

Introduction

When the first edition of this book was published several years ago, our understanding of “giftedness” was largely based on theories and research in behavioural and cognitive psychology. Neuroscientists had barely begun to use their scanning technologies to look inside the working brain of gifted and talented people. But during the first decade of this twenty-first century, the field of neuroscience has just exploded, splintering into new disciplines, such as social cognitive neuroscience and behavioural neuroscience. Of particular interest to educators is the emergence of educational neuroscience, an area that promises to enrich pedagogy with new insights into how we can translate research in the neurosciences into educational practice.

This book is designed to examine the needs of gifted and talented students, to uncover what more we are learning about the gifted brain, and to suggest strategies and programs that can help our best and brightest students achieve their full potential. Classroom teachers, education specialists, administrators, instructors and parents should all find items of interest in *How the Gifted Brain Learns*. Although many books have been written about the gifted, this book focuses primarily on insights to be gained about the gifted brain from the current explosion of research in neuroscience. It also reviews research information about the gifted learner for prospective and current teachers and administrators so that they may consider alternative instructional approaches.

WHAT DO WE MEAN BY GIFTED AND TALENTED?

Many terms are used to describe the student who demonstrates exceptional talent, and sometimes these terms themselves become a challenge to understand. *Gifted* is the most commonly used word, but it has hundreds of definitions, from legal to jargon. *Talented* usually describes an individual with a performance skill that has been refined through practice, such as music or dance. *Precocious* and *prodigy* are most commonly used to describe young children who display a high level of skill in a particular endeavour at a very early age.

In earlier times, *genius* was widely used, but it is now limited to the phenomenally gifted. *Superior* has recently come into vogue. Being a comparative term, it tempts one to ask superior to whom or to what, and to what degree. The vagueness of the term limits its usefulness in helping educators design an educational program for an individual student. *Exceptional* is an appropriate term when referring to a gifted child as being different from the regular school population, although it is also used to describe children with learning difficulties.

During the 1970s, the combined term *gifted and talented* came into common use. Although *gifted* and *talented* are often used interchangeably, Gagné (1985) differentiated between the two terms. For Gagné, *giftedness* is above-average aptitude (as measured by IQ tests) in creative and intellectual abilities, and *talent* is above-average performance in an area of human activity, such as music, mathematics or literature.

In recent years, most researchers have moved away from defining *giftedness* solely in terms of IQ tests and have broadened its usage to include the characteristics of giftedness, such as creativity and motivation.

Currently, the process of identifying gifted students and the programs designed to address their needs vary greatly by year level and school area. Gifted students who are not identified and served by these programs are not likely to ever have their needs fully met while in school.

Our society has not given the same attention to the education of the gifted as it has given to other special groups.

The loss of such potential is a serious blow to society as well as to the student and teacher. The student never feels fulfilled, loses self-esteem and lacks direction. The teacher, meanwhile, is faced with student boredom, underachievement and a litany of discipline problems that could have been avoided. One purpose of this book is to examine the current state of programs for the gifted and to suggest what we might do to make them better serve the gifts and talents of all students.

A Word About Elitism

Some parents, educators and politicians object to any special programs for gifted children on the grounds of *elitism*. This word has acquired the negative connotations of snobbishness, selectivity and unfair special attention at a time, critics say, when we should be emphasising egalitarianism. Even some educators believe this notion of elitism has only been encouraged by efforts that emphasise increasing resources for less able students but do little to enhance programs for our most able students.

The reality is that gifted students are elite in the sense that they possess skills to a higher degree than most people in their class. The same is true for professional athletes, musical soloists, inventors or physicians. Parents and schools must provide children with equal opportunity, not equal treatment. Treating all students as though they learned exactly the same way is folly. Therefore, schools have a responsibility to challenge gifted students to their fullest potential while, at the same time, challenging those who cry elitism to rethink the true meaning of the word and the real purpose of education.

ABOUT THIS BOOK

The serious problems of the twenty-first century (e.g. dealing with climate change, protecting the environment and managing population growth) will require the concerted efforts of our best minds. Thus, more attention needs to be given to clarifying what constitutes a comprehensive and effective gifted program and what steps schools can take to ensure a broad and rich variety of educational experiences for our most gifted students.

