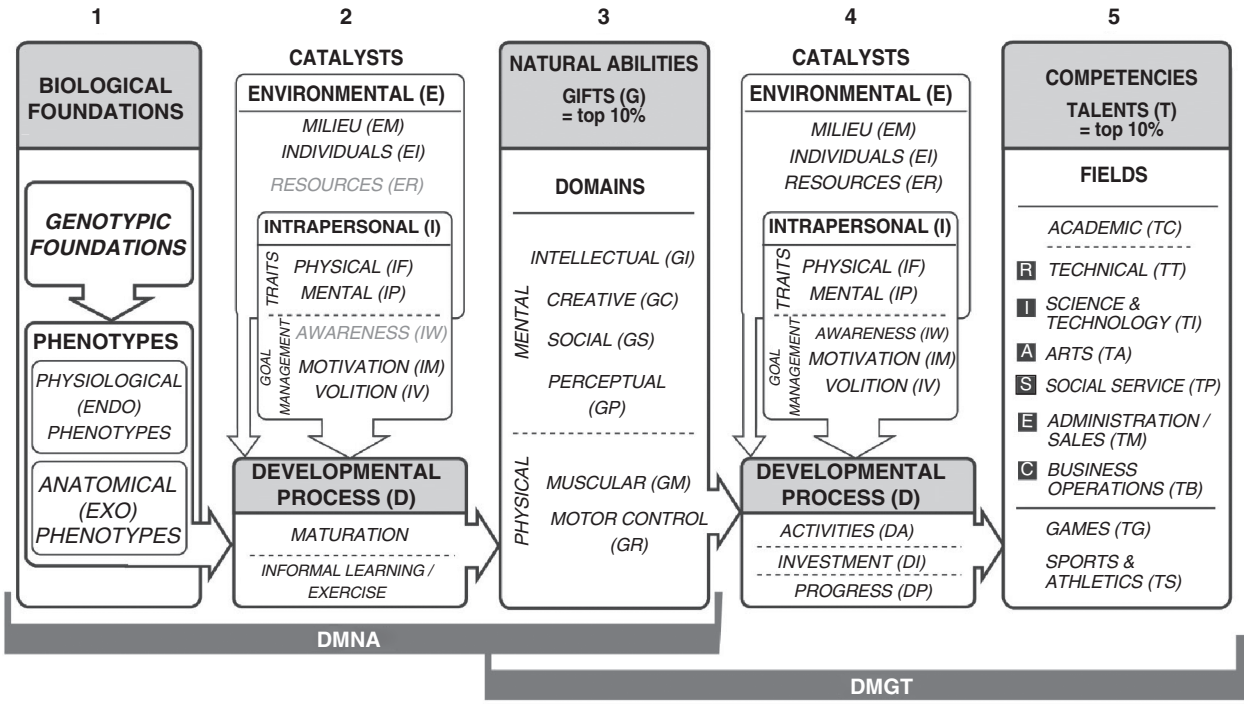

FIGURE 11.1. Gagné's integrative model of talent development.

abilities from those of talent, performance, achievement, and systematically developed abilities, as well as expertise, eminence, and prodigiousness. The theory will stand—or fall—on the validity of that basic distinction, especially on the acceptance of the concept of giftedness. Note also that the term *ability* serves as an umbrella construct that covers natural abilities (e.g., aptitudes) and systematically developed abilities (e.g., competencies). Borland (1989) was one of the first scholars in the field to recognize the value of this distinction:

> Gagné's use of the terms *giftedness* and *talent* appears to be the least arbitrary and the most useful of those proposed thus far. The distinction between competence and performance is a real and meaningful one, and it allows for the building of a model that permits the operationalization of the concepts (p. 23).

Unfortunately, he didn't notice that the DMGT terminology considers the terms competence and performance as synonyms.

How many people are gifted and/or talented? As shown in these definitions, the DMGT offers another unique characteristic, namely a clear answer to the prevalence question: *outstanding* means individuals who belong to the top 10% of the relevant reference group in terms of natural ability (for giftedness) or achievement (for talent). This generous choice for the initial threshold is counterbalanced by the recognition of levels of giftedness or talent; the DMGT's metric-based system of levels constitutes an intrinsic constituent of the DMGT. It has five hierarchically superposed levels, with each successive level including the top 10% of the preceding level. They are labeled *mildly* (top 10%), *moderately* (top 1%), *highly* (top 0.1%), *exceptionally* (top 0.01%), and *extremely or profoundly* (top 0.001%) gifted/talented. Why 10%? The prevalence question has no absolute answer; nowhere will we find a magical number that automatically separates those labeled gifted or talented from the rest of the population. The choice of a proper threshold requires that professionals come to a consensus. Unfortunately, no such consensus has yet been achieved in the various fields of talent development. The prevalence question is crucial for theoretical and practical reasons. From a theoretical standpoint, a prevalence estimate represents an important contribution

toward a more precise definition of any normative construct (e.g., poverty, tallness, weight, most neurotic syndromes) that targets a marginal subgroup within a population. Practically speaking, adopting a threshold of 10% instead of 1%—a tenfold difference in estimated prevalence—has a huge impact on selection practices and talent development services (Gagné, 1998).

The talent development trio (gifts, talents, and the talent development process). The DMGT identifies six natural ability domains: four of them belonging to the mental realm (intellectual gifts, creative gifts, social gifts, and perceptual gifts), and the other two belonging to the physical realm (muscular gifts and motor control gifts). In the field of gifted education, as well as within this handbook, the term gifted refers almost exclusively to outstanding intellectual or cognitive natural abilities. Natural abilities are not innate (see the following DMNA section); they develop, especially during childhood, through maturational processes and informal exercise. Yet, that development and the level of expression are substantially controlled by individuals' genetic endowment. Major individual differences can be observed in natural abilities in the daily lives of children, at home and at school. For instance, intellectual abilities are needed to learn to read, speak a foreign language, or understand new mathematical concepts; creative abilities are needed to solve different kinds of problems and produce original work in the visual and performing arts, literature, and science; physical abilities are involved in sports, music, and sculpture; and social abilities are essential when interacting with classmates, teachers, and parents. Gifts can be observed more easily and directly in young children because environmental influences and systematic learning have not yet exerted their moderating influence in a significant way. However, they still show themselves in older children, even in adults, through the facility and speed with which individuals acquire new competencies in any field of human activity. Ease and speed in learning are the trademarks of giftedness: They contribute strongly to the learners' pace of progress, with an extremely rapid pace being a key characteristic of prodigies (Gagné & McPherson, 2016).

Talents progressively emerge from the transformation of these outstanding natural abilities or gifts into the well-trained and systematically developed competencies that define a particular field of human activity. On the potential–performance continuum, talents represent the performance end and the outcome of the talent development process. Talent fields can be extremely diverse. Column 5 in Figure 11.1 shows nine talent subcomponents. Six of them have their source in Holland's (see Anastasi & Urbina, 1997) classification of work-related personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC). Three additional subcomponents complement the RIASEC taxonomy: preoccupational academic (K–12) subjects, games, and sports. A natural ability can express itself in many different ways depending on the field(s) of activity adopted by an individual. For example, motor control can be modeled into the particular skills of a pianist, a painter, or a video game player. Similarly, cognitive processes can be modeled into the scientific reasoning of a chemist, the memorization and game analysis of a chess player, or the strategic planning of an athlete.

Natural abilities or aptitudes serve as the "raw materials" or constituent elements of talents; they act through the talent development process. The neologism *talentee* was created to describe any individual actively involved in a systematic talent development process, whatever the field. Talentees coordinate the various elements of that process, which is subdivided into three subcomponents of talent development (see Figure 11.1): activities, investment, and progress. Each of these subcomponents is subdivided again into multiple facets. Talent development begins when a child or adult gains access, through an identification or selection process, to a systematic program of activities. These activities include a specific content (the curriculum) offered within a specific learning environment. The investment subcomponent quantifies the intensity of the talent development process in terms of time, psychological energy, and money. Ericsson's (2002) concept of deliberate practice combines the time and psychological energy facets. Finally, the progress of talentees from initial access to peak performance can be broken down into a series of stages (e.g., novice,

advanced, proficient, expert). Its main quantitative representation is pace (e.g., how fast talentees are progressing, compared with learning peers, toward their predefined excellence goal). The long-term developmental course of most talentees will be marked by a series of more or less crucial turning points (e.g., being spotted by a teacher or coach, receiving an important scholarship, accidents, death of a family member or close friend).

