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# Gifted and Talented International

The Journal of the World Council for Gifted and Talented Children

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Gifted and Talented International



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# Promoting the Dream

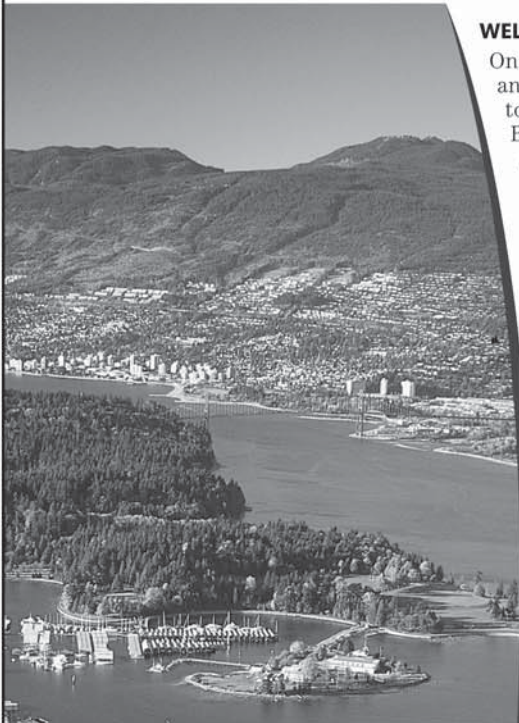


## 18<sup>th</sup> World Conference for Gifted and Talented Children

**August 3 - 7, 2009**  
**THE SHERATON VANCOUVER WALL CENTRE HOTEL**  
**Vancouver, Canada**

### IMPORTANT DATES

Online Abstract Submission Opens	<b>01 October 2008</b>
Online Registration Opens	<b>01 October 2008</b>
Abstract and Paper Submission Deadline	<b>19 January 2009</b>
Author Notification of Acceptance	<b>30 March 2009</b>
Final date to register and present at the Conference	<b>04 May 2009</b>
Conference Early Registration Deadline	<b>15 May 2009</b>
Preliminary Program appears online	<b>12 June 2009</b>
Conference Hotel Reservation Deadline	<b>01 July 2009</b>
Conference Regular Registration Deadline	<b>15 July 2009</b>



### WELCOME MESSAGE FROM THE CHAIR

On behalf of the World Council for Gifted and Talented Children, Inc. and the Local Organizing Committee, we are pleased to invite you to the 18<sup>th</sup> Biennial World Conference taking place in Vancouver, British Columbia, Canada from August 3<sup>rd</sup> to 7<sup>th</sup>.

The 18<sup>th</sup> Biennial World Conference will be an excellent opportunity for teachers, researchers, parents, and students from around the world to share the most up-to-date information regarding the science and advances in programs and practice. In addition to the outstanding program, you will also have an opportunity to enjoy the culture and sights of beautiful Vancouver and its surrounding areas. It is an opportunity you surely will not want to miss. Please, join us in Vancouver as we gather for a stimulating and enjoyable Conference and work together to promote the needs of gifted children worldwide.

### CONFERENCE REGISTRATION

Registration will open on October 1, 2008. For further information, please, visit the Registration Information section of the website at [www.worldgifted2009.com](http://www.worldgifted2009.com). If you wish to receive a copy of the registration package, along with a more complete description of the Conference, please, complete and return the self-addressed reply card found within this brochure.

#### Early Registration Fees (all fees in Canadian dollars) 01 October 2008 - 15 May 2009

Member Fee	\$485.00
Non-Member Fee	\$585.00
Student Fee	\$260.00

For more information on Registration, please, visit the Conference website or contact [conference@world-gifted.org](mailto:conference@world-gifted.org).

### KEYNOTE SPEAKERS

- **Dr. Lloyd Axworthy** (Canada), President and Vice-Chancellor of the University of Winnipeg
- **Robert Bateman** (Canada), artist and naturalist
- **Dr. John Geake** (United Kingdom), researcher and educator
- **Dr. Lannie Kanesky** (Canada), researcher and educator
- **Janet Matthews** (Canada), inspirational speaker and author
- **Dr. Joseph S. Renzulli** (USA), researcher and educator



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# Gifted and Talented International Volume 23, No.1

August 2008

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Submit all manuscripts in quadruplicate, double spaced, accompanied by a short abstract (approximately 100 to 150 words), and with citations and references, following the guidelines set forth in the Publication Manual of the American Psychological Association, Fifth Edition.  
Include author's full mailing address, phone and fax numbers, as well as an e-mail address.  
Send manuscripts to Taisir Subhi-Yamin, Editor, Gifted and Talented International, Heilmeyersteige 93, D-89075, Ulm, Germany, mobile telephone: (0049) 172-929-7632





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# From the Editor's Desk

Taisir Subhi-Yamin

Greetings and welcome to Volume 23, Number 1 (August, 2008) of Gifted and Talented International (GTI). The current issue comprises fourteen interesting articles and three book reviews, all of which broaden our view of this field and its assumptions. I am grateful to the originators of this material for the diligence and insight with which they so richly benefit this journal.

This issue appears three months after the editorship and production agreement between the World Council for Gifted and Talented Children (WCGTC) and the International Centre for Innovation in Education (ICIE). This five-year agreement enables the ICIE to edit the GTI, and to produce the journal in two formats, i.e., e-copy, and hard copy. For this opportunity, I am grateful to the members of the Executive Committee and the board of editors.

This issue's first article, "*Early Signs of Entrepreneurial Giftedness*" by Larisa V. Shavinina, opens a new direction in giftedness research. She introduced the concept of entrepreneurial giftedness in the belief that research in this context is important for the advancement of this field of knowledge. In addition, she believes this kind of research will shed light on an unexplored phenomenon — entrepreneurial talent as a special type of giftedness — "which has not yet been studied by psychologists". According to Shavinina "parents and teachers concerned with developing children's talents get interesting insights for practical implications. ... Future research is needed to provide a comprehensive understanding of this multidimensional and multifaceted phenomenon". In this article, she investigated early signs of entrepreneurial giftedness and its impact on the subsequent development of entrepreneurial talent by analyzing early general and specific manifestations of entrepreneurial giftedness in the cases of Richard Branson, Michael Dell, Bill Gates, Warren Buffett and other entrepreneurs.

In his article, "*An ACCESS Enrichment Model for an Undergraduate Education Program*", Philip A. Baker introduced the rationale, aims and objectives, and outcomes of capacity building programmes employed by the University of Winnipeg for the benefit of individuals from diverse cultural backgrounds. While many participants are from various immigrant or other minority groups, more than 50% are of Aboriginal descent.

In a highly competitive high-tech job market, students need particular competencies (knowledge, productive thinking skills, and expertise) to understand existing

knowledge, generate new ideas, adapt to change, cope with ambiguity, and properly perceive patterns. In "*International Teachers' Judgment of Gifted Mathematics Student Characteristics*", Abdullah Fici and Del Siegle pointed out that competency in mathematics is essential for employment in the new world economy. The authors of this article focused on four research questions: What are the demographic characteristics (gender, highest degree earned, certification in math, years of experience teaching math and other subjects, and current and highest level of teaching mathematics) of secondary school mathematics teachers in South Korea, Turkey, and United States? Is there a relation between the demographic characteristics of teachers and their ratings of the characteristics of mathematically gifted students? Are there any differences among mathematics teachers from South Korea, Turkey, and United States in terms of their ratings of the characteristics of mathematically gifted students? Are there any differences among mathematics teachers from South Korea, Turkey, and the United States in terms of their views about mathematics and the teaching of mathematics?

They confirmed teachers' key role in the identification and training of talented mathematicians and the importance of their attitudes in improving math instruction for gifted students. The authors concluded that identifying and providing services to gifted mathematicians is vitally important in a rapidly shrinking global economy that requires advanced technological skills. In addition, they found creativity in approaching problem solving is the most valued characteristic for young mathematicians to possess.

In the next article, "*Satisfaction with School Among Gifted Israeli Students Studying in Various Frameworks*", Hava Vidergor and Shunit Reiter assessed gifted students' satisfaction with school. The study found that a male gifted junior high school student, who had dropped out of a pullout program, and whose mother is a high school graduate, will express the lowest level of satisfaction with school. The authors argued that "policy makers and practitioners are encouraged to examine the possibility of incorporating enrichment programs for gifted and talented students into the regular elementary and junior high school curriculum". They imply that gifted education is essential to supply regular teachers with tools for curriculum differentiation that particularly emphasize the needs of gifted students. In addition, services for gifted

students should be enhanced by including a gifted specialist in each school to cater for the needs of the gifted.

In the fifth article, *“Blending Creativity, Science and Drama”*, Howard Nicholas and Wan Ng described how they provided an initial ‘thinking activation’ and promoted self-efficacy in their students. While framing abstract science concepts in a more concrete, visual and novel form, in this case through drama, they found students were able to draw on, further develop and apply their communicative, creative and higher order thinking skills. Their study demonstrated that creativity can be taught to high ability students by stimulating their thinking and providing the initial spark of activation to think. Novel ‘solutions’ for bringing concepts of science to life were demonstrated in the script.

The provision of dedicated training for teachers is an essential factor in the development of their competency and capacity to serve the gifted and talented students. In *“A Survey of Korean Elementary Teachers’ Perceptions of and In-service Needs for Gifted Education”*, HeeJung Kim and Marcia Gentry examined the Korean elementary teachers’ knowledge of and interest in gifted education, in-service training needs, and perceptions of gifted education to provide implications for developing in-service teacher training programs. This article provides guidelines for the training including employing qualified experts in the gifted education field, developing appropriate length of training sessions, finding the best time for training, and providing relevant content during training. This study demonstrated that teachers’ knowledge and interest are positively associated with training in gifted education.

In his article, *“Assessing the High School Teachers’ Emotional Intelligence in Karak District of Jordan”*, Mousa Alnabhan pointed out that emotions play a major part in all our lives. They are critical to our physical and mental health. Our overall development, including physical, social, mental, linguistic and spiritual growth, depends largely on our emotional well-being. This is particularly true of teachers who must be able to tolerate and deal with the stress associated with teaching. Based on data obtained from his study aimed at assessing the level of the emotional intelligence (EI) of high school teachers and exploring aspects of the EI, he is able to characterize the emotionally intelligent teacher who resists or delays the drive or temptation to act impulsively when dealing with others. He argues that a teacher with low frustration tolerance, impulsiveness, anger control problems, abusiveness, loss of self-control and explosive and unpredictable behavior is not going to be successful.