Questions This Book Will Answer

This book will answer questions such as these:

- How different are the brains of gifted students from those of typical students?
- What kinds of strategies are particularly effective for students with specific gifts?
- What progress is brain research making in discovering the nature of intelligence and giftedness?
- Will brain research help us identify potentially gifted students sooner and more accurately?
- Are schools adequately challenging gifted students today? If not, what can we do about it?
- How can improving programs for the gifted and talented benefit other students?
- What can we do to identify and help gifted students who are underachievers?
- How can we identify students who are both gifted and learning disabled, and how can we help them?
- What insights are we gaining about students who are gifted in language, mathematics and the arts?
- What progress are we making in identifying underrepresented minorities for gifted programs?

Chapter Contents

Chapter 1. What Is a Gifted Brain? This chapter looks at various conceptual schemes (e.g. psychological, socio-emotional) that attempt to define the nature of intelligence and giftedness. Of particular interest is the discussion over the long-standing debate about whether nature (i.e. genetic programming) or nurture (i.e. environment and upbringing) has greater impact on talent development. Several current models of giftedness are explained as well as a review of what current researchers suggest are the characteristics that gifted individuals are likely to display.

Chapter 2. Challenging the Gifted Brain. Here we examine specific suggestions for designing curricular and instructional strategies that are more likely to challenge the gifted brain. Because many teachers are faced with addressing the needs of gifted students within the context of the inclusive classroom, this chapter focuses on the concept of differentiated curriculum. Also discussed are acceleration, curriculum compacting, grouping formats and other techniques that have been successful in developing the talents of gifted students.

Chapter 3. Underachieving Gifted Students. In this chapter, we investigate the various symptoms, causes, and types of underachievement in gifted students. A somewhat overlooked area of gifted education, this chapter presents ways of identifying these students and suggests strategies for reversing underachievement. Particular attention is paid to the growing number of underachieving minority students and to ways for addressing their needs.

Chapter 4. The Twice-Exceptional Brain. Although the notion that a person can be both gifted and learning disabled may seem strange, this chapter examines the twice-exceptional student. The difficulties of identifying these students along with some of the more common combinations of giftedness and learning disabilities are discussed—for example, gifted children with attention-deficit hyperactivity disorder or autism.

Chapters 5, 6 and 7. Language, Mathematical and Artistic Talent. These chapters deal with attempts to understand the nature of giftedness in three specific areas: language, mathematics and the arts, respectively. As scientific evidence accumulated over the last few decades suggesting that the human brain is pre-wired for language, mathematics and artistic capabilities, research resources were directed toward investigating the cerebral nature of these activities. Consequently, we include these areas because they currently have the largest base of research studies among all the school disciplines. Furthermore, there is little evidence at this time to indicate that the brain is specifically wired for science, economics or history. According to current thinking, it is more likely that high ability in these areas results from high ability in one or more of the pre-wired areas (e.g. mathematics for science, and language for history) coupled with intense personal interest in, say, scientific phenomena or historical events.

Chapter 8. Putting It All Together. Finally, this chapter suggests some ways of identifying gifted children and setting up a learning environment where gifted students, along with their classmates, can excel in the inclusive classroom. The effectiveness of current programs to aid gifted students in primary and secondary schools is also discussed.

CHAPTER 1

What Is a Gifted Brain?

Ask 50 people what is meant by giftedness and you will likely get 50 different definitions. And that becomes a major problem when deciding who is gifted. Nonetheless, some common elements will emerge from most of the descriptions. These might include describing a person's aptitude in a specific subject area or a talent in the visual or performing arts, or in sport. Also mentioned might be creativity, inventiveness or just plain "intelligent in everything". Descriptions of giftedness also vary from one culture to another. For example, in a culture with no formal schooling, a skilled hunter might be the gifted one. Gifted abilities are also more likely to emerge when the individual's talents coincide with what is valued by the culture. Chess prodigies, for example, appear in cultures where such talent is valued and nurtured. So it can be said that giftedness is what others in a society perceive to be higher or lower on some culturally embedded scale.

From one perspective, giftedness is what people in a society perceive to be higher or lower on some culturally embedded scale.