The supporting cast. Two large sets of catalysts, intrapersonal and environmental (see Figure 11.1) affect the talent development process, positively or negatively. The intrapersonal component has five subcomponents grouped into two main dimensions: stable traits (physical and mental/personality) and goal management processes (self-awareness, motivation, and volition). Within the mental/personality category, there is an extremely long list of descriptive qualities. *Temperament* refers to behavioral predispositions with strong biological and hereditary underpinnings, whereas *personality* encompasses a large diversity of positive or negative acquired styles of behavior (Rothbart, 2012). The most widely accepted structure for personality attributes is called the five-factor personality model; research has shown each factor to possess significant biological roots (McCrae, 2009). The term *motivation* usually brings to mind the idea of what motivates us and how motivated we are (i.e., volition), that is how much effort we are ready to invest to reach a particular goal. Within the framework of the action control theory, Kuhl and Beckmann (1985; see also Corno, 1993) proposed to differentiate the global goal seeking process into (a) distinct goal-setting activities, labeled motivation and (b) goal-attainment activities, labeled volition or will power. Talentees first examine their values and needs, as well as determine their interests; these will serve to identify the specific talent goal for which they will aim. The loftier the goal, the more efforts talentees will need to reach it. Long-term goals placed at a vey high level will require intense dedication, as well as daily acts of will power to maintain investment in practice through obstacles, boredom, and occasional failure.

The environmental component appears in Figure 11.1 partially hidden behind the intrapersonal component. This partial overlap signals the crucial filtering role that the intrapersonal component plays with regard to environmental influences. The bulk of environmental stimuli must pass through the analytical sieve of individuals' needs, interests, or personality traits; talentees continually pick and choose which stimuli will receive their attention. The environmental component comprises three distinct subcomponents: a diversity of environmental influences, including physical (e.g., climate, rural vs. urban living), social, political, financial, and cultural influences; the psychological influence of significant persons in the talentees' immediate environment, including parents and siblings, but also extended family, teachers and trainers, peers, mentors, and role models; and talent development resources, including adapted curricula, special courses or schools, advanced teams in sports, and so forth.

Dynamic interactions. All five components of the DMGT entertain a large diversity of complex dynamic interactions among themselves and between specific facets within each of them. This chapter does not allow the space for a detailed survey, but consider that efforts by parents or teachers to modify the characteristics of children and students (e.g., interests, personality, beliefs, deviant behavior) illustrate environmental to intrapersonal influences; of course, influences in the opposite direction can also be imagined (e.g., students' passions influencing the behavior of parents or teachers). The most fundamental pattern of interactions defines the DMGT's view of the talent development process, namely the long-term transformation of outstanding potentialities into equally outstanding competencies, thanks to the constant mediating effect of both groups of catalysts. Even talent can have a motivating impact on students: success breeds success. It can also influence environmental sources (e.g., parents and teachers). In summary, no causal component stands alone; they all interact with each other and with the learning process in very complex ways, and these interactions will differ significantly from one person to the next. Even though all four causal components are constantly active, it does not mean that they are equally powerful as agents of talent emergence. This is no doubt a

truism at the individual level because each talented person follows a unique path toward excellence. But what can be said about averages? Are some factors generally recognized as stronger predictors of outstanding performance? For those involved in the talent development of gifted individuals, this is the ultimate question. Its extensive discussion represents another unique characteristic of the DMGT. (See Gagné, 2004, for a further presentation of this analysis.)

Beyond the Differentiating Model of Giftedness and Talent: Introducing the Developmental Model for Natural Abilities and the Integrative Model of Talent Development

The DMGT constitutes a strictly behavioral representation of the numerous influences facilitating or blocking the growth of competencies in general, including their outstanding manifestations as talents. Among this large set of influences, natural abilities play a significant causal role as building blocks of competencies. I defined natural abilities as having significant biological roots; these roots manifest themselves in many ways, for instance anatomical or morphological characteristics, neurophysiological activity in the brain and body, gene expression, and countless others. Unfortunately, the DMGT framework leaves no room for these distal sources of talent emergence. It became imperative to find a way to integrate them.

Biological foundations of talent development. Science has adopted a hierarchical organization of explanations, moving progressively from behavioral phenomena to physiology, microbiology, and chemistry, and then to physics. For instance, Plomin, DeFries, Craig, and McGuffin (2003) described functional genomics as "a bottom-up strategy in which the gene product is identified by its DNA sequence and the function of the gene product is traced through cells and then cell systems and eventually the brain" (p. 14). The expression "bottom-up" makes clear that such biological underpinnings occupy some underground level under the strictly behavioral DMGT framework. A brief examination of the literature suggests three levels constitute an acceptable vertical differentiation (see Column 1 in Figure 11.1): The *chemical level* is reserved for genotypic foundations (e.g., gene identification, mutations, gene expression, epigenetic phenomena, protein production, etc.). The *physiological level* covers microbiological and (neuro)physiological processes, which move from genotypic to phenotypic phenomena. Their hidden nature explains the label of *endophenotypes*; they correspond to

> physical traits—phenotypes—that are not externally visible but are measurable. Endophenotypes can reveal the biological bases for a disorder better than behavioral symptoms because they represent a fundamental physical trait that is more closely tied to its source in a gene variant. (Nurnberger & Bierut, 2007, pp. 48–49)

Finally, the *morphological level*[3] includes anatomical characteristics that have been shown to impact abilities or intrapersonal catalysts. Most of these characteristics are observable *exophenotypes*, either directly (e.g., height in a basketball player, physique in a gymnastist) or indirectly (e.g., brain size, muscle type). Endophenotypes and morphological traits are part of the complex hierarchical causal chain joining genes to physical or mental abilities, and ultimately to systematically developed skills.

The proper meaning of *innate*. The DMNA was conceived first and foremost to integrate these biological foundations, and to explain and illustrate their developmental process. It was also trying (a) to respond to scholars' questioning of the relevance of the concept of giftedness and (b) to correct the misunderstanding of individuals using the DMGT who describe gifts as innate and talents as acquired. This simplistic bipolar view is wrong: gifts are not

[3]Anatomy and morphology appear almost synonymous. But, anatomy is considered a subdivision of morphology. "External features such as gross size, shape, color, and other physical features of the biological structures are studied in morphology, whereas anatomy is concerned about the cellular and tissue level composition of the biological structures" (Difference Between Anatomy and Morphology, 2012). Both perspectives are relevant in the present context, making it difficult to adopt one term over the other.

innate, they develop during childhood, and sometimes continue to do so during adulthood. This developmental view of "natural" abilities has to fight its way through a host of common expressions that maintain the ambiguity, like "She is a born musician," "It's God's gift," or "Either you have it or you don't!" If all these uses of innate are incorrect, what does the term innate really mean? When a child is said to be a "born" pianist, it is not implied that he or she began playing the piano in the nursery, nor that he or she was able to play a concerto within weeks of beginning piano lessons. Describing talent as innate only makes sense metaphorically. It will convey the idea that the pianist progressed rapidly and seemingly without effort through his or her music curriculum, at a much more rapid pace than that of his or her learning peers. The same applies to any natural ability. Intellectually precocious children do not suddenly manifest an exceptional vocabulary or highly logical reasoning processes; they develop these cognitive abilities by going through the same developmental stages as any other child. The difference resides in the ease and speed with which they advance through these successive stages. The term *precocious* says it all: they reach a given level of knowledge and reasoning before the majority of their learning peers.

Researchers in behavioral genetics have given the term innate a very specific definition. At the behavioral level, it implies

> hard-wired, fixed action patterns of a species that are impervious to experience. Genetic influence on abilities and other complex traits does not denote the hard-wired deterministic effect of a single gene but rather probabilistic propensities of many genes in multiple-gene systems. (Plomin, 1998, p. 421)

So, when people use the term innate to qualify the DMGT's natural abilities, they convey two false interpretations: (a) observed individual differences are immutable, and (b) they are present at birth or, if not, appear suddenly with minimal training. Because of its restricted meaning, very few scientists use the term innate to describe any type of natural ability or temperamental characteristic. If natural abilities cannot be considered innate, where does the "gift" in giftedness reside? It is not in the morphological level identified earlier, because these morphological structures require extensive development, and most do not achieve their maturity until adolescence or adulthood. If we go to the physiological level, we might be in a gray zone where it becomes difficult to separate innate processes from those that result from developmental activities. For example, genetic agents govern most stages of embryogenesis. If the development was strictly maturational, then we could probably speak of innateness. It is clear, however, that the chemical level, devoted to gene activity, is almost completely—but not totally, according to the new field of epigenetics—under inborn control.