Potentially gifted and talented individuals can go through life unrecognized for their gifts and talents because they are not given the right opportunities to employ their gifts and talents in efficient and productive ways. Gifted children identified in a Mayan region, in the state of Yucatán, Mexico, as those who have demonstrated cognitive skills, scholarly motivation and creativity. The major purpose of this traditional identification process is to determine which children have needs for special educational provisions. In his article, *“Methods and Procedures in Screening Gifted Mayan Students”*, Pedro Sánchez Escobedo describes how 242 8th -grade students were identified through the use of standardized and non-standardized tests and additional qualitative assessment through interviews and observations. Results of this study highlighted the diverse difficulties in screening gifted Yucatec Mayan students, especially those arising from a deficiency in valid and pertinent standardized tests and a lack in teachers’ understanding regarding the conception of giftedness.

Recognising and nurturing giftedness in young children presents an important challenge to educators. In the next article *“Using Learning Journeys to Develop a Challenging Curriculum for Gifted Children in a Nursery (Kindergarten) Setting”*, David Coates; Wendy Thompson; and Andrew Shimmin introduced Learning Journeys (or stories) which were developed as a way of recording and then responding to children’s interests and motivations. Learning journeys are described as observational narratives which are more systematic than an anecdotal daily record. They include everything the child does and says whilst involved in an activity. This study found that gifted children’s Learning Journeys provided insights into the types of provision which provided both challenge for them and other children in the Nursery.

In the next article, *“The Reliability and Validity of a Spanish Translated Version of the Gifted Rating Scales”*, Javier I. Rosado; Steven I. Pfeiffer; and Yaacov Petscher examined the preliminary psychometric properties of a newly developed version of the Gifted Rating Scales-School Form (GRS-S) as translated into Spanish. Results provided initial support for the GRS-S as a reliable and potentially useful screening measure to assist in the identification of gifted students living on the island Puerto Rico.

Intuition is most frequently analyzed by either treating it as cognitive style or ability. With this in mind, Maciej Karwowski offers his article entitled: *“Giftedness and Intuition”*. He conducted two studies to show connections between giftedness and intuition. According to Karwowski, people differ in ways

they receive and respond to information from their surroundings. Some receive information through their senses step by step responding to it analytically and sequentially. Other individuals receive and respond to information by means of intuition, holistically, in jumps, and synthetically. Based on the results of his first study, Karwowski concluded that “by comparing gifted intuitionists and gifted rationalists, interesting differences were observed. Rationalists were significantly more conformist and less oriented towards a creative, heuristic style of behaviour than intuitionists”. His second study tested the theoretical model proposing intuition both as a style and ability. Results with respect to human functioning showed “independence between the ability level, i.e., intelligence and creative thinking, and cognitive style preferences, i.e., towards intuition or rationality. However, preference for a rational style of cognition was correlated significantly with school grades indicating higher achievement levels in school for rationalists than intuitionists”.

Understanding teachers’ beliefs with respect to the nature of giftedness is critical to any development of programmes and practices designed to enhance the provision for highly able students. Accurate identification of gifted and talented children is essential. However, beliefs based on theoretical models or assumptions rooted in personal conceptions can make the difference between gifted children being readily identified or being ignored. In this article, “*Gender, Social Behaviour and Domain of Ability – Influences on Teachers’ Diagnoses of Giftedness*”, Martina Endepohls-Ulpe investigated why German teachers seem to have more difficulties identifying giftedness in girls than boys. This study illustrates various ways by which teachers describe gifted and talented children, namely as excellent, having potential, being rare, being noticeable, possessing innate ability, being motivated as well as demonstrating asynchronous development. Although results failed to show evidence of influences of gender stereotypes on teachers’ diagnoses, they did reveal significant effects with respect to social behaviour and domain of giftedness.

In her article, “*Developmental Potential Among Creative Scientists*”, Rita R. Culross employed Dabrowski’s theory to frame her research about creativity among contemporary research scientists. Dabrowski’s Theory of Positive Disintegration provides a means of piercing the veil of creativity as it pertains to today’s creative scientists. Creative scientists are described in terms of Dabrowski’s concepts of psychic excitability and developmental potential. According to Rita Culross, “today’s scientists work in a world of collaboration, dependent not only on their intellectual, imaginal, psychomotor, and

emotional sensitivities, but also on their abilities to move beyond an egocentric perspective, accepting the traditional norms of the field, and re-imagining a new conceptualization of problems grounded in a clear sense of moral values.” The creative scientists must be willing to step away from their status as experts to allow the perspectives of others to influence the creative process. In pursuing new directions through a process of disintegration and growth the truly creative scientist will realize his or her full developmental potential and make way for new knowledge to emerge.

In the last article, “*Assessing the Effect of Explicit Teaching on High Reasoning Primary Students’ Knowledge of Self-Directed Learning*”, Penny Van Deur addresses the assumption that students with high ability are self-directed or autonomous learners and that teachers could develop self-direction in their gifted students by involving them in experiences requiring “increasing degrees and kinds of self-management”. She reports on an assessment of knowledge of Self-Directed Learning (SDL) in primary (elementary) South Australian school students, fifty-six of whom were assessed to be high reasoning. She addressed the issue of assessing whether explicit teaching has an effect on high reasoning students’ knowledge of SDL - a significant issue because it identifies the need for teachers to be aware of their expectations of students’ capability as self-directed learners. This article describes differences found in knowledge of SDL following a teaching intervention related to reasoning, and how, for high reasoning students in particular, engagement is important for developing this process knowledge.

In this issue of Gifted and Talented International, we present an in-depth review of “*Von der Aktivierung der Begabungsreserven zur Hochbegabtenförderung*” (*From the Activation of Hidden Talents to Promoting Highly Gifted Students*). The author, Kurt A. Heller, offers his contributions to the domain of giftedness and talent which take the form of 20 texts (in German) written over the past 40 years covering a broad spectrum of themes. This book is given a thoughtful review by Heinz Neber and his co-author.

In the second book review, James T. Webb and his co-authors’ book, “*A Parent’s Guide to Gifted Children*”, is given a comprehensive review by Mihyeon Kim. This book covers just about everything a parent of a gifted child needs to know about raising gifted children. Those who are new to the world of gifted children will find this book very informative. Any previous knowledge of giftedness is not required to read this book. Fifteen comprehensive chapters cover a number of issues pertinent to parenting, the conception of giftedness, conception



of creativity, behavioural characteristics of the gifted and talented, communication and motivation, perfectionism, stress, various programming options and educational services. It is one of the best books on parenting gifted children. Authors referred to research outcomes and frameworks and offer very clear discussions.

In the third book review, Karen Isaacson and Tamara Fisher's book, "*Intelligent Life in the Classroom: Smart Kids and their Teachers*" is given a comprehensive review by Sandra Linke. This practical book introduces readers to the wonderful world of identifying and nurturing the gifted and talented children, and offers them a wealth of practical knowledge and strategies for working with the gifted. Authors have contributed a refreshingly welcome perspective concerning the complexities of smart kids and the teachers who teach them. For example, they highlight how inconsistently children's abilities are labeled, i.e., a student who is inquisitive can be viewed as a disruption in one class and seen as gifted by another teacher in a different

school. Such perspectives can affect students' academic careers, self-esteem, and life choices. It is a thoughtful book that will provide graduate students, teachers, school principals, parents, and counselors inspiration to improve practices in all levels of the classroom educational settings.

I hope you will find the contents in this issue of Gifted and Talented International interesting, fascinating, useful and informative. It presents the high-water mark of the theory and practice of research in gifted education, and we hope that it will serve as a reference for years to come.

Should you have any comments or suggestions, please feel free to forward them to me. Additional intriguing works are already on the horizon, and a new look and format for the journal will be introduced. So, starting July 2009, look for a journal rather different in both form and substance to land on your desk!

*And ... stay tuned to Gifted and Talented International!*



# Early Signs of Entrepreneurial Giftedness

Larisa V. Shavinina<sup>1</sup>

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## Abstract

Although successful entrepreneurship is important for the economic prosperity of any society, one should acknowledge that entrepreneurial giftedness is terra incognita from a research viewpoint. This article analyzes early manifestations of entrepreneurial giftedness in the cases of Richard Branson, Michael Dell, and Bill Gates and thus opens a new direction in giftedness research. These outstanding, highly accomplished entrepreneurs with long-standing records of achievements in business represent cases of fulfilled or realized entrepreneurial giftedness. It is thus appropriate to study them in detail in order to understand the first signs of potential or developing entrepreneurial giftedness in today's children.

**Keywords:** Entrepreneurial giftedness, entrepreneurship, entrepreneurial talent, entrepreneurial ability, innovation, creativity, metacognitive abilities.

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## Introduction

At the age of 5 Carl decided to grow tomato plants. He purchased seeds and planted them. When the tomato plants were 10-15 cm., Carl went door-to-door to sell them for 1 euro each. The initial reaction of neighbors was not very pleasant: "They are too expensive,"—many of them said. Then Carl changed his strategy and asked the neighbors to pay "at least something." And they started to pay him 1 euro for each tomato plant. This is the beginning of the developmental trajectory of entrepreneurial giftedness. Such a developmental path is common for all gifted entrepreneurs (Branson, 2002; Dell, 1999).

*Entrepreneurial giftedness* refers to talented individuals who have succeeded in business by creating new ventures (*fulfilled* entrepreneurial giftedness) with at least a minimal financial reward or who demonstrates an exceptional potential ability to succeed (*prospective* entrepreneurial giftedness). As research on entrepreneurial giftedness is in its initial stage and we do not know a lot about this phenomenon, it seems reasonable to use the concepts 'entrepreneurial giftedness,' 'entrepreneurial talent,' and 'entrepreneurial ability' interchangeably. The given article is thus about an unexplored yet exciting topic within the field of high abilities: entrepreneurial giftedness.

It is interesting to note that scholars working in the area of entrepreneurship have not yet

studied entrepreneurial giftedness systematically (Shavinina, 2008b. The existing investigations of entrepreneurs' skills are not equal to entrepreneurial giftedness). Similarly, giftedness researchers have not yet made entrepreneurial giftedness a subject of systematic research. This article introduces the concept of entrepreneurial giftedness to the field of high abilities and thus fills an apparent niche in research on this important topic.

When an area of research is in its infancy—as is the case with the study of entrepreneurial giftedness—then the most reasonable strategy is to study those talented entrepreneurs whose entrepreneurial giftedness is undeniable. In other words, we have to concentrate on the cases of fulfilled entrepreneurial giftedness such as Richard Branson, Michael Dell, Bill Gates, Akio Morita, Fred Smith, and the like. The first logical step in this direction is to study early signs or manifestations of entrepreneurial giftedness. Such signs of entrepreneurial giftedness are indeed important indicators of the right start of the developmental trajectory of entrepreneurial giftedness. This article therefore presents early manifestations of entrepreneurial giftedness that clearly indicated the emergence of talented entrepreneurs. It provides valuable findings about the developmental trajectories of entrepreneurial giftedness and shed light on the scientific understanding of this phenomenon<sup>1</sup>.