Even researchers in gifted education have a difficult time agreeing on what giftedness means. But they do agree on one thing: Giftedness derives from a well above average level of intelligence in one or more observable behaviours. So before we can understand what makes a person gifted, we have to take a closer look at what modern research has discovered about intelligence.

UNDERSTANDING INTELLIGENCE

Have We Found the Genes for Intelligence?

An obvious starting point in the search to understand intelligence is our genes. Impressive advances in methods for scanning our genetic makeup have inspired scientists to hunt for the specific gene or genes that can be linked to native intelligence. Imaging technologies that probe the workings of the brain are also valuable tools in this search because they may reveal the brain components that account for the differences in intelligence among individuals. The environment also plays an important role because some genes express their traits only when provoked by environmental influences.

Researchers often use studies of identical twins raised together and apart to explore whether certain traits are the result of genetics or the environment. Results of twin studies conducted over the past two decades have convinced some scientists that genes play a crucial role in intelligence but they do not act alone. So far, the hunt for specific genes related to intelligence has been disappointing. Comparing the DNA of highly intelligent people with each other and with the DNA of people with low and average intelligence can reveal patterns, called markers, which help identify neighbouring genes. But tests have so far shown that these genes account for only a small variation in intelligence (Plomin & DeFries, 1998).

- Help people use their imagination to function in the real world and promote learning and productivity. For example, instead of the conventional school organised notebook, ask the students to create their own system for organising their work.

Emotional Strategies

- Accept all feelings, regardless of intensity. For people who are not highly emotional, this may seem particularly unusual. They may feel that those high in Emotional OE are just being melodramatic or seeking attention. But if we accept their emotional intensity as an innate trait and help them work through any problems that might result, we will facilitate their healthy growth and adjustment.
- Teach individuals to anticipate physical and emotional responses and to prepare for them. Emotionally intense people often are not aware when they are becoming so overwrought that they may lose control or may have physical responses to their emotions. Help them to identify the physical warning signs of their emotional stress such as a headache, sweaty palms or stomachache. By knowing the warning signs and acting on them early, individuals will be better able to cope with emotional situations and not lose control.

From a Teacher's Desk: A *Primary Example*

I had the challenging pleasure of two “twice exceptional” students in my class one year who evidenced several different kinds of overexcitability. Although they were both autistic and gifted, they were very different in their mannerisms. One student, Nathan, demonstrated sensual and imaginal overexcitability, while the other, Jamie, possessed psychomotor and intellectual overexcitability characteristics. Their varied intensities promised and delivered a year without a boring day!

In order to give the students an opportunity to evidence special abilities, one day I had the class play a PowerPoint *Jeopardy* game to review parts of speech. Jamie declared, “This is the best day ever!” Everyone wanted to be on his team because I set the scene with the facts that he regularly viewed the television show and had an excellent memory. He was quivering with enthusiasm at the prospect and desired to present the introductory part of the “show”, which he recited verbatim. His team did end up earning the most points and more importantly, he had the chance to be a social leader and demonstrate his intellect at the same time.

Some students are simply dissonant with the routines and rules of standard school structure. As Nathan resisted compliancy and preferred to be in his imaginative world, drawing all day, I struggled to challenge him. Creative humour and exaggeration would get his attention and connect with him on a personal level, but wouldn’t always produce results. Our “aha!” breakthrough moment was when I utilised independent study through technology. The Web site I found merged his interests and my expectations—he could research and explore his fascinations while also meeting standards. That day he changed from the stubborn underachiever who would hardly complete a sentence to a scholar that needed multiple pages to write down all of his ideas.

That year taught me some valuable ways to deal with overexcitability:

- Meet exaggeration with exaggeration
- Find humour in each intense situation
- Allow opportunity for intensities to be shown (get excited with and for them)
- Use specific phrases as the teacher and demonstrate for other students (e.g. “When you interrupt like that, it hurts my feelings because I feel disrespected and I lose my train of thought . . .” or “When you tap like that it distracts me and I can’t concentrate” and “You see that child crying, with tears running down the face? That means they are sad and they need my help first-thing.”)
- Patience, patience, patience

Overexcited students can be exhausting one day and revitalising another day. Basically, if you give them attention and patience, they will repay you with positive reinforcement and revelations.