Describing the developmental model for natural abilities. How does the development of natural abilities proceed? The left side of Figure 11.1 shows that process through the DMNA. At first glance, it might look similar to the DMGT counterpart on the left side of the figure, but a closer look shows major differences between them, at the component and the subcomponent levels. The main difference is of course a transfer of the gifts component from the left side (DMGT) to the right side (DMNA); aptitudes—and their outstanding expression in gifts—are now the outcome of this particular developmental process. Here, the three levels of biological underpinnings, structural elements, and processes become the building blocks for the phenotypic behavioral abilities. The developmental process specific to the DMNA is described next, with two macro processes identified. Maturation of course covers a diversity of biological processes at each of the three basement levels, from the chemical level upward, that govern the growth of mental and physical abilities. These maturational processes have no direct relationship with the talent development process itself; their role is to mold the natural abilities that will become the building blocks of talents. As for the learning subcomponent, it is considered informal because it lacks the structured organization (e.g., curriculum, access rules, systematic schedule, formal assessment) typical of talent development activities. It takes the form of spontaneous learning

and practice, acquired mostly subconsciously without regular attention to its growth.

One cannot imagine a developmental process without catalytic influences, intrapersonal and environmental. These two sets of catalysts appear structurally identical to their DMGT counterparts, although the exact contents within each element will differ, as well as their relative causal significance. Two subcomponents, self-awareness and resources, play a much more modest causal role in the DMNA than in the DMGT (they appear in lighter font in Figure 11.1). For instance, we cannot expect young children to show the same level of awareness toward their strengths and weaknesses as older individuals, but intense interests and passions can manifest themselves very early (see Gagné & McPherson, 2016). Similarly, within the realm of mental traits, very large individual differences appear as soon as they are assessed, either through self, parent, or teacher ratings. With respect to motivational issues, children express very early their desire—or lack of it—to engage in all kinds of daily activities: physical exercise, reading, learning to play a musical instrument, video games, playing with friends, and so forth. To some extent, their level of interest will influence the amount of their short-term or long-term investment, as well as their potential decision to participate in a talent development program and to maintain their involvement in it. Environmental catalysts also play a significant role in fostering or hindering the development of human aptitudes; and all three subcomponents are involved, except that resources play a lesser causal role because of the informal nature of children's developmental activities. A few examples are described next.

- Milieu—Recent studies (e.g., Harden, Turkheimer, & Loehlin, 2007) have shown that the degree of heritability (H) of cognitive abilities varies with the socioeconomic level of the families; the H component's importance decreases significantly in low-income families. In fact, the whole area of gene-by-environment interactions belongs to the environmental component.
- Individuals subcomponent—Any interventions by the parents to create a specific family environment, propitious either to general knowledge learning, to musical activities, or to athletic ones, could impact the development of related natural abilities.
- Resources subcomponent—Government programs developed to improve the school preparedness (i.e., cognitive abilities) of at-risk children (Nijenhuis, Jongeneel-Grimen, & Kirkegaard, 2014) represent interesting efforts to build up these natural abilities.

In sum, natural abilities proceed through a developmental process somewhat similar to the talent development process. The same basic "ingredients" are involved in fostering or hindering their growth. As Angoff (1988) highlighted, the most significant distinction between gifts and talents remains the amount of direct genetic contribution. The DMNA makes that point clear in its choice of building blocks.

Merging the differentiating model of giftedness and talent and the developmental model for natural abilities into the integrative model of talent development. As soon as the DMNA was conceived, it became clear that joining the two developmental models into the IMTD would bring closure to these theoretical musings. Figure 11.1 illustrates the result, with the gifts component's central position ensuring the linkage between the DMNA's build-up of outstanding natural abilities on the left side and the DMGT's talent development process on the right side. IMTD shows how talent development has its distal origins in the progressive emergence of natural abilities, as early as through the complex process of embryogenesis. The maturation process will continue after birth as the various natural abilities, mental and physical, progressively take form at different levels of expression from one individual to the next, thanks to the contribution of the two sets of catalysts, as well as innumerable daily occasions for informal learning and exercise. At some point, usually during childhood or early adolescence depending on the talent chosen, some gifted individuals will choose a talent field that fits their perceived profile of natural abilities and interests, and begin the long and complex journey that leads to eventual top performance, as described in the DMGT model. Some individuals will go far beyond the basic 10%

threshold of minimal talent, others will not, and the reasons behind the level of expertise achieved by talentees will borrow from many of the facets that comprise the DMGT.

Summary and Conclusions

This first part of the chapter aimed to introduce a theoretical framework that would explain the emergence of outstanding school achievements, called academic talents. That framework was the IMTD, which brings together a proximal interpretive model, the DMGT, and a more distal one, the DMNA (see Figure 11.1). The DMGT brings together, in constant complex interactions, four groups of behaviorally defined causal influences: outstanding natural abilities or gifts, a long-term developmental process, intrapersonal catalysts, and environmental catalytic influences. For its part, the DMNA focuses on the biological foundations of natural abilities, proposing three biological levels (chemical, physiological, and morphological), and describing their role as building blocks for the DMGT's natural abilities. This discussion leads to the following theoretical definition of ATD within the IMTD framework.

> Academic talent development corresponds to the progressive transformation through a long-term learning process of biologically anchored, informally developed, and mostly cognitive outstanding natural abilities (gifts) into equally outstanding systematically developed academic competencies (e.g., knowledge and skills—talents), thanks to constant moderating interactions with two large groups of catalysts, intrapersonal characteristics and environmental influences.

This definition answers the initial question proposed as a guiding principle at the beginning of this chapter, namely "which personal and contextual causal influences contribute significantly to the emergence of excellence in school subjects?"

ACADEMIC TALENT DEVELOPMENT: PROGRAMMING WITH BEST PRACTICES

The beginning of this chapter posed the question, "Which educational resources will maximize the transformation of outstanding aptitudes into academic excellence?" Most school districts in the United States and abroad address that question with a variety of provisions grouped under the label "gifted program" (see Part I of this handbook). In line with this theoretical framework, I use "ATD program" instead of the more commonly used gifted program; not only does it identify the desired goal of the educational resources to be described, but it allows giving the term "program" a meaning that differs in most instances from its use in gifted programs. Moreover, I find the label gifted program difficult to justify semantically—the programs themselves are not gifted, just their target population.[4]

Programs Versus Provisions

The concept of program used here endorses a seminal distinction proposed over three decades ago by Abraham Tannenbaum (1983).

> A program is a comprehensive offering, sequenced over a long period of time, usually designed as a requirement, and very much a major part of the total school curriculum. Thus, the school offers *programs* in mathematics, literature, art, social studies, and the like. A *provision*, on the other hand, is more fragmentary, an ad hoc offering, relatively brief in duration, often designed by an individual teacher with special abilities rather than by a curriculum committee, and supplemental to the major offerings, not integral with them. (p. 515)

Borland (1989) built on Tannenbaum's distinction. Although he considered "that there is nothing at all wrong with provisions for the gifted," and that they "may be among the most valuable [opportunities] offered to students in their school careers," he

[4]Under this logic, should programs targeting other special populations be labeled autistic programs, mentally deficient programs, hearing impaired programs, and so forth? Note that the same questioning applies to gifted teachers, gifted resources, gifted education, and other similar labels.

judged these provisions to have a major drawback, namely that they are not "programmatic," that there is "no guarantee that all gifted students in the system will be exposed to them" (p. 44). He summarized the main differences as follows.