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<sup>1</sup> Successful, gifted entrepreneurship in adulthood is associated with a high degree of practical intelligence, creative abilities, innovation, intuition, wisdom, excellence, managerial talent, and courage. These attributes are described in my chapters on managerial talent and innovation education included in *The International Handbook on Giftedness* (Shavinina, 2008a; Shavinina & Medvid, 2008). Consequently, I will not discuss these issues here but will exclusively concentrate on entrepreneurial giftedness in childhood.

From the methodological point of view, I will use the case-study method and will rely on (auto) biographical accounts of great entrepreneurs, which very well capture the early signs of entrepreneurial giftedness (Foster, 1986; Frey, 1978; Merriam, 1988). (Auto) biographical literature is crucial for research on individuals distinguished by their rarity as is the case with

gifted entrepreneurs. I will thus adopt a very different sampling procedure, *significant samples* (Simonton, 1999), because every talented entrepreneur, who achieved a remarkable success in business, is a significant sample. Specifically, (auto) biographical accounts of Richard Branson, Michael Dell, Bill Gates, and Warren Buffett will be used below.

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## Early manifestations of entrepreneurial giftedness

Two types of early signs of entrepreneurial giftedness can be identified: *specific* and *general*. Specific manifestations refer to those actions, abilities, skills, or personality traits that are directly related to *entrepreneurial* giftedness. For example, the creation of ventures with money-making potential belongs to the specific manifestations of entrepreneurial giftedness. General manifestations refer to those actions, abilities, skills, or personality traits that can also be useful in other types of giftedness and are not exclusively associated with entrepreneurial giftedness. For example, competitiveness as a personality trait is helpful in business and sports alike. It seems appropriate to identify the following interrelated yet different *specific* manifestations of entrepreneurial giftedness.

1. *Constantly generate ideas on how to make money:* creative abilities conducive to entrepreneurial giftedness. The following example is quite relevant here. When he was six, a boy “managed to buy a six-pack of Cokes for twenty-five cents; then he waddled around. . . selling the sodas at five cents each, for a nickel profit. Back in Omaha, he bought soda pop from his grandfather’s grocery and sold it door-do-door on summer nights while other children played in the street” (Lowenstein, 1996; p. 10). The boy became a famous businessmen and the second richest person in the world. His name is Warren Buffett.

2. *Love to generate and implement real-life projects with at least a minimal financial reward.* This is the key characteristic of entrepreneurial giftedness that incorporates both creative and innovative abilities of entrepreneurs. This is because innovation is essentially about the implementation of creative ideas into practice in the form of new products, processes, or services. The ability to implement ideas into practice implies highly developed executive or metacognitive abilities (Brown, 1978, 1987; Shavinina, 2003, 2007, 2008a). Many examples demonstrate that this is indeed one of the main characteristics of entrepreneurial giftedness in childhood.

For instance, when Richard Branson was 12 years old, he made his mind up to grow Christmas trees. “One Easter holiday, I decided to follow my mother’s example and make some money. Undeterred by the school’s lack of faith in my ability with numbers, I saw an opportunity to grow Christmas trees. . . I went round to talk Nik into the plan. He was also on holiday from his school. . . We would plant 400 Christmas trees in the field. . . By the Christmas after next, they would have grown to at least four feet and we would be able to sell them. Nik and I agreed to do the work together, and share the profits equally.

That Easter we furrowed the ground and planted the 400 seeds. . . We worked out that, if they all grew to six feet, we would make £2 a tree, creating a grand total of £800, compared with our initial investment of just £5 for the seeds. In the following summer holiday, we went to investigate the trees. There were one or two tiny sprigs above ground, but the rest had been eaten by rabbits. We exacted dire revenge and shot and skinned a lot of rabbits. We sold them to the local butcher for a shilling each, but it wasn’t quite £800 we had planned” (Branson, 2002, p. 37). Nevertheless, this failure did not stop Richard.

The following Christmas Nik’s brother was given a budgerigar as a present. This gave Richard “the idea for another great business opportunity: breeding budgies! For a start, I reasoned, I could sell them all year round rather than just during the fortnight before Christmas. I worked out the prices and made some calculations about how fast they could breed and how cheap their food was, and persuaded my father to build a huge aviary” (Branson, 2002, p. 37-38).

Another quite impressive example is Michael Dell who at the age of 12 organized his own stamp auction. The father of his best friend in Houston was a pretty avid stamp collector, so Michael and his friend also wanted to collect stamps. “To fund my interest in stamps, I got a job as a water boy in a Chinese restaurant two blocks from my house. I started reading stamp journals just for

fun, and soon began noticing that prices were rising. Before long, my interest in stamps began to shift from the joy of collecting to the idea that there was... a commercial opportunity” (Dell, 1999, p. 3). “It was obvious to me from what I’d read and heard that the value of stamps was increasing, and being a fairly resourceful kid, I saw this as an opportunity. My friend and I had already bought stamps at an auction, and since I knew even then that people rarely did something for nothing, I assumed that the auctioneers were making a decent fee. Rather than pay them to buy the stamps, I thought it would be fun to create my own auction” (Dell, 1999, p. 4). Michael thus decided to organize his own auction where he “could learn even more about stamps and collect a commission in the process” (Dell, 1999, p. 4). He got neighbors to consign their stamps to him, and then advertised “Dell’s Stamps” in *Linn’s Stamp Journal*. Finally, Michael typed, with one finger, a 12-page catalogue (he did not yet know how to type, nor had a computer) and mailed it out. He made \$2,000 on his very first business venture. The roots of the famous “direct model” of Dell Computer Inc. lie here, when Michael first experienced the power and the rewards of being direct (i.e., eliminating the middleman). He also learned an important lesson that “if you’ve got a good idea, it pays to do something about it” (Dell, 1999, p. 4).

3. *Love doing real business plans with predicted financial outcomes.* The case in point is Richard Branson. While neither of his childhood ventures had the effect of making money as he wanted, they did teach him “something about maths. “I found that it was only when I was using real numbers to solve real problems that maths made any sense to me. If I was calculating how much a Christmas tree would grow, or how many budgies would breed, the numbers then became real and I enjoyed using them. Inside the classroom I was still a complete dunce at maths. I once did an IQ test in which the questions just seemed absurd. I couldn’t focus on any of the mathematical problems, and I think that I scored about zero. I worry about all the people who have been classified as stupid by these kinds of tests. Little do they know what often these IQ tests have been dreamt up by academics who are absolutely useless at dealing with the practicalities of the outside world. I loved doing real business plans—even if the rabbits did get the better of me” (Branson, 2002, pp. 38-39).

4. *Work passionately and hard on executing their plans.* Young gifted entrepreneurs are able to work hard on implementing their projects into practice. They do everything necessary for their projects to succeed. For instance, gifted entrepreneurs from

early years are able to convince other people (e.g., parents, friends, and other relatives) to participate in the implementation of their ventures. Thus, Richard Branson involved his parents in all his projects. As mentioned above, Richard persuaded his father to build a huge aviary for his second business venture. He wrote to Dad from the school and explained the financial implications: “So few days now until the holidays. Have you ordered any material we might want for our giant budgerigar cage? I thought our best bet to get the budgerigars at reduced rate would be from Julian Carlyon. I feel that if the shops sold them for 30sh., we would get say 17sh. And we could buy them off him for 18 or 19sh. Which would give him a profit and save us the odd 10sh. per bird. How about it?” (Branson, 2002, p. 38).

His father “reluctantly built the aviary and the birds bred rapidly. However, I had overestimated the local demand for budgies. Even after everyone in Shamley Green had bought at least two, we were still left with an aviary full of them. One day at school I got a letter from my mother breaking the bad news that the aviary had been invaded by rats which had eaten the budgies. It was only many years that she confessed she had been fed up with cleaning out the aviary so one day had left the cage door open and they all escaped. She didn’t try too hard to recapture them” (Branson, 2002, p. 38).

5. *Wish to do ‘real’ things that bring money and try to do whatever possible to cut unnecessary steps.* It can be considered as one of the manifestations of practical intelligence in young gifted entrepreneurs. Michael Dell is a good example. “I’ve always been fascinated with eliminating unnecessary steps. When I was in third grade, I sent away for a high school diploma. I had seen the advertisement in the back of a magazine: “Earn your high school diploma by passing one simple test,” it said. It’s not like I had anything against school; I liked third grade. And getting a good education had always been really important to my family. But at that age, I was both impatient and curious. If there was a way to get something done more quickly and easily, I wanted to try it. And trading nine years of school for “one simple test” seemed like a pretty good idea to me. Early one evening, a woman from the testing company appeared at the door of my family’s home in Houston. My mother answered, and the woman politely asked for Mr. Michael Dell. At first, my mother was puzzled. But after asking a few questions, she figured out what was going on. “He’s taking a bath right now, but I’ll call him”, she said. Much to the woman’s surprise, out I came, an eight-year-old, in a red terrycloth bathrobe. Both my parents and the



woman from the testing company thought I had applied to take the test as a joke. But I was quite serious. Since an early age, I've been fascinated with the idea of eliminating unnecessary steps" (Dell, 1999, pp. xv-xvi).

*The general signs of entrepreneurial giftedness include the following interrelated characteristics.*

1. *Perseverance to succeed: If I put my mind to something, I can do almost everything.* The best manifestation of gifted entrepreneurs' persistence is the fact that they do not give up after the first failed project(s). Failures do not stop them at all. For example, when Richard Branson's venture to grow Christmas trees failed, soon after he decided to breed budgies. The bottom-line is that he was not stopped by his first unsuccessful venture.

Another manifestation of gifted entrepreneurs' determination to succeed is their underlying belief that they are able to do everything as soon as they put their mind to something. Bill Gates is a good example. The 11 year old Bill won the challenge presented annually by Reverend Dale Turner and as a prize he was invited to have a dinner at Space Needle, a fancy restaurant 600 feet above Seattle. The story is as follows. At the beginning of each school year, the Reverend would challenge his students to memorize several chapters from the Book of Matthew, which is a quite difficult to memorize. "The worlds do not rhyme, the sentence structure is disjointed, and it is very long—the equivalent of nearly four standard newspaper columns of type. Twenty-five years later, Turner can still remember the afternoon he sat down with Gates in the living room of the Gates' home, to hear him recite the passage" (Wallace & Erickson, 1992, p. 6). "Listening to Gates, Turner was astounded. No one, in all his years in the ministry, had been able to make it thought the entire passage without stumbling over at least a few words or lines. But Gates had recited the passage nonstop from the beginning, never missing a line. I needed only to go to his home that day to know that he was something special," Turner later recalled. "I couldn't imagine how an 11-year-old boy could have a mind like that. And my subsequent questioning of him revealed a deep understanding of the passage" (Wallace & Erickson, 1992, p. 7). "He loved challenges, Turner said. . . As Gates has told the pastor that day in his house, "I can do anything I put my mind to" (Wallace & Erickson, 1992, p. 8).

2. *Optimism and "change the world" attitude.* Gifted entrepreneurs from early years believe in themselves and their ability to change the world by succeeding with their projects. They have a positive vision of the future and of every venture

they initiate. For instance, Richard Branson did not give up after his very first venture failed. Soon he saw "another great business opportunity: breeding budgies" (Branson, 2002, p. 37) and fully concentrated on it. Optimism helps gifted entrepreneurs succeed. This supports scientific findings demonstrating that optimists always outperform pessimists (Carver & Scheier, 2003).

3. *Early exposure to challenges.* It is amazing how gifted entrepreneurs liked challenges from their early years and had a lot of exposure to them. Their environments provided a wide range of challenges and, as a result, the love of challenges became one of the distinguishing characteristics of talented entrepreneurs. The above-mentioned example of Bill Gates when he successfully memorized several chapters from the Book of Matthew is appropriate here. Similarly, Richard Branson's parents always set up challenges for him (Branson, 2002; Shavinina, 2006).

4. *Competitiveness, leading to excellence, and perfection.* As a consequence of the early exposure to challenges or an intensive involvement in sport activities, young gifted entrepreneurs often possess competitive personalities. When they compete, they always try to be the best and win. Bill Gates is a case in point. His closest childhood friend was Carl Edmark, who later said of Bill: "He was very eccentric even back then." Even as a child Gates had an obsessive personality and a compulsive need to be the best. "Any school assignment, be it playing a musical instrument or writing papers, whatever, he would do at any or all hours of the day" said Edmark. What seemed like eccentric behavior to fellow fourth graders, however, was likely nothing more than his competitive spirit. One of his first major assignments in his fourth grade class was to write a four or five page report on a particular part of the human body. Gates wrote more than 30 pages. Later, the class was told to write a short story of no more than two pages. Trey's story was five times that length. "Everything Bill did, he did it to the max," said Edmark, "What he did always went well, well beyond everyone else" (Wallace & Erickson, 1992, pp. 11-12).

5. *Neglect of academic subjects.* Probably because gifted entrepreneurs live in their own world of 'real practical' projects (often with money making potential), school subjects do not make much sense to them. Many do not do well at school and simply ignore academic subjects (e.g., Richard Branson). This is also because teachers usually do not demonstrate the practical applications of those subjects; they just ask children to memorize a great deal of knowledge. This directly contradicts the essence of the practical mind of

gifted entrepreneurs who are eager to do 'real' things in real life; not in the classroom for their teachers.

With respect to this characteristic, there are some exceptions. Bill Gates is one of them. For instance, he was doing well in the elementary school. However, it is not clear whether Bill's success in academic subjects was determined by his intellectual abilities or by his extraordinary competitiveness described above.

6. *Independence in thoughts and actions.* From early years gifted entrepreneurs are very independent in their thoughts and actions: authorities do not exist for them. For example, Mary Gates, in describing her son, Bill, has said that "he has pretty much done what he wanted since the age of eight" (Wallace & Erickson, 1992, p. 11). The same is true for Richard Branson, Michael Dell, and other gifted entrepreneurs (Branson, 2002; Dell, 1999; Shavinina, 2006).

7. *Rule-breaking attitude.* As a result of their extreme independence, a rule-breaking attitude is another distinguishing characteristic of young entrepreneurs. As Richard Branson put it convincingly, "I always thought that rules exist for me to break them." This is why talented entrepreneurs are innovators: they are able to break all the existing rules of the game

and introduce something new. This is how great innovation happens (Drucker, 1998).

It is indeed interesting that the above presented specific and general manifestations of entrepreneurial giftedness in childhood became strong characteristics of talented entrepreneurs in their adulthood. The case in point is Richard Branson. As an adult, he is often characterized as an exceptional challenger, an entrepreneur with a highly independent spirit, an unbelievable optimist, an initiative citizen, and a philanthropist. Nevertheless, he had all of these characteristics from early childhood. They shaped the developmental trajectory of his entrepreneurial giftedness. The same is true for Michael Dell, Bill Gates, Warren Buffett and other entrepreneurs. For example, as it was discussed above, the famous business model of Dell Computer Inc. takes its origins in Michael Dell's wish to cut unnecessary steps in everything that very clearly manifested itself as early as in the age of eight (Dell, 1999, p. 4).

This section therefore described general and specific manifestations of entrepreneurial giftedness. In the rest of the article I will discuss the impact of those early signs of entrepreneurial giftedness on the subsequent development of entrepreneurial talent and briefly summarize the main findings.

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## Discussion and Summary

It is interesting to see that the identified early manifestations of entrepreneurial giftedness predetermined to a great extent entrepreneurial talent of famous entrepreneurs. Richard Branson is a good example. For instance, the following Richard's personality traits developed early in life:

- *Innovative abilities.* The previous section provided many examples of his unique ability to generate and implement into practice a lot of real-life projects.
- *Initiative.* He was not just a rebel who wished to break rules. Richard always proposed something better instead of the existing rules. When he wanted to change the school rules, he wrote a few letters to the headmaster suggesting how to reorganize the system of school meals and other things.
- *Creativity.* Richard is always full of new ideas and open to creative ideas of other people. His philosophy of business is based on creativity: "I have never gone into any business purely to make money... A business has to... exercise your creative instincts" (p. 58).

- *Independence.* As a twenty-year-old Richard put it, "I have never enjoyed being accountable to anyone else or not being in control of my own destiny... I had lived life entirely on my own terms, following my own instincts" (p. 100).
- *Love of challenges and adventures.* "I knew that I would attempt another balloon flight because it's one of the few great challenges left... Both the series of balloon flights and the numerous Virgin companies I have set up form a seamless series of challenges which I can date from my childhood" (pp. 13-14).
- *Strive for excellence.* "Anything I do in life I want to do well and not half-heartedly. I feel I am doing my best in *Student*," wrote sixteen-year-old Richard in a letter home (p. 46).
- *Rule-breaking attitude.* "I have always enjoyed breaking the rules, whether they were school rules or accepted conventions, such as that no seventeen-year-old can edit a national magazine," summarized a twenty-year-old Richard (p. 100).

It is interesting to see an amazing similarity between Richard-child and Richard-adult, a highly accomplished, successful entrepreneur. The early manifestations of entrepreneurial giftedness identified in the previous section had indeed a *long-lasting effect* on the development of Richard Branson's entrepreneurial career. It means that those early signs really predetermined the development of his entrepreneurial talent.

To sum-up, the given article introduced the concept of entrepreneurial giftedness and thus filled an existing niche in research on high abilities. It has shed light on the nature of entrepreneurial giftedness by discussing its early signs or manifestations, which greatly contributed to the emergence of great entrepreneurs. Specifically, the following manifestations of entrepreneurial giftedness were identified: constantly generate ideas on how to make money, love to generate and implement real-life projects with at least a minimal financial reward, love doing real business plans with predicted financial outcomes, work passionately and hard on executing their plans, wish to do 'real' things that bring money and try to do whatever possible to cut unnecessary steps, perseverance to succeed, optimism and "change the world" attitude, early exposure to challenges, competitiveness, excellence and perfection, neglect of academic subjects, independence in thoughts and actions, as well as rule-breaking attitude. The first five characteristics constitute specific manifestations of entrepreneurial giftedness; the last seven constitute its general manifestations.

The article also provided evidences, which prove that the identified early signs of entrepreneurial giftedness were indeed stable characteristics and predetermined the subsequent development of the entrepreneurial talent of great entrepreneurs. Richard Branson is a case in point. For instance, his personality and creativity traits in adulthood are similar to those demonstrated in childhood. These traits had a long-lasting effect on both Richard-person and Richard-entrepreneur. It is therefore safe to conclude that the unique combination of the identified early manifestations of entrepreneurial giftedness greatly contributed to the appearance of Richard Branson—brilliant, highly accomplished entrepreneur.

Research on entrepreneurial giftedness is important for the advancement of the field of high abilities in a number of ways. First, it fills an obvious niche in the study of giftedness by introducing the concept of entrepreneurial giftedness. Second, it sheds light on an unexplored phenomenon—entrepreneurial talent as a special type of giftedness—which has not yet been studied by psychologists. Finally, parents and teachers concerned with developing children's talents get interesting insights for practical implications. They are primarily responsible for the early identification and subsequent development of entrepreneurial giftedness. Future research is needed to provide a comprehensive understanding of this multidimensional and multifaceted phenomenon.

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<sup>i</sup> My research on entrepreneurial giftedness is probably an exception (Shavinina, 2006).

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<sup>ii</sup> It is not therefore surprising that he started a company based on eliminating the middleman (i.e., bypassing the dominant method of computer distribution). Dell Computer Inc. sells computers directly to customers, deals directly with its suppliers, etc., all without the unnecessary and inefficient presence of intermediaries.

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## About the Author

**Prof. Dr. Larisa V. Shavinina** is a Professor at the Université du Québec en Outaouais, Québec, Canada. Her main research focus is the psychology of high abilities broadly defined, including the nature of giftedness, the child prodigy phenomenon, scientific talent in the case of Nobel laureates, entrepreneurial giftedness, and managerial talent, new assessment procedures for the identification of the gifted, as well as high intellectual and creative educational multimedia technologies (HICEMTs) aimed at developing potential abilities of gifted and talented individuals.

Over the years Dr. Shavinina's research has expanded to encompass innovation. Her bestselling *International Handbook on Innovation* (1171 pages) published by Elsevier Science in 2003, the first and only book of this type, that is considered the beginning of innovation science, is aimed at unifying the field of innovation, that is, at merging psychological, management, and business perspectives together. She introduced innovation education as a new direction in gifted education. Innovation is also an important element in Dr. Shavinina's research on giftedness and economy. Her publications have appeared in *Gifted Child Quarterly*, *Journal for the Education of the Gifted*, *High Ability Studies*, *Creativity Research Journal*, *Review of General Psychology*, *New Ideas in Psychology*, and others. She co-edited *CyberEducation* and *Beyond Knowledge*. Her forthcoming *International Handbook on Giftedness* will be published in December 2008.