> In many respects, programs are everything provisions are not. Whereas provisions are often temporary expedients, programs are designed to be permanent features of school districts' educational offerings. Whereas provisions are fragmentary, programs have well-articulated sequences of goals, skills, and content. Whereas provisions are extracurricular, programs consist of activities that constitute a prescribed part of the course of study of identified gifted students. Whereas provisions are optional, programs are required for all gifted students who move through the system. (p. 44)

Borland (1989) considered his definition "a list of the specifications of an ideal program," but added: "Even if these specifications are met, there is no assurance that the program will be a good one" (p. 45).[5] Note that the two labels do not represent qualitatively distinct categories, but opposite poles on a continuum. Therefore, some educational resources could possess characteristics that place them somewhere between the two poles. Moreover, both scholars considered that most existing gifted programs at that time belonged much more to the provision than to the program pole. That observation probably inspired Tannenbaum's differentiation. I consider this judgment to apply equally well to current gifted programs, which are discussed later in this chapter. All uses of the label program within this chapter will imply the differentiating characteristics described by Tannenbaum and Borland (e.g., long-term, district planning, part of regular curriculum, compulsory for target population). In other words, there is no need to mention them as constituent characteristics of the IMTD-inspired ATD programs. There is one exception—I use the expression gifted programs to refer to the same ensemble of provisions that this label targets in the gifted education literature, including within this handbook. The final construct to be introduced is that of an ATD pathway. It corresponds within a school district to an uninterrupted sequence of ATD programs covering the whole K–12 educational course.

Seven Essential Characteristics

Moon and Rosselli (2000) proposed to break down talent development programs into three main components: (a) the definition of the program's developmental goals, (b) the identification of the target population (e.g., talentees), and (c) the content of the proposed developmental intervention, in terms of its curriculum and its administrative parameters. The goal of an IMTD-inspired ATD program is clear: foster, through the best educational practices available, the maximal transfer of cognitive gifts into academic excellence.[6] The target population is also clearly identified—students who are best prepared to profit from the program's content (curriculum and format). This leaves the third component to be defined: Which resource components can best foster the emergence of academic talent? When I first considered this question, I was not looking for small details, but for general characteristics that could apply to most learning situations in general education, from kindergarten to high school and beyond. I surveyed the professional and scientific literature, taking note of suggestions from various scholars and professionals. I also examined a diversity of existing gifted programs (e.g., pull-out classes, weekend activities, grade skipping, special selective high schools, advanced placement, summer camps); I found a huge diversity of practices, but little homogeneity of components. I examined the best practices acknowledged in other talent development fields, especially the well-structured fields of music and sport. I found much more convergence and homogeneity in goals and practices, and they offered plenty of materials that could be

[5]This seminal conceptual distinction between provisions and programs, twice advanced 3 decades ago, has had no impact on the terminological habits of practitioners; terminological fuzziness remains one of the differentiating characteristics between the social and natural sciences.

[6]Choosing this particular program goal does not exclude adopting parallel goals within a given program, for instance developing personal maturity and social conscience, or fostering physical well-being.

applied in educational settings. A synthesis of that search first took form as the "10 commandments" for ATD (Gagné, 2007). That initial inventory was subsequently reduced to six (Gagné, 2011), then finalized (Gagné, 2015) into seven constituent elements judged essential to ensure the effectiveness of an ATD program:

1. enriched K–12 curriculum
2. systematic daily enrichment
3. full-time ability grouping
4. customized/accelerated pacing
5. personal excellence goals
6. highly selective access
7. early introduction

The first four characteristics target Moon and Rosselli's (2000) content/format component, the fifth characteristic targets the program's goals, and the last two characteristics target the talentee population. An enriched K–12 curriculum is a keystone characteristic—grouping all the others according to program components solved a conundrum, namely trying to create some hierarchy among them. Except for the early introduction characteristic, which targets the point of departure of a structured ATD pathway, I consider the six other constituent characteristics as necessary components. These seven characteristics lead to the following formal definitions of ATD as either a program offered by a school system or a developmental process followed by academic talentees.

> An *IMTD-inspired ATD program* is a customized long-term sequence of structured learning activities anchored in a consistantly enriched and challenging academic curriculum directed toward the attainment of high-level excellence goals.
>
> An *(ATD) process* refers to the pursuit by academic talentees of personal long-term excellence goals within an IMTD-inspired ATD program.

Each of the seven constituent characteristics are examined in more detail next.

1. An enriched K–12 curriculum. By definition, ATD programs aim to foster academic excellence, and academic excellence expresses itself as outstanding mastery of the official K—12 curriculum. This is the curriculum that must be enriched for academic talentees to experience regular learning challenges. The term *curriculum* covers the content of specific subject matters at a particular grade level, and their integrated structure within and between grade levels; it also includes instructional strategies. A service that does not have as its mission to implement this keystone characteristic cannot receive the IMTD-inspired ATD label. This is also the key element in Tannenbaum's (1983) definition of a proper program for gifted students. As he pointed out, "enrichment for the gifted is as much an educational imperative as is the 'common core' for the general school population" (p. 424). The recently proposed advanced academics model (Peters, Matthews, McBee, & McCoach, 2014) recommends a similar curricular priority. I use the term *enriched* with the clear awareness that I was "delinquently" rejecting the politically correct custom of my colleagues, who have adopted the term *differentiation* (e.g., Borland, 1989; French, 2009; Kaplan, 2009; Renzulli, 2009; VanTassel-Baska & Little, 2003). It is a very sad thing that perceived political pressures or public stereotypes (e.g., a nonenriched curriculum is a "poor" curriculum) force professionals to put aside proper terminology. I have argued repeatedly (e.g., Gagné, 2007) for the rehabilitation of the concept of enrichment, for the simple reason that it best describes the type of differentiation specifically appropriate for fast learners.

What does an enriched curriculum look like? At the broadest level, that of a structured set of subject matters, it does not differ substantially from standard curriculum; most adaptations appear to target specific contents at particular grade levels, as well as instructional strategies (e.g., Hertberg-Davis & Callahan, 2013; Tomlinson, 2009; VanTassel-Baska & Little, 2003). For instance, Rogers (2009) identified seven research-based content—and instructional—modifications that provide "significant academic benefits for gifted learners" (p. 264): abstract concepts, complex contents, multidisciplinary themes, sequence reorganization, links with human and social issues, introduction of professional inquiry methods, and subject acceleration

(see Chapter 23, this handbook). With respect to instructional strategies, I proposed (Gagné, 2007) four different types of enrichment, called the four Ds: (1) density, (2) difficulty, (3) depth, and (4) diversity. This sequence reflects a decreasing order of relevance, giving priority to enrichment in density. Also called *curriculum condensation* or *compacting* (Reis, Burns, & Renzulli, 1992), it serves as the pedagogical core of a properly enriched curriculum. ATD specialists should prioritize it over other forms of enrichment because it offers the most relevant response to giftedness's trademark, namely ease and speed in learning. Moreover, the school time liberated through faster mastery of subject matter creates learning space for additional enrichment.

2. Systematic daily enrichment. This second characteristic might look almost tautological because of similarities with the first characteristic (an enriched K–12 curriculum) with its enrichment focused on condensing the standard curriculum, which implies its implementation on a daily basis. I perceived a need for its inclusion because many teachers or school administrators are worried about the (mythic) cataclysmic impact of accelerative measures; these unfounded fears lead them to refuse that their talentees progress too far ahead while remaining in standard classrooms. Accordingly, after allowing a short burst of enrichment in density, talentees switch to other types of enrichment, like enrichment in depth (long-term projects) or enrichment in diversity (noncurricular short-term activities). Talentees will progress in brief rapid spurts followed by pauses occupied with "lateral" enrichment, ending their school year more or less at the same level of subject matter mastery as their well-performing nongifted learning peers. Appropriate enrichment must propose intellectual challenges on a daily basis. Vygotsky's (1978) concept of zone or proximal development, as well as Brody and Stanley's (2005) talent search instructional approach, aptly convey the need to maintain students' pace at the cutting edge of their learning capacity, neither too slow to force them to idle regularly nor too fast to create feelings of helplessness. In the case of academic talentees, teachers must look out regularly for signs of unchallenging content; high-achieving students often struggle to face, day after day, the consistently slow and repetitious pace in standard classrooms. This particular problem rarely surfaces in sports or arts, where talent development practices almost automatically maintain a cutting edge teaching strategy.

3. Full-time ability grouping. This next characteristic corresponds with the preceding one: how can we best deliver daily enrichment to talentees, if not by grouping them with a specially trained ATD teacher?[7] Yet, this administratively sensible solution, especially its full-time variety, touches a sensitive chord, probably even more sensitive than the subject of academic acceleration (see the Customized/Accelerated Pacing section). Commonly discussed in gifted education handbooks 20 years ago (e.g., Colangelo & Davis, 1997; Davis & Rimm, 1985; Heller, Mönks, & Passow, 1993), the subject of ability grouping has almost disappeared from recent handbooks, as a separate chapter (e.g., Balchin et al., 2009; Callahan & Hertberg-Davis, 2013; Dixon & Moon, 2006; Heller, Mönks, Sternberg, & Subotnik, 2000; MacFarlane & Stambaugh, 2009; Shavinina, 2009) and as an entry in encyclopedia-type handbooks (e.g., Kerr, 2009; Plucker & Callahan, 2008). I defended the role of grouping early in my career (Gagné, 1987), and the arguments I invoked then are as valid today as they were three decades ago: Opposition to the full-time grouping of talentees remains hard to understand in view of the research evidence on the positive academic impacts of grouping (Kulik, 2003; Rogers & Span, 1993) and the almost total lack of enrichment activities in standard classrooms that specifically target academically talented students (Archambault et al., 1993). At all levels of the K–12 educational system, teachers prioritize students with learning difficulties. Moreover, the curriculum of most preservice teacher training programs reflects the low priority of

[7]ATD teacher is more appropriate and clear than gifted teacher. We could similarly substitute academic talentee for gifted student, ATD for gifted education, and National Association for the Development of Academic Talent for National Association for Gifted Children.

talented students' needs; courses on special populations give only lip service to the characteristics and educational needs of academically talented students (Croft, 2003). In that context, responding adequately to the special educational needs of fast learners becomes a mission impossible.

This leads directly to the generalization of full-time grouping as the only effective way to create appropriate classroom conditions for sustained daily enrichment; by grouping thirty or so students around a single ATD teacher, it also provides an efficient use of limited specialized resources. In a nutshell, full-time grouping answers a full-time need with a full-time solution, facilitates the enrichment of all subject matters in the standard curriculum, and contrary to most pull-out services, does not require adding a teacher to the school faculty. Recent evidence gives additional strength to that solution. An important evaluation study (VanTassel-Baska et al., 2008) confirmed the enormous time and financial resources required to train regular elementary school teachers to implement language arts enrichment modules in their classroom. A team of university specialists had to invest hundreds of hours of professional time over a period of 2 years to train just 12 elementary school teachers to an acceptable level in the proper use of these enrichment materials, which covered about a third of a school year in a single subject matter.

4. Customized/accelerated pacing. Grouping talentees to offer an enriched curriculum does not mean that all individual differences in learning pace have disappeared; these individual differences produce an increasing gap over time between slow and fast learners, which has been called a *fan spread effect* (Gagné, 2005). Analyses of achievement test scores, as well as results from talent searches, show a large gap in knowledge and skills between mildly talented students and their exceptionally talented peers (Gagné, 2005; Lupkowski-Shoplik, Benbow, Assouline, & Brody, 2003). Consequently, those who progress significantly faster than other talentees should be allowed to move ahead at an accelerated pace. Unfortunately, most accelerative measures face strong resistance from most administrators, teachers, and parents despite scientific evidence in support of all forms of accelerative enrichment (Colangelo, Assouline, & Gross, 2004; Rogers, 1991). Borland (1989) summarized the problem as follows: "Acceleration is one of the most curious phenomena in the field of education. I can think of no other issue in which there is such a gulf between what research has revealed and what most practitioners believe" (p. 185). Similar statements abound in the gifted education literature, including a remarkable metaphor involving medical innovation proposed by Durr (1964).

5. Personal excellence goals. Four qualifiers (personal, excellence, challenging, long-term) describe the educational goals that talentees are invited to set for themselves, however only the first two are included in the heading of this section. Excellence goals must be understood normatively, which means in relationship with the expected achievements of learning peers. As members of a highly selective group (see Full-Time Ability Grouping and Highly Selective Access sections), talentees' reference base differs from that of standard education students. They are no longer "big fish in a little pond" (Marsh & Hau, 2003; Plucker et al., 2004), but have become smaller fish in the bigger pond of talented classmates. Therefore, these goals should far exceed the level of academic excellence typically expected within the standard curriculum. Obtaining high marks in a standard classroom has nothing to do with ATD; most academically talented students can reach such goals easily. Their normative status also distinguishes them from personal bests, which can apply to the academic goals of all students. The personal qualifier refers to talentees not only choosing these educational goals themselves, but also revising them periodically; they have full ownership.

The *challenging* qualifier means that these personal excellence goals should incite talentees to leave the security formerly offered by their big fish status, and accept to test their learning limits, not only in cognitive terms, but also with respect to their motivation and volition. The final qualifier, long-term, refers to a goal-setting process that looks beyond a few weeks or months, trying to encompass at least a full segment (e.g., elementary, middle school, high school) of the K–12 educational

trajectory. Consequently, these goals cannot apply to popular activities like summer camps, once a week pull-out classes, or weekend enrichment activities; they need to target main academic objectives relevant to the enriched curriculum. Goals must also involve a substantial investment in time and effort. On the other hand, these goals do not need to be ultimate or peak achievement goals (e.g., completing a PhD), at least not before entering high school. However, if some young talentees entertain long-term career plans, so much the better. But such passionate involvements remain quite rare.

6. Highly selective access. This sixth characteristic follows directly from the first two defining characteristics: an enriched curriculum offered daily. ATD requires not only outstanding natural learning abilities, but also, as with any other developmental program, demonstrated probability of future success. To best assess this probability, we look for criteria that have been shown to significantly predict achievement in the program; programs with many years of activity should have gathered that kind of information. These predictors can be found among the dozens of variables included in the four causal components (gifts, talent development, intrapersonal catalysts, and environmental catalysts) of the DMGT. There is of course a limited pool of scientifically proven predictors, crowned by intellectual aptitudes (Macintosh, 2011), which includes, as most powerful predictors, intrapersonal characteristics like conscientiousness, deliberate practice, love of learning, will power, and grit (e.g., Duckworth, Peterson, Matthews, & Kelly, 2007; Ericsson, 2006; Gagné, 2004; von Stumm, Hell, & Chamorro-Premuzic, 2011). The relative predictive power of these variables will certainly vary to some extent from one ATD program to the next.

A partial digression relevant to the DMGT gifts/talents differentiation seems appropriate with respect to the identification or selection process: The relative importance of measures of cognitive abilities (with intellectual giftedness as its outstanding manifestation) as opposed to measures of school achievement (and academic talent as its outstanding manifestation). Various surveys of identification practices in school districts (e.g., Coleman & Cross, 2001; Cox, Daniel, & Boston, 1985; Johnsen, 2009) have shown that two identification instruments outrank all others in terms of their prevalence: (a) IQ scores from group-administered cognitive ability tests, and (b) scores from local subject exams and/or standardized achievement tests (SATs). Indeed, the ubiquity of these two measures led me to propose the acronym IGAT—intellectually gifted and academically talented—to describe the typical population of students in most gifted programs (Gagné, 2007). In other words, being bright is rarely sufficient to deserve the gifted label and gain access to local programs; students must also show high academic performance. The IGAT acronym conveys that idea of "bright achievers."