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# The ACCESS Enrichment Model for an Undergraduate Education Program

Philip A. Baker

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## Abstract

The intent here is to describe an “in-the-trenches” model for preparing teachers for service in a rather specialized field. It is presently operating successfully at the University of Winnipeg, in the Province of Manitoba, Canada and is offered to stimulate and guide enrichment and talent development efforts for pre-service teachers in ACCESS, Alternative Education Programs or their equivalents elsewhere in the world. While recognizing some of the information presented is especially pertinent to one particular situation, the hope is that the shared philosophical perspectives and observations might pique the interest of educators in other post-secondary settings. Perhaps by adapting and building upon the principles and concepts salient to this approach, others may be able develop ways to inject more enrichment and innovation into their own programs.

**Keywords:** ACCESS, alternative education, enrichment, community outreach.

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## The ACCESS Education Program at the University of Winnipeg

The majority of teacher training programs prepare young, up-and-coming pre-service educators to take their places in the schools. The University of Winnipeg Education Centre (UWEC), however, is a markedly different teacher preparation program that is having a profound impact in many ways (Gadsby & Baker, 2003).

This unique program has been developed to prepare disadvantaged individuals from diverse cultural backgrounds to teach in inner-city settings. It has as its student base mature learners (with an average age of 31) who come from the area where they will one day be working, i.e., the core of the city. Indeed, our students are representative of the inner city with more than half of Aboriginal descent. Many others are from various immigrant or other minority groups. In terms of family demographics, many of our 100 or so ACCESS students are married and well over half are single parents – a far different breakdown from that in most traditional education programs! Certainly, UWEC graduates have experienced life. They are very able to relate directly to the socio-economics, the diversity, and the challenges of inner-city life.

The five-year program at our institution prepares teachers in the early and middle years streams. Candidates are selected primarily on the basis of financial, academic, and social-personal needs. Most fall in the mature learner category (over 21 years of age) but do not have a complete grade 12 high school standing. Funding for the participants comes mainly from government student loans, Native bands/communities, or ACCESS grants.

ACCESS or Alternative teacher education programs tend to emphasize collaborative and collective professional socialization. By focusing on the candidates’ own cultural values, these programs can prepare strong inner-city teachers. UWEC is housed in the core of Winnipeg’s downtown in a stand-alone building on the university campus. Student teaching placements are in inner-city schools, and courses and professional development opportunities emphasize inner-city issues (e.g., gangs, poverty, diversity, etc.).

The purpose of UWEC is to address inequality by targeting economically and socially disadvantaged people living in the inner city of Winnipeg (Lukinski, 1995). More specifically, the intent of the UWEC

program is to offer educational opportunities for disadvantaged people facing systemic barriers and to provide access for individuals who have come to believe that post-secondary education is “not for them.”

Part of the commitment of UWEC faculty and staff is to become talent spotters (McCluskey & Treffinger, 1998). Despite their abilities, most candidates for the ACCESS program never had their talents identified, yet alone nurtured, in their earlier years. For many, basic survival, certainly not enrichment, has been their goal. As Peterson (1997) has observed, the “tough bright” don’t usually get selected for school gifted programs. Our experience has been, however, that once their abilities are noticed and highlighted, our pre-service teachers become much more willing to address thornier issues in their lives. They are also more able to focus on seeking out and responding to the talents of their students in practicum placements.

### An In-House Enrichment Model

One very popular and effective approach for working with relationship resistant, behaviourally challenging, at-risk young people is Life Space Crisis Intervention (LSCI) (Long, Wood, & Fecser, 2001) which was founded on the work of Fritz Redl (1959). Redl developed the Life Space Interview technique, or as he also termed it “therapy on the hoof.” He felt the need to do something practical to reach troubled children and youth in real-life settings. My colleagues and I had a similar need when it came to identifying and nurturing the potential of the students in our ACCESS Program.

As a consequence, we developed a model to direct and support our on-going emphasis on talent development at UWEC – an “enrichment on the fly” approach, as it were. We considered it an In-house Enrichment Model. We borrowed heavily from a variety of other frameworks, including Feldhusen’s (1995) Talent Identification and Development in Education (TIDE) formulation, Renzulli’s Enrichment Triad and Schoolwide Enrichment Models (SEM) (Renzulli, 1994; Renzulli & Reis, 1997), Treffinger, Young, Nassab, and Wittig’s (2004) Levels of Service (LoS) approach (2004), and McCluskey, Treffinger, & Baker’s Amphitheater Model (2003).

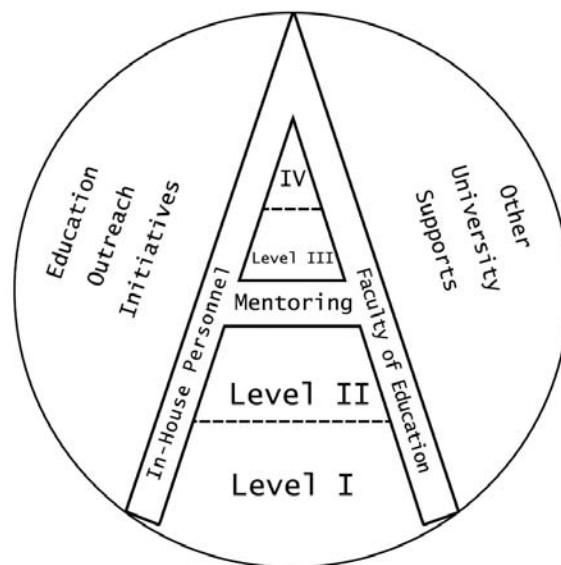


Figure 1: The ACCESS Enrichment Model.

The ACCESS Enrichment Model described here in diagrammatic form, is essentially an A imbedded within an O as presented in Figure 1.

### A is for ACCESS

The innards of the A consist of four levels. Here, in particular we were guided by the work of Renzulli (1994) and Treffinger (Treffinger, Young, Nassab, & Witting, 2004). Indeed, the four Levels in our model parallel Treffinger’s model directly:

#### Level I

Level I is designed for *All* our ACCESS students in the UWEC cohorts. Since the playing field of life has not been level for these individuals, most require extra help in a variety of areas before they can move forward. The emphasis at this level, then, is expanding learning opportunities for all. This implies front-end load supports which include:

- Counseling for students who may be experiencing emotional upsets, personality conflicts, family issues, financial hardship, and the like;
- A study skills program; and
- A math preparation/refresher course in first year to help students face the dreaded “for credit” compulsory course.

Tutors are available to provide one-on-one assistance and, in addition, a voluntary Elder Program, consisting of traditional Aboriginal “teachings” and “sharing circles,” is available once a month. The trusting, respectful, and warm environment at UWEC encourages students to seek appropriate assistance for themselves and to offer support to each other.

UWEC adheres to the program delivery model which asserts that classroom practicum experience has at least as much value as education theory. UWEC students are fortunate in that they receive much more time in the practicum placement than do their campus counterparts. Our goal is to provide as many opportunities as possible to connect theory and practice. By providing significantly more time in school-based practicums, the UWEC approach strikes a balance between what the students learn and how they apply that knowledge in real-world classrooms. Our mature students are well-equipped to work with disadvantaged children and become community role models for high-ability youngsters from the inner city. They get an extra eight full days in their first and second years with 16 additional days in the third year. This allows integration of practical and cognitive activities through a continuous process of reflection and analysis.

Of course, faculty members at UWEC are encouraged to go beyond curriculum requirements incorporating excitement, challenge, and interest into their lessons. Creative and critical thinking strategies are taught in various courses, stimulating new topics are introduced, and general exploratory activities abound with guest speakers, visits to historical sites, tours of museums and art galleries, and regular noon hour professional development sessions on topics such as gangs, adapted instruction, clinicians in the schools, and the role of the Manitoba Teachers’ Society. In keeping with the community ethos, there are family nights for our students, their partners, and children, holiday parties, lunches, and other group activities such as bowling and Karaoke.

### **Level II**

Level II is for Many students. Participation here is based largely on interest and self-selection. The goal is to expand student experiences. To illustrate, many UWEC students have been involved in Contact-to-Contract (a career awareness and job-finding program), Future Problem Solving training, and expanded computer technology opportunities. Others have had the opportunity to go on the Winnipeg General Strike Tour (to

review a defining period in the history of the union movement in Canada) and to be trained in the use of a curriculum package/kit on the topic.

Special sections of elective courses are also available for ACCESS students in Creative Problem Solving, Issues with At-Risk Children and Youth, and Enrichment and Talent Development.

### **Level III**

Level III is for Some students. At this point, the focus shifts very much towards more in-depth, higher-order activities for those who have the passion and ability to meet the challenge. Much of the work at this level is done in alternative learning environments.

In terms of specific examples, each year some UWEC pre-service teachers serve as mentors in the *Doors Open* project (where they guide high school students as they do research and produce permanent display banners about and for local Heritage Buildings). Others have different mentoring experiences. Still others, again annually, are given the chance to attend the Western Canadian Association for Student Teaching (WestCAST) Conference in a major city in Western Canada. Of late, some intriguing international options have also surfaced. Some UWEC students have already been selected to take their practicum block in Thailand. Other opportunities are emerging in China, Greece, Costa Rica, and elsewhere.

In the summer of 2008 some WEC students and graduates were hired by the Winnipeg Aboriginal Sport Achievement Centre as counsellors for the Eco-Kids summer camps. Eco-Kids, a program delivered directly through our institution’s Innovative Learning Centre, gives disadvantaged 10 to 14 year olds tangible opportunities to work in a university setting exploring the relationship between culture, science, and the environment, as well as links with the Aboriginal community’s traditional teachings and the Winnipeg School Division’s science curriculum. Some of our UWEC students are deeply engaged in making it possible for these inner-city youngsters to participate fully in hands-on environmental science experiments, a wide range of field trips, and other “fun” activities.

### **Level IV**

Level IV is for a Few students. The focus at this topmost level is on specialized individual production by highly talented teachers-to-be. Opportunities result from outstanding performance



or potential in specific areas, and students work more independently to produce highly authentic products.

Certain UWEC pre-service teachers take on highly focused, demanding mentorship relationships. A few others serve as paid research assistants for faculty members, help write professional papers, and present at conferences, e.g., including the aforementioned WestCAST event. A handful of students have written intriguing articles for the Education Students' Anthology, a high-quality production featuring students' writing that is distributed locally and around the world. One UWEC student has even served as editor of this publication. She then moved on to take up a part-time position as Office Assistant in the Headquarters of the World Council for Gifted and Talented Children, which is housed in our ACCESS facility.