If both sources of information dominate identification criteria, which of the two should receive priority, IQ scores or SATs? At first glance, indices of academic talent appear simple, at the data collection and interpretation levels. Yet, that easy metric and straightforward meaning hides a much more complex interpretive power. According to the DMGT, talents result from the progressive transformation of high natural abilities through a long developmental process, with the catalytic help of personal characteristics and environmental influences. Consequently, measures of talent incorporate the combined influences of all these distinct sources; it gives them very complex roots. They have roots in the genetics of high natural abilities, roots in passion and interest for a field's knowledge and skills, roots in unfailing perseverance and will power, roots in parental and teacher support, and, roots in chance (i.e., good and bad luck). This is no doubt why achievement measures predict future achievement so well, much better by far than any aptitude measure. For instance, Marques, Pais-Ribeiro, and Lopez (2011) found correlations above .90 between consecutive aggregated subject matter achievements in Grades 6 to 8. For his part, Muijs (1997) observed an "extremely strong relationship [between] school achievement in Wave 1 [Grade 4] with school achievement in Wave 2 . . . a fact born out by a Pearson correlation of .88 ($p < .001$) over time" (p. 272). Talent scouts usually identify future talentees by observing the noncompetitive learning activities of a mixed group of learners (e.g., standard schooling,

music lessons, playful sport participation); they look for outstanding and precocious achievements (i.e., emerging talent), as well as signs of strong intrinsic motivation and volition. If forced to choose between intellectual giftedness and academic talent measures, I would prioritize academic talent, even if it meant that some selected students would not reach the minimum giftedness threshold of top 10%. Other scientifically confirmed significant predictors, like those mentioned previously, can easily compensate for below threshold natural cognitive abilities.

7. Early introduction. The final characteristic of IMTD-inspired ATD programs questions a common administrative practice in school districts—delay structured enrichment until at least Grades 3 or 4. The justifications given appear associated with worries about (a) a less reliable selection of procedures with younger children, (b) a still fragile development in younger children, and (c) a too rapid move from the playful early school environment to the more achievement-oriented classroom treadmill (Rogers, 1991). That postponement policy contradicts a fundamental law of individual differences in development: precocity can manifest itself precociously. Indeed, the popularity of the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 2003) confirms that intellectual precocity becomes easily noticeable by ages 3 or 4. Indeed, many children who enter kindergarten already know the alphabet, can write their name, read some words, and do simple arithmetic. Their intellectual precocity makes them better prepared than the average first grader to tackle the Grade 1 curriculum. Dozens of studies (see Gagnier, 1999) have shown that the level of cognitive development, as measured by IQ and/or school readiness tests, predicts academic achievement in the first grades of elementary school much better than students' chronological age. The correlation between chronological age and academic achievement among cohorts of first graders ranges between .10 and .25 (Gagné & Gagnier, 2004), whereas the predictive power increases to .50 or more when using school readiness tests (Jensen, 1980). In terms of explained variance (r^2), the difference between the two predictors amounts to at least a 6:1 ratio. Although early entrance provisions have never become popular, research evidence has shown their numerous benefits. After examining all 68 evaluative studies of early entrance, Rogers (1991) concluded that it constitutes a very desirable initiative for the majority of children. In summary, this seventh characteristic strongly invites school administrators to make this initial service the cornerstone of their school district's talent development program. Of course, qualifying early entrance as a cornerstone implies that it should be followed by the other building blocks of a comprehensive ATD pathway, from kindergarten to college.

Summary and Conclusions

The second part of this chapter aimed to identify the characteristics of ATD programs that best encourage an academic talentee's outstanding potential. I described seven constituent elements that were essential to reach that goal. These characteristics led to formal definitions of IMTD-inspired programs and processes. ATD programs could in turn be sequentially structured into a comprehensive K–12 ATD pathway. Concretely, it would begin in kindergarten or first grade with an early entrance policy for intellectually precocious children. Beyond that initial cornerstone, academic talentees would follow a parallel, constantly enriched pathway through primary and high school. This pathway would be available to all children manifesting clear indices of future outstanding academic achievement, and it would invite these academic talentees to set for themselves challenging academic excellence goals. Full-time ability grouping would not necessarily mean enforcing an enriched age-grade lockstep; educators would still occasionally allow further acceleration because of remaining large individual differences in learning pace within the talentee population. This comprehensive programming pathway would introduce more relevant designations, replacing the labels gifted children and gifted education with the more relevant terms talentee, academically talented, and ATD. Educators would still use the gifted label, but in a more specific context; it would refer to natural abilities (e.g., when talking about gifted learners) as proposed within the DMGT framework. But the term academically talented student would become the more common expression, if only because it represents the main criterion of access

to, and progress within, ATD programs. Teachers responsible for guiding talentees through the various components of that ATD pathway would be called ATD teachers.

I am not aware that such a pathway exists anywhere. Indeed, most school systems in developed countries do not even succeed in putting into practice the first two key characteristics. Indeed, as discussed in more detail elsewhere (Gagné, 2011), the two more popular prototypes currently found in elementary classrooms (Archambault et al., 1993; Cox et al., 1985) are pull-out classes and regular classroom enrichment. Both practices ignore most of the key characteristics described previously, especially the crucial principle of daily enrichment of the regular school curriculum. In the specific case of regular classroom enrichment, major evaluation studies (e.g., Archambault et al., 1993; Robinson, 1998) have shown that the majority of these provisions offer little more than a lip service response to talented students' needs. The results revealed, among other things, that teachers offered these activities no more than two or three times a month. Even worse, the activities usually targeted the whole classroom, leaving little specific enrichment for talented students. The authors concluded that their survey had painted

> a disturbing picture of the types of instructional services gifted students receive in regular classrooms across the United States. It is clear from the results that teachers in regular third and fourth grade classrooms make only minor modifications in the curriculum and their instruction to meet the needs of gifted students. (Archambault et al., 1993, p. 5)

From these results, one can understand the *busywork* label Julian Stanley (1979) used with disdain to describe most of what passes for regular classroom enrichment.

If we encounter virtually no IMTD-based ATD programs in primary schools, we can observe interesting examples of ATD-style academic enrichment at the high-school level (e.g., 165 highly selective public high schools in 30 U.S. states—less than 1%—identified by Finn & Hockett, 2012, or the 45 or so selective high schools in New South Wales, Australia [List of Selective High Schools in New South Wales, 2017]). When systematically implemented with a truly enriched curriculum, self-contained honors classes also represent potentially appropriate examples of ATD (Kulik, 2003). This limited sample of existing programs demonstrates that the IMTD's ATD model can be implemented in our field, if not as a full ATD pathway, at least through partial ATD programs. On the other hand, their small number, especially their almost total absence in elementary and middle schools, suggests that extensive dissemination lies far in the future. Most school systems fall very short of answering the educational needs of their academically talented high school students; they have planned as their unique pathway an age-grade lockstep coupled with a slow-paced curriculum that covers the 13 years from kindergarten to twelfth grade. And that harsh judgment of academic monotony extends to almost every developed country. Such slow dissemination should surprise no one; ATD promoters face numerous obstacles. The specter of elitism hangs constantly over their heads; the low priority in most schools of talented students' educational needs remains a serious obstacle to increased public investment; the ambivalent attitudes of many teachers and administrators have deep roots; and resistance toward the two main administrative provisions needed to fully implement the ATD model (full-time grouping and acceleration) will not disappear easily. Changes in terminology will also happen very slowly. The gifted label is too deeply embedded in our professional lexicon to expect a rapid increase in use for the terms academically talented or talentee. In summary, just as students do with regard to their educational goals, we should split our ultimate objective into a coordinated series of more modest intermediate goals. If we believe in the ATD model, we must maintain constant pressure on educational authorities and the school community. As stated in my 11th commandment (Gagné, 2008): "Thou shalt advocate . . . unremittingly!" (p. 237).

References

Anastasi, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Angoff, W. H. (1988). The nature–nurture debate, aptitudes, and group differences. *American*

Psychologist, *43*, 713–720. http://dx.doi.org/10.1037/0003-066X.43.9.713

Archambault, F. X., Jr., Westberg, K. L., Browns, S. W., Hallmark, B. W., Emmons, C. L., & Zhang, W. (1993). *Regular classroom practices with gifted students: Results of a national survey of classroom teachers*. Storrs, CT: The National Research Center of the Gifted and Talented.

Balchin, T., Hymer, B., & Matthews, D. J. (Eds.). (2009). *The Routledge international companion to gifted education*. London, England: Routledge.

Barbe, W. B., & Renzulli, J. S. (Eds.). (1975). *Psychology and education of the gifted* (2nd ed.). New York, NY: Halsted Press.

Bloom, B. S. (Ed.). (1985). *Developing talent in young people*. New York, NY. Ballantine Books.

Borland, J. H. (1989). *Planning and implementing programs for the gifted*. New York, NY: Teachers College Press.

Brody, L. E. (2009). Personalized programs for talent development: The Johns Hopkins model for meeting individual needs. In B. MacFarlane & T. Stambaugh (Eds.), *Leading change in gifted education: The festschrift of Dr. Joyce VanTassel-Baska* (pp. 93–105). Waco, TX: Prufrock Press.

Brody, L. E., & Stanley, J. C. (2005). Youths who reason exceptionally well mathematically and/or verbally: Using the MVT:D^4 model to develop their talents. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2nd ed., pp. 20–37). http://dx.doi.org/10.1017/CBO9780511610455.003

Callahan, C. M., & Hertberg-Davis, H. L. (2013). *Fundamentals of gifted education*. New York, NY: Routledge.

Colangelo, N., & Assouline, S. (Eds.). (2001). *Talent development IV: Proceedings from the 1998 Henry B. and Jocelyn Wallace national research symposium on talent development*. Scottsdale, AZ: Great Potential.

Colangelo, N., Assouline, S., & Gross, M. U. M. (2004). *A nation deceived: How schools hold back America's brightest students*. Iowa City, IA: Connie Belin and Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Colangelo, N., & Davis, G. A. (Eds.). (1997). *Handbook of gifted education* (2nd ed.). Boston, MA: Allyn & Bacon.

Colangelo, N., & Davis, G. A. (Eds.). (2003). *Handbook of gifted education* (3rd ed.). Boston, MA: Allyn & Bacon.

Coleman, L. J., & Cross, T. L. (2001). *Being gifted in school: An introduction to development, guidance, and teaching*. Waco, TX: Prufrock Press.

Corno, L. (1993). The best-laid plans: Modern conceptions of volition and educational research. *Educational Researcher*, *22*, 14–22. http://dx.doi.org/10.3102/0013189X022002014

Cox, J., Daniel, N., & Boston, B. O. (1985). *Educating able learners: Programs and promising practices*. Austin: University of Texas Press.

Croft, L. J. (2003). Teachers of the gifted: Gifted teachers. In N. Colangelo and G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 558–571). Boston, MA: Allyn & Bacon.

Davis, G. A., & Rimm, S. B. (1985). *Education of the gifted and talented*. Englewood Cliffs, NJ: Prentice Hall.

Difference between anatomy and morphology. (2012). Retrieved from http://www.differencebetween.com/difference-between-anatomy-and-vs-morphology

Dixon, F. A., & Moon, S. M. (Eds.). (2006). *The handbook of secondary gifted education*. Waco, TX: Prufrock Press.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*, 1087–1101. http://dx.doi.org/10.1037/0022-3514.92.6.1087

Durr, W. K. (1964). *The gifted student*. New York, NY: Oxford University Press.

Ericsson, K. A. (2002). Attaining excellence through deliberate practice: Insights from the study of expert performance. In M. Ferrari (Ed.), *The pursuit of excellence in education* (pp. 4–55). http://dx.doi.org/10.1002/9780470690048.ch1

Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. Feltovich, & R. R. Hoffman (Eds.), *Cambridge handbook of expertise and expert performance* (pp. 683–706). http://dx.doi.org/10.1017/CBO9780511816796.038

Feldhusen, J. F. (1992). *Talent identification and development in education (TIDE)*. Sarasota, FL: Center for Creative Learning.

Finn, C. E., Jr., & Hockett, J. A. (2012). *Exam schools: Inside America's most selective public high schools*. http://dx.doi.org/10.1515/9781400844579

French, H. M. (2009). Curriculum differentiation. In B. MacFarlane & T. Stambaugh (Eds.), *Leading change in gifted education: The festschrift of Dr. Joyce VanTassel-Baska* (pp. 351–360). Waco, TX: Prufrock Press.

Gagné, F. (1985). Giftedness and talent: Reexamining a reexamination of the definitions. *Gifted Child Quarterly*, *29*, 103–112. http://dx.doi.org/10.1177/001698628502900302

Gagné, F. (1987). Doit-on regrouper les élèves doués ou talentueux? [Should we group gifted or talented

students?]. *Revue Canadienne de Psycho-Education*, *16*, 57–75.

Gagné, F. (1998). A proposal for subcategories within the gifted or talented populations. *Gifted Child Quarterly*, *42*, 87–95. http://dx.doi.org/10.1177/001698629804200203

Gagné, F. (2000). Understanding the complex choreography of talent development through DMGT-based analysis. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. Subotnik (Eds.), *International handbook for research on giftedness and talent* (2nd ed., pp. 67–79). http://dx.doi.org/10.1016/B978-008043796-5/50005-X

Gagné, F. (2004). Transforming gifts into talents: The DMGT as a developmental theory. *High Ability Studies*, *15*, 119–147. http://dx.doi.org/10.1080/1359813042000314682

Gagné, F. (2005). From noncompetence to exceptional talent: Exploring the range of academic achievement within and between grade levels. *Gifted Child Quarterly*, *49*, 139–153. http://dx.doi.org/10.1177/001698620504900204

Gagné, F. (2007). Ten commandments for academic talent development. *Gifted Child Quarterly*, *51*, 93–118. http://dx.doi.org/10.1177/0016986206296660

Gagné, F. (2008). Talent development: Exposing the weakest link. *Revista Española de Pedagogía*, *LXVI*, 221–240.

Gagné, F. (2011). Academic talent development and the equity issue in gifted education. *Talent development and excellence, 3*, 3–22.

Gagné, F. (2013). The DMGT: Changes within, beneath, and beyond. *Talent Development and Excellence*, *5*, 5–19.

Gagné, F. (2015). Academic talent development programs: A best practices model. *Asia Pacific Education Review*, *16*, 281–295. http://dx.doi.org/10.1007/s12564-015-9366-9

Gagné, F., & Gagnier, N. (2004). The socio-affective and academic impact of early entrance to school. *Roeper Review: A Journal on Gifted Education*, *26*, 128–138. http://dx.doi.org/10.1080/02783190409554258

Gagné, F., & McPherson, G. E. (2016). Analyzing musical prodigiousness using Gagné's Integrative Model of Talent Development. In G. E. McPherson (Ed.), *Musical prodigies: Interpretations from psychology, education, musicology, and ethnomusicology* (pp. 3–114). Oxford, England: Oxford University Press.

Gagnier, N. (1999). *L'adaptation socio-affective et scolaire des élèves admis à une entrée précoce au préscolaire* [The socio-affective and academic adjustment of students admitted early in kindergarten] (Unpublished doctoral dissertation). University of Quebec, Montreal, Quebec, Canada.

Harden, K. P., Turkheimer, E., & Loehlin, J. C. (2007). Genotype by environment interaction in adolescents' cognitive aptitude. *Behavior Genetics*, *37*, 273–283. http://dx.doi.org/10.1007/s10519-006-9113-4

Heller, K. A., Mönks, F. J., & Passow, A. H. (Eds.). (1993). *International handbook of research and development of giftedness and talent*. Oxford, England: Pergamon Press.

Heller, K. A., Mönks, F. J., Sternberg, R. J., & Subotnik, R. (Eds.). (2000). *International handbook for research of giftedness and talent* (2nd ed.). Oxford, England: Pergamon Press.

Hertberg-Davis, H. L., & Callahan, C. M. (2013). Defensible curriculum for gifted students: An introduction. In C. M. Callahan & H. L. Hertberg-Davis (Eds.), *Fundamentals of gifted education* (pp. 259–262). New York, NY: Routledge.

Jensen, A. R. (1980). *Bias in mental testing*. New York, NY: Free Press.

Johnsen, S. K. (2009). Identification. In B. Kerr (Ed.), *Encyclopedia of giftedness, creativity, and talent* (pp. 439–443). http://dx.doi.org/10.4135/9781412971959.n194

Kaplan, S. N. (2009). The grid: A model to construct differentiated curriculum for the gifted. In J. S. Renzulli, E. J. Gubbins, K. McMillen, R. D. Eckert, & C. A. Little (Eds.), *Systems and models for developing programs for the gifted and talented* (2nd ed., pp. 235–251). Mansfield Center, CT: Creative Learning Press.

Kerr, B. (2009). *Encyclopedia of giftedness, creativity, and talent*. http://dx.doi.org/10.4135/9781412971959

Kuhl, J., & Beckmann, J. (Eds.). (1985). *Action control: From cognition to behavior*. http://dx.doi.org/10.1007/978-3-642-69746-3

Kulik, J. A. (2003). Grouping and tracking. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 268–281). Boston, MA: Allyn & Bacon.