Additional aspects of the A in our model include:

- *Mentoring.* To truly reflect the reality of what is transpiring at UWEC, it seemed logical to include a Mentoring dimension. This is described in the Model by the horizontal bar of the A between Levels I and II and the more in-depth, specialized categories of Level III and IV. Quite simply, mentoring is the connecting mechanism for many of our enrichment projects. The coordination of our mentoring programs for inner-city, war-affected, gifted/talented, and other young people takes place from our ACCESS building. Since these and other mentoring undertakings have been described in some detail elsewhere (Lamoureux, McCluskey, Wiebe, & Baker, 2008; McCluskey & Mays, 2003), there is no need to elaborate further here. Suffice to say that mentoring is the common thread that is woven into much of what occurs at UWEC. It provides service for disadvantaged, vulnerable children and youth, offering powerful enrichment opportunities to our pre-service teacher mentors.
- *In-House Personnel.* This is described by the left side of the A in our diagram. It serves as an important reminder to make use of the in-house abilities of our faculty and staff, who employ their talents to help develop the talents of their charges. Two UWEC faculty members are gifted education "specialists", who, in the company of other innovative faculty members in math, history, language arts, and technology, strive regularly to stretch and challenge their ACCESS students.
- *Faculty of Education.* The right side of the A in our diagram acknowledges the inextricable

link between ACCESS and our vibrant Faculty of Education at the University of Winnipeg. UWEC instructors teach in the main program, and vice-versa, and our students can connect to innovative initiatives within the Faculty as a whole. Such initiatives include: international experiences, museum tours and role plays, Indigenous science offerings, and war-affected children courses – held in "refugee camps" constructed on the front lawn of the campus

UWEC students are also part of a required Service Learning course, a new second year course in which more than 200 students annually will serve the community through "work experience" placements. Our faculty and staff want our students to understand the importance of community involvement, servant leadership, and service to others. Albert Schweitzer has said, "I don't know what your destiny will be, but one thing I know: the only ones among you who will be truly happy are those who will have sought and found how to serve." We concur. As our students discover, Greenleaf (1991, 1998) – in his influential work on servant leadership – suggested that truly legitimate leaders should be altruistically concerned with "serving" the people they represent, rather than being motivated by power, influence, or money.

## O is for Outreach

We will now explain the significance of the O in our diagrammatic version of the ACCESS model. Although it is not necessary to go into great detail at this juncture, it is relevant to note that ACCESS is part of our university's general emphasis on community outreach, thus, the A embedded within the O.

Creativity does not occur in a vacuum. There is always a context of behind-the-scenes factors and structures that must be taken into account (Isaksen, Dorval, & Treffinger, 2000; Treffinger, Isaksen, & Dorval, 2006). The fact that much of our ACCESS programming takes place against a backdrop of community outreach presents many possibilities for our students. Certainly, if they have the interest and the passion, they can become intimately involved in many initiatives within the Faculty of Education:

- *Education Outreach Initiatives;*
- *Wii Chiiwaakanak* ("partnership" in Ojibway); *Learning Centre.* With its various computer, cultural, and study skills programs for children and adults alike, this Centre reaches out strongly to the Aboriginal community in the inner city.

- *Global Welcome Centre (GWC)*. This Centre provides social, educational, and career awareness support (and creates “bridges” to post-secondary institutions) for newcomers to Canada.
- *Camp UWin*. Each year, two instructors from Education – along with their pre-service teacher assistants – plan and run Camp UWin, a free summer camp for inner-city children emphasizing enrichment experiences in art and music.
- *SpeciaLink*. This national centre for child care inclusion (now located in our ACCESS building) supports special needs children and their families through resources, research, and advocacy. It has helped expand opportunities for inclusion in child care, education, recreation, and other community settings.
- *World Council for Gifted and Talented Children (WCGTC)*. There’s no need to elaborate any further in this journal: The fact that the Executive Committee of the WCGTC chose to locate its Headquarters at the University of Winnipeg (also within the ACCESS facility) provides a wonderful opportunity for our students to explore gifted education, connect with the rest of the world, and become more informed, conscientious global citizens.
- *Innovative Learning Centre (ILC)*. Mentioned previously, the ILC provides direct programmatic support for school-aged children and youth, and partners with schools to inform pre-service and in-service teachers about philosophy, approaches, and curricular materials in the at-risk domain. With their additional focus on sustainability and Indigenous science, ILC programs ensure that students acquire the knowledge they need to understand and preserve the environment around them. At the same time, the programs allow disadvantaged young people to envision themselves as future university students.

- *Other University Supports.*

Of course, not all institutional outreach emanates from the Faculty of Education. Meaningful mentoring, research, and publishing opportunities exist for our students in the Departments of History, English, and Aboriginal Governance. And all kinds of supports and possibilities are available through the Aboriginal Student Services Centre.

The University of Winnipeg Collegiate, the only high school in Canada fully integrated within a university, is just opening its new Model School. The philosophical base for the high school is founded upon Creative Problem Solving (Isaksen, Dorval, & Treffinger, 2000; Treffinger, Isaksen, & Dorval, 2006), best practices in the at-risk domain (Brendtro, Brokenleg, & Van Bockern, 1990), and the seminal Lost Prizes project (McCluskey, Baker, & McCluskey, 2005; McCluskey, Baker, O’Hagan, & Treffinger, 1995, 1998). The goal of this program is to turn around the lives of talented, but vulnerable young people in grades 9 through 12. What an opportunity for our ACCESS students to connect with and make a contribution to this mission of equity and reclamation!

In closing, our faculty and staff at UWEC know that ACCESS Education has made a tremendous difference, not only in the lives of many formerly disadvantaged individuals, but also for many graduates of the program, in the lives of their students. Despite the challenges and obstacles in their path, once given the opportunity, our “UWECies” tend to make good. The proof, as they say, is in the pudding. Our retention rate overall is above 75 percent, our graduation rate matches or exceeds that of traditional programs, hiring rates are impressive, and we receive extremely positive feedback from schools in the field concerning the performance of our students and graduates. It has been quite an impressive turnaround for large numbers of people. We believe the emphasis on enrichment and talent development has strongly influenced these outcomes for the better.

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# International Teachers' Judgment of Gifted Mathematics Student Characteristics

Abdullah Ficici, and Del Siegle

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## Abstract

Teachers play a key role in the identification and training of talented mathematicians, and their attitudes are important in improving math instruction for gifted students. We surveyed secondary mathematics teachers from South Korea, Turkey, and the United States. These teachers completed a survey instrument called the Teachers' Judgments of Gifted Mathematics Student Characteristics (TJGMSC) that measured how important they believed 40 behaviors were with regards to students' mathematics giftedness. They also evaluated different strategies for teaching mathematics. The more years teachers taught mathematics, the more likely they were to report that students' computational skills, students' ability to relate mathematics to everyday life, and students' ability to generate multiple and unique solutions to problems were indicators of mathematical talent. The opposite was true for the highest level of mathematics taught. The higher the grade level of mathematics teachers taught, the less they valued each of these. Teachers with advanced degrees were less impressed with computation skills. Teachers from South Korea, whose students score near the top on international mathematics exams, were less likely to view mathematical talent as innate. They saw mathematics as an abstract subject in which students who were having difficulty should be given time in class to practice by themselves. They were less likely to regard mathematics as a practical topic or a formal way of representing the world. They were also less likely to use a variety of representations (pictures, concrete objects, and symbols) when teaching mathematics.

**Keywords:** Mathematics instruction, mathematics aptitude, secondary education, gifted and talented, international studies.

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## Introduction:

The National Research Council (1989) stated that mathematics is essential for employment in the new world economy. The new work force needs the problem-solving skills of absorbing new ideas, adapting to change, coping with ambiguity, and perceiving patterns. Basic calculation skills are now insufficient with the ubiquitous availability of calculators and computers. Students need mathematical skills in problem solving and critical thinking in order to be marketable in a highly competitive high-tech job market. They should also be confident in their mathematical abilities and in their abilities to use mathematical skills to confront new problems (Borasi, 1996). For a country to be a leader in the high-tech global economy it must develop the mathematic talents of its citizens. This involves identifying and serving students who show talent in mathematics.

Nations must invest in the education of well-trained mathematicians and engineers (National Commission on Excellence in Education, 1983).

Teachers play a key role in the identification and training of talented mathematicians. Teachers' gender, experience, education, culture, perceptions, and expectations may influence how well they identify and train mathematically gifted students (Greenes & Mode, 1999; Keynes, Olson, Shaw, & Singer, 1999; Reis & Gavin, 1999). It is important, therefore, to study these variables. For example, within the United States a debate exists over which mathematical skills ought to be valued (National Council of Teachers of Mathematics, NCTM, 2000). Just as there are differences of opinion within the United States, the particular mathematical skills valued by teachers may vary from one culture to another.



## Research Questions

In this study we surveyed secondary mathematics teachers from South Korea, Turkey, and the United States. The following research questions guided our research:

1. What are the demographic characteristics (gender, highest degree earned, certification in math, years of experience teaching math and other subjects, and current and highest level of teaching mathematics) of secondary school mathematics teachers in South Korea, Turkey, and United States?
2. Is there a relation between the demographic characteristics of teachers and their ratings of the characteristics of mathematically gifted students?
3. Are there any differences among mathematics teachers from South Korea, Turkey, and United States in terms of their ratings of the characteristics of mathematically gifted students?
4. Are there any differences among mathematics teachers from South Korea, Turkey, and the United States in terms of their views about mathematics and the teaching of mathematics?

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## Background

### Mathematics Achievement of South Korea, Turkey, and United States

The 1995 Third International Mathematics and Science Study (TIMSS) was the largest, most comprehensive, and most rigorous international comparison of education ever undertaken (National Center for Educational Statistics, NCES, 1996). During 1995, the study assessed the mathematics and science knowledge of a half-million students from 42 nations at three levels of schooling. The Third International Mathematics and Science Study–Repeat (TIMSS–R) followed in 1999 (NCES, 2000). The 1999 assessment measured the mathematics and science achievements of eighth-grade students (13- and 14-year-olds). Extensive information was collected from students, teachers, and school principals about mathematics and science curricula, instruction, home contexts, and school characteristics and policies. The United States and South Korea participated in 1995 and in 1999. Turkey participated only in 1999. The results, generally, were alarming to the United States.

- U.S. fourth graders scored only slightly above the international average (NCES, 1997).
- At the eighth-grade level, U.S. students fell slightly below the international average (NCES, 1996).
- U.S. performance continued to fall in the twelfth-grade assessment where the U.S. students scored significantly below the international average (NCES, 1998).
- No country scored below the U.S. on the advanced mathematics assessment (NCES, 1998).
- In TIMSS-R eighth graders from Turkey scored significantly below the U.S. eighth graders (IEA, 2000).

- South Korean eighth graders scored second among 42 nations (NCES, 1996).

We chose the three countries for this study because their students exemplified different levels of mathematics achievement in this international data. Generally, students from the United States achieved lower than students from South Korea, but higher than students from Turkey.

### Identification of Gifted Mathematicians

Various attempts have been made to identify the characteristics of mathematically gifted students (Greenes, 1981; Heid, 1983; House, 1987; Lester & Shroeder, 1983; Osborne, 1981; Sheffield, 1994; Waxman, Robinson, & Mukhopadhyay, 1996). Above-level testing is sometimes used to identify precocious mathematical ability. A high score at an early age on a mathematics aptitude test indicates mathematical talent (Stanley & Benbow, 1986). One of the best-known mathematics programs for gifted children is the Study of Mathematically Precocious Youth (SMPY). It was founded by Julian C. Stanley at Johns Hopkins University in 1971 to identify, study, and facilitate the education of youths who reason mathematically extremely well (Stanley, Keating, & Fox, 1974). SMPY uses above-level testing with the Scholastic Aptitude Test (SAT) to identify precocious mathematical ability and designs rigorous academic coursework to challenge high-scoring students (Stanley & Benbow, 1986).

The tests are selected for several reasons. They focus on mathematical reasoning rather than learned mathematical facts and do not have a ceiling for young children. The scoring system can be compared to different tests. The tests are easy to administer and cost effective because they are administered to a group, rather than individually (Hoeflinger, 1998; Kissane, 1986;

Rotigel & Lupkowski-Shoplik, 1999; Sheffield, 1994). Longitudinal research with SMPY students showed the SAT was predictive of later advanced achievement (Lubinski & Benbow, 2006). On grade-level testing also is used. The Test of Mathematical Abilities for Gifted Students (TOMAGS; Ryser & Johnsen, 1998) is a standardized, norm-referenced test designed to identify students who are gifted in mathematics. A test such as the TOMAGS is considered superior to traditional standardized achievement tests because typical standardized achievement tests often concentrate on low-level tasks that fail to identify gifted students (Romberg & Wilson, 1992).

Teacher nominations are often used in the identification of students with exceptional talent—a process debated for decades (Gagné, 1994; Hoge & Cudmore, 1986; Pagnato & Birch, 1959; Rohrer, 1995). Pagnato and Birch (1959), when examining the efficiency and effectiveness of seven different methods of identifying gifted students, concluded teachers are not reliable in this regard. The Pagnato and Birch study was referenced as proof of teachers' inability to identify gifted students in their classrooms for over four decades. However, slightly over a decade ago, Gagné (1994) reported that Pagnato and Birch's methods were unreliable. Furthermore, after reevaluation of data from the study, Gagné concluded teachers are actually as reliable as most other sources of information.

Other studies have also shown teachers can identify gifted students reliably. Hoge and Cudmore (1986) found very little empirical evidence exists to support a negative evaluation of teacher judgments. Rohrer (1995) found, in general, teachers are able to recognize intellectual potential in students not in the mainstream. Borland (1978) found identification improved when teachers were provided with specific criteria to use when identifying students. Other studies have found this to be true. Gender bias (Powell & Siegle, 2000) and student interest areas (Siegle & Powell, 2004) are areas of concern in identifying students for gifted programs when specific criteria are not provided.

Unfortunately, mathematics teachers generally do not have background in teaching gifted students. According to Sheffield (1999), teachers should ideally receive training and experience in both the complexities of mathematical content and, particularly, in the characteristics and needs of gifted students, prior to evaluating students for mathematical giftedness. In some states, elementary teachers might be certified to teach all subjects from K-8 but have little background in mathematics after taking only one or two

university-level mathematics courses. Secondary school teachers generally major in mathematics at the university while receiving little or no training in talent identification.

The Scales for Rating Gifted Students (Ryser & McConnell, 2004) and the Scales for Rating the Behavioral Characteristics of Superior Students (Renzulli, Smith, White, Callahan, Hartman, & Westberg, 2004) are two popular rating scales to identify mathematically gifted students. These commonly used rating scales are based on published characteristics of mathematically talented students.

### **Characteristics of Mathematically Talented Students**

Mathematically gifted students have complex types of reasoning skills. Unfortunately the reasoning abilities associated with high ability in mathematics are often underemphasized, and computational accuracy and conformity to taught procedures are overemphasized. Lupkowski-Shoplik and Assouline (1994) noticed many mathematically gifted children are advanced in their understanding of mathematical concepts but relatively weak in mathematical calculations. Mathematically gifted children may conceptualize problems and solutions correctly even though they may make computational errors (Miserandino, Subotnik & Ou, 1995).

Mathematically gifted students also have an unusually keen awareness of, and intense curiosity about, numeric information (Miller, 1990). They develop unique solutions to common problems (Wolfe, 1986) and interpret problem information in original ways (Greenes, 1981). They work with mathematical problems in flexible, creative ways rather than in a stereotypic fashion (Miller, 1990). Mathematically challenging problems give these talented children an opportunity to shine. Mathematically gifted children make unique associations when presented with a challenging problem (Chang, 1985). Krutetskii (1976) also believed mathematically gifted children have a "mathematical cast of mind" disposed toward interpreting the world mathematically. They have a tendency to see mathematics in the ordinary and commonplace (Osborne, 1981).

Mathematically gifted children ask mathematics-related questions that go beyond clarification (Miserandino, Subotnik, & Ou, 1995). They have a capacity to go beyond the answer to a particular problem and field questions that the answer itself raised (Marjoram, 1992). They are unwilling to accept statements without critical examination to find the "whys" and "hows" (Wolfe,

1986). They criticize constructively, sometimes argumentatively (Wolfe, 1986).

Hoeflinger (1998) reported that when a genuine problem is presented, mathematically gifted students have the ability to experience true problem solving tasks by internalizing, reshaping, and questioning. This involves applying multiple strategies to move forward the process of solving problems.

Results of a study by Olszewski-Kubilius, Shaw, Kulieke, Willis, and Krasney (1990) suggested previous experience and exposure to mathematics are important predictors of success in accelerated mathematics classes, especially for gifted females. Previous experience and exposure is acquired through independent activities such as participation in math clubs, tutoring, and parental teaching at home. These activities evidently give both mathematically talented females and males an advantage. They provide opportunities for students to increase in both abstract reasoning skills and specific mathematical knowledge. Math clubs and parental teaching may therefore be important factors in the talent development process.

Teachers' observations of students involved in a mathematical problem solving process and its associated discussion can be an accurate and reliable tool for identifying gifted young students (Gavin et al., 2007). Through this process students show how they organize knowledge, communicate ideas, and make convincing arguments (Hoeflinger, 1998). Teachers should look for strategies, efficiency, and elegance as well as pace during the identification process. Wilson and Briggs (2002) suggested observing children at work and using audio and video recordings, presentations, and displays of work to support assessments. To maximize the numbers of students involved, several opportunities should be available requiring no formal identification process such as investigating challenging, open-ended problems during mathematics classes, joining mathematics clubs, entering mathematics contests, and using technology to find and discuss engaging problems or to meet mentors or peers with similar interests (Sheffield, 1999).

According to Krutetskii (1976), talent is not a single characteristic but rather a qualitative combination of different abilities unique for each person. Not all mathematically gifted students will have all the attributes listed above. A student may possess only some of the characteristics.

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## Method

### Instrumentation

We developed a survey instrument called the Teachers' Judgments of Gifted Mathematics Student Characteristics (TJGMSC) to collect data for this study. Items from the preliminary version of the SRBCSS-Math Scale (Renzulli et al., 2004) formed the basis of the survey instrument. We added 20 additional characteristics to the survey. These were based on one of our experiences teaching mathematics in Turkey and the United States. We field tested the 40-statement instrument with a group of 95 preservice education majors and summer school graduate students in gifted education in the United States. The teachers read each statement and indicated how important they believed the behavior was with regards to students' mathematics giftedness. Teachers rated the characteristic on a 5-point Likert scale (1=*Unimportant*, 2=*Of Little Importance*, 3=*Moderately Important*, 4=*Important*, and 5=*Very*

*Important*). After the field test, minor wording changes were made in a few items, but all of the items were retained.

In addition to these 40 items, we reviewed the TIMSS-R Mathematics Teacher Questionnaire. We selected 15 closely related items from TIMSS-R Mathematics Teacher Questionnaire. Six of these items related to student characteristics and were added to the 40 items previously field tested. We added another nine items from TIMSS-R Mathematics Teacher Questionnaire to create a second section of the survey. In this section, teachers rated their view about mathematics and teaching mathematics on a 4-point Likert scale (1=*Strongly Disagree*, 2=*Disagree*, 3=*Agree*, and 4=*Strongly Agree*). The statements in both survey sections were closed-ended to facilitate data analysis (Gall, Borg, & Gall, 1996).

The final TJGMSC survey contained four pages. The teacher information section contains eight

items providing information about a teacher's background. These items include descriptive demographic data on each teacher (gender, highest degree earned, subject area(s) taught, certification in math, years of experience teaching math and other subjects, and current and highest level of teaching mathematics). The first section contained 46 items covering gifted mathematics students' characteristics. The second section included nine items measuring teachers' views about mathematics and teaching mathematics.

Following the field test, the final survey and instructions were translated into Turkish by one of the researchers. A qualified bilingual Turkish mathematics teacher translated the Turkish translation from Turkish back to English. The Turkish to English translation was compared to the original English version. All statements were closely matched, and we accepted the Turkish translation as comparable to the English version of the survey.

Similarly, the final survey and the instructions were translated into Korean by a South Korean researcher. Another South Korean researcher translated that translation from Korean back to English. All statements closely matched, and we accepted the Korean translation of the survey as being comparable to the English version. Since all the mathematics teachers are certified in South Korea, questions about certification were omitted from the Korean version of the survey.

We sampled 900 high school mathematics teachers from South Korea, 408 high school mathematics teachers from Turkey, and 1000 high school mathematics teachers from the United States. A South Korean researcher cluster sampled 900 secondary mathematics teachers. The surveys were sent to 180 high schools in South Korea. Five surveys were sent to each high school. A total of 296 teachers from 65 high schools returned the surveys. The sample consisted of 33 high schools in metropolitan cities, 18 high schools in small cities, 4 high schools in rural areas, 6 science high schools for gifted students, and the Korean Minjok Leadership Academy for gifted students. The type and location of 3 high schools were not reported.