List of selective high schools in New South Wales. (2017). Retrieved from https://en.wikipedia.org/wiki/List_of_selective_high_schools_in_New_South_Wales

Lupkowski-Shoplik, A., Benbow, C. P., Assouline, S. G., & Brody, L. E. (2003). Talent searches: Meeting the needs of academically talented youth. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 204–218). Boston, MA: Allyn & Bacon.

MacFarlane, B., & Stambaugh, T. (Eds.). (2009). *Leading change in gifted education: The festschrift of Dr. Joyce VanTassel-Baska*. Waco, TX: Prufrock Press.

Macintosh, N. J. (2011). *IQ and human intelligence* (2nd ed.). Oxford, England: Oxford University Press.

Marques, S. C., Pais-Ribeiro, J. L., & Lopez, S. J. (2011). The role of positive psychology constructs in predicting mental health and academic achievement in children and adolescents: A two-year longitudinal study. *Journal of Happiness Studies*, *12*, 1049–1062. http://dx.doi.org/10.1007/s10902-010-9244-4

Marsh, H. W., & Hau, K. T. (2003). Big-fish-little-pond effect on academic self-concept. A cross-cultural (26-country) test of the negative effects of academically selective schools. *American Psychologist*, *58*, 364–376. http://dx.doi.org/10.1037/0003-066X.58.5.364

McCrae, R. B. (2009). The Five-Factor Model of personality traits: Consensus and controversy. In P. J. Corr & G. Matthews (Eds.), *The Cambridge handbook of personality psychology* (pp. 148–161). http://dx.doi.org/10.1017/CBO9780511596544.012

Moon, S. M., & Rosselli, H. C. (2000). Developing gifted programs. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. Subotnik (Eds.), *International handbook for research on giftedness and talent* (2nd ed., pp. 499–521). Oxford, England: Pergamon.

Muijs, R. D. (1997). Predictors of academic achievement and academic self-concept: A longitudinal perspective. *British Journal of Educational Psychology*, *67*, 263–277. http://dx.doi.org/10.1111/j.2044-8279.1997.tb01243.x

Nijenhuis, J., Jongeneel-Grimen, B., & Kirkegaard, E. O. W. (2014). Are Headstart gains on the *g* factor? A meta-analysis. *Intelligence*, *46*, 209–215. http://dx.doi.org/10.1016/j.intell.2014.07.001

Nurnberger, J. I., Jr., & Bierut, L. J. (2007). Seeking the connections: Alcoholism and our genes. *Scientific American*, *296*(4), 46–53. http://dx.doi.org/10.1038/scientificamerican0407-46

Olszewski-Kubilius, P. (2009). The idea of talent development: How we got there and where we are going. In B. MacFarlane & T. Stambaugh (Eds.), *Leading change in gifted education: The festschrift of Dr. Joyce VanTassel-Baska* (pp. 81–91). Waco, TX: Prufrock Press.

Passow, A. H. (Ed.). (1979). *The gifted and talented: Their education and development*. Chicago, IL: University of Chicago Press.

Peters, S. J., Matthews, M. S., McBee, M. T., & McCoach, D. B. (2014). *Beyond gifted education: Designing and implementing advanced academic programs*. Waco, TX: Prufrock Press.

Plomin, R. (1998). Genetic influence and cognitive abilities. *Behavioral and Brain Sciences*, *21*, 420–421. http://dx.doi.org/10.1017/S0140525X98381236

Plomin, R., DeFries, J. C., Craig, I. W., & McGuffin, P. (2003). *Behavioral genetics*. In R. Plomin, J. C. DeFries, I. W. Craig, & P. McGuffin, P. (Eds.), *Behavioral genetics in the postgenomic era* (pp. 3–15). Washington, DC: American Psychological Association.

Plucker, J. A., & Callahan, C. M. (Eds.). (2008). *Critical issues and practices in gifted education: What the research says*. Waco, TX: Prufrock Press.

Plucker, J. A., Robinson, N. M., Greenspon, T. S., Feldhusen, J. F., McCoach, D. B., & Subotnik, R. F. (2004). It's not how the pond makes you feel, but rather how high you can jump. *American Psychologist*, *59*, 268–269. http://dx.doi.org/10.1037/0003-066X.59.4.268

Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). *Curriculum compacting: The complete guide to modifying the regular curriculum for high ability students*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S. (2009). The multiple menu model for developing differentiated curriculum. In J. S. Renzulli, E. J. Gubbins, K. McMillen, R. D. Eckert, & C. A. Little (Eds.), *Systems and models for developing programs for the gifted and talented* (2nd ed., pp. 353–381). Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Gubbins, E. J., McMillen, K. S., Eckert, R. D., & Little, C. A. (2009). *Systems and models for developing programs for the gifted and talented* (2nd ed.). Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1991). The reform movement and the quiet crisis in gifted education. *Gifted Child Quarterly*, *35*, 26–35. http://dx.doi.org/10.1177/001698629103500104

Robinson, G. J. (1998). *Classroom practices with high achieving students: A national survey of middle school teachers* (Unpublished doctoral dissertation). University of Connecticut, Storrs.

Rogers, K. B. (1991). *A best evidence synthesis of the research on types of accelerative programs for gifted students* (Doctoral dissertation). Available from Dissertation Abstracts International (UMI no. 9122206).

Rogers, K. B. (2009). What we now know about appropriate curriculum and instruction for gifted learners. In B. MacFarlane & T. Stambaugh (Eds.), *Leading change in gifted education: The festschrift of Dr. Joyce VanTassel-Baska* (pp. 263–269). Waco, TX: Prufrock Press.

Rogers, K. B., & Span, P. (1993). Ability grouping with gifted and talented students: Research and guidelines. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and*

development of giftedness and talent (pp. 585–592). Oxford, England: Pergamon Press.

Rothbart, M. K. (2012). Advances in temperament: History, concepts, and measures. In M. Zentner & R. L. Shiner (Eds.), *Handbook of temperament* (pp. 3–20). New York, NY: Guilford Press.

Shavinina, L. (Ed.). (2009). *International handbook on giftedness*. http://dx.doi.org/10.1007/978-1-4020-6162-2

Siegle, D., & McCoach, D. B. (2013). Underachieving gifted students. In C. M. Callahan and H. L. Hertberg-Davis (Eds.), *Fundamentals of gifted education: Considering multiple perspectives* (pp. 377–387). New York, NY: Routledge.

Stanley, J. C. (1979). Educational non-acceleration: An international tragedy. In J. J. Gallagher (Ed.), *Gifted children: Reaching their potential* (pp. 16–43). Jerusalem, Israel: Kollek & Sons.

Sternberg, R. J., & Davidson, J. E. (Eds.). (2005). *Conceptions of giftedness* (2nd ed.). http://dx.doi.org/10.1017/CBO9780511610455

Tannenbaum, A. J. (1983). *Gifted children: Psychological and educational perspectives*. New York, NY: Macmillan.

Tomlinson, C. A. (2009). The parallel curriculum model: A design to develop potential and challenge high-ability learners. In J. S. Renzulli, E. J. Gubbins, K. McMillen, R. D. Eckert, & C. A. Little (Eds.), *Systems and models for developing programs for the gifted and talented* (2nd ed., pp. 571–597). Mansfield Center, CT: Creative Learning Press.

VanTassel-Baska, J., Feng, A. X., Brown, E., Bracken, B., Stambaugh, T., French, H., . . . Bai, W. (2008). A study of differentiated instructional change over 3 years. *Gifted Child Quarterly*, *52*, 297–312. http://dx.doi.org/10.1177/0016986208321809

VanTassel-Baska, J., & Little, C. A. (Eds.). (2003). *Content-based curriculum for high-ability learners*. Waco, TX: Prufrock Press.

von Stumm, S., Hell, B., & Chamorro-Premuzic, T. (2011). The hungry mind: Intellectual curiosity is the third pillar of academic performance. *Perspectives on Psychological Science*, *6*, 574–588. http://dx.doi.org/10.1177/1745691611421204

Vygotsky, L. S. (1978). *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.

Wechsler, D. (2003). *Wechsler intelligence scale for children* (4th ed.). San Antonio, TX: Psychological Corporation.