A Turkish sample of 408 high school mathematics teachers was selected from a list provided by the Turkish Ministry of Education, Educational Research and Development Directorate (ERDD). These teachers were teaching in 25 cities that included metropolitan cities, small cities, and rural areas in seven different geographic regions of the country. This sample included teachers from different types of high schools. In Turkey, there

are many types of high schools: public, private, regular, vocational, and science high schools. The Turkish sample included all types of high schools. Of all the surveys sent out and collected by the ERDD, 389 were complete.

In the United States, we randomly sampled 1000 mathematics teachers using a Market Data Retrieval (MDR) list of high school mathematics teachers. MDR is a national company that compiles categorized lists of names and addresses to sell for research purposes. We received a total of 262 surveys from two mailings. All participants were provided with a cover letter explaining the study and a survey. In the United States, the teachers mailed the completed surveys to the principal investigators in postage paid envelopes.

In South Korea, with only one mailing, the return rate was 33%. In Turkey, with only one mailing the return rate was 95%. The higher return rate for Turkey was because it was sent through the Turkish Ministry of Education. In United States, the return rate was 19% after the first mailing and 26% after the second mailing.

Table 1 shows the number of teacher respondents to TIMSS-R Mathematics Teacher Questionnaire in 1999 and to our TJGMSC survey in 2003.

Upon collection of the data, a factor analysis with a varimax rotation was performed on the 46 gifted

**Table 1:** Sample sizes comparison with TIMSS-R.

S.Korea		Turkey		USA	
TJGMSC	TIMSS	TJGMSC	TIMSS	TJGMSC	TIMSS
296	193	389	204	262	462

Note: TIMSS-R 1999 International Average sample size=196.

mathematics student characteristics items to determine if an appropriate set of subscales could be found. Most teachers responded to all items on the survey. In the event a teacher left an item blank, it was listwise deleted. The analysis produced a nine-factor solution. An examination of factor loadings and the distribution of the items by factor resulted in the selection of three of these factors. This three-factor solution accounted for 42% of the variance on the gifted mathematics student characteristics statements in our survey. These factors were labeled as follows: School Smart Mathematics Students (students with excellent arithmetic skills), Mathematics Perspective for the Real World (students who relate mathematics



**Table 2:** lists the gifted mathematics student characteristics for each factor and their reliability analysis.

Item	Factor loading
Factor 1: School Smart Mathematics Students ( $\alpha = .901$ )	
27. displays ability to do calculations accurately.	.815
40. has good memory recall.	.813
41. remembers formulas and procedures.	.793
28. has ability to do calculations quickly.	.772
38. earns high scores in math/quantitative test(s).	.731
42. thinks in a sequential and procedural manner.	.667
43. understands mathematical concepts, principles, and strategies.	.601
Factor 2: Mathematics Perspective for the Real World ( $\alpha = .882$ )	
24. relates math to everyday life.	.696
23. can see the world through a math lens.	.652
45. understands how mathematics is used in the real world.	.561
36. makes connections between math and other subject areas.	.553
13. looks at the world from a mathematical perspective.	.542
20. sees the connections between different areas of mathematics.	.521
22. can explain concepts in math terms.	.498
46. is able to provide reasons to support their solutions.	.461
14. displays a strong number sense	.448
21. can distinguish relevant and irrelevant information in math problems.	.444
16. asks high-level questions such as “why” or “what if” that increase the depth and complexity of the mathematics being studied.	.433
15. displays an interest in analyzing the mathematical structure of a problem.	.423
Factor 3: Creative Problem Solver ( $\alpha = .840$ )	
44. is able to think creatively.	.746
31. generates new ways to solve problems.	.714
4. has creative (unusual and divergent) ways of solving math problems.	.592
33. offers different solutions to one problem.	.589
39. generates many ideas, solutions, explanations, etc.	.557
30. has ability to incubate when s/he cannot solve the problem immediately.	.521
26. has spatial/3D ability.	.440
37. enjoys solving challenging problems.	.431

to everyday life), and Creative Problem Solver (students who generate a variety of possible solutions to problems). Alpha reliabilities for the factors were .901, .882, and .840 respectively.

We calculated a composite score for each factor based on the mean of the statements within each factor. Histograms revealed the composite scores for the three factors were negatively skewed. We approximated a normal distribution for each factor with natural log transformations.

## Participants

A majority of the high school mathematics teachers were male in South Korea and Turkey, while gender was fairly evenly split in the United States (see Table 3). The majority of U.S. teachers held Master’s degrees while most Turkish teachers held Bachelor’s degrees. South Korean teachers were somewhat split between having an undergraduate degree and having a graduate degree (see Table 3). Some of the Turkish teachers held a degree

from a 3-year education institute, and they were coded as if they held a Bachelor's degree.

All of the teachers in South Korea and Turkey reported they only taught mathematics. Only a small percentage, 0.4% of the United States teachers taught a subject other than mathematics. All South Korean mathematics teachers were certified in mathematics. Turkey and the United States had small percentages of non-certified mathematics

teachers, 0.8% and 2.9%, respectively.

The number of years of teaching experience in South Korea, Turkey, and in the United States ranged from 0 to 35, 1 to 34, and 0 to 43, respectively (see Table 4). Sixteen percent of the United States mathematics teachers had more than 30 years of experience while less than 1% of the South Korean and Turkish mathematics teachers had more than 30 years of experience.

**Table 3:** Teacher demographic information reported as percentages for gender and highest degree held by country.

	South Korea <i>n</i> =296	Turkey <i>n</i> =389	USA <i>n</i> =262	Total <i>N</i> =947
<b>Gender</b>				
Female	33.9	41.9	51.3	41.8
Male	66.1	58.1	48.8	58.2
<b>Highest Degree of Education</b>				
Bachelors	55.7	93.6	39.5	66.6
Masters	41.6	6.4	59.3	32.2
Sixth Year	0.0	0.0	0.4	0.1
Ph.D.	2.7	0.0	0.8	1.1

**Table 4:** Years of experience teaching (All) and years of experience teaching mathematics (Math).

Years	South Korea <i>n</i> =296		Turkey <i>n</i> =389		USA <i>n</i> =262	
	All	Math	All	Math	All	Math
0 – 5	26.7	23.8	11.4	12.4	13.0	18.3
6 – 10	11.0	13.3	24.8	24.0	18.8	18.3
11 – 15	21.2	22.1	20.1	19.9	14.6	14.4
16 – 20	18.8	18.7	12.4	13.2	12.2	10.9
21 – 25	11.3	12.2	23.3	23.3	7.3	6.6
26 – 30	10.3	8.2	7.5	6.9	16.9	15.5
31 – 35	0.7	0.7	0.5	0.3	13.8	12.5
36 – 40	0.0	0.0	0.0	0.0	2.6	2.7
41 – 45	0.0	0.0	0.0	0.0	0.8	0.8

## Results

Data were entered into a series of stepwise multiple regression procedures to assess the relation between the demographic characteristics of the teachers and their ratings of the characteristics of mathematically gifted students. The predictor variables, gender (dummy coded), years of experience teaching mathematics, highest level of teaching mathematics (9-12), and highest degree earned (codes 1-5) were measured through completion of the personal information section of the Teachers' Judgments of Gifted Mathematics Student Characteristics survey by the 947 high school mathematics teachers from South Korea, Turkey, and United States. The criterion variables were the natural log transformed composite scores for the three factors from our survey: School Smart

Mathematics Students, Mathematics Perspective for the Real World, and Creative Problem Solvers. We performed separate step-wise regressions for each of these factors.

Data analyses indicated that years of experience teaching mathematics, highest level of teaching mathematics, and highest degree earned were significant predictors for the School Smart Mathematics Students factor. Teachers who taught higher grade levels were less likely to value School Smart Mathematics Students. Teachers who taught mathematics for more years were more likely to value School Smart Mathematics Students. Teachers who had higher degrees were less likely to value School Smart Mathematics

**Table 5:** Step-wise regression analysis summary for teacher characteristics variables predicting school smart mathematics students ( $N=947$ ).

Variable	<i>B</i>	<i>SEB</i>	$\beta$	$R^2$	$\Delta R^2$
Step 1				.046	
Highest Grade Level Teaching Math	-.054	.008	-.214		
Step 2				.091	.045
Highest Grade Level Teaching Math	-.068	.008	-.273		
Number of Years Teaching Math	.004	.001	.219		
Step 3				.096	.005
Highest Grade Level Teaching Math	-.061	.009	-.243		
Number of Years Teaching Math	.004	.001	.228		
Highest Degree Earned	-.028	.012	-.081		

**Note:** Gender was not a significant predictor.

**Table 6:** Step-wise regression analysis summary for teacher characteristics variables predicting gifted students mathematics perspective for the real world ( $N=947$ ).

Variable	<i>B</i>	<i>SEB</i>	$\beta$	$R^2$	$\Delta R^2$
Step 1				.021	
Highest Grade Level Teaching Math		-.027	.006	-.146	
Step 2				.041	.020
Highest Grade Level Teaching Math			-.035	.006	-.185
Number of Years Teaching Math		.002	.000	.146	
Step 3				.060	.019
Highest Grade Level Teaching Math		-.033	.006	-.177	
Number of Years Teaching Math		.002	.000	.186	
Gender		-.035	.009	-.142	

**Note:** Highest degree earned is not included.

**Table 7:** Step-wise regression analysis summary for teacher characteristics variables predicting creative problem solvers ( $N=947$ ).

Variable	<i>B</i>	SEB	$\beta$	$R^2$	$\Delta R^2$
Step 1				.035	
	Highest Grade Level Teaching Math	-.036	.007	-.188	
Step 2				.050	.015
	Highest Grade Level Teaching Math	-.043	.007	-.221	
	Number of Years Teaching Math	.002	.000	.123	

**Note:** Highest degree earned and gender are not included.

Students. These variables accounted for 9.6% of the variance (see Table 5). This is a small, but significant, effect size. This indicates older teachers, evident by the number of years they taught, were more likely to value traditional mathematics skills such as computational speed and accuracy. Teachers with more advanced degrees and those who taught higher level courses were less likely to place a high value on these skills.

Step-wise regression analyses indicated that highest grade level teaching mathematics and numbers of years of teaching mathematics were significant predictors for the Creative Problem Solvers factor. Teachers who taught higher grade levels were less likely to value students as Creative Problem Solvers. Teachers who taught mathematics for more years were more likely to value students as Creative Problem Solvers. These variables accounted for 5% of the variance (see Table 7). This represents a small, but significant, effect size. Once again, the teachers who probably taught higher level mathematics were less appreciative of students who generated a variety of ideas and possible solutions compared with the more experienced teachers who were more likely to value computational skills. They were also more appreciative of divergent thinking students.

We used a MANOVA to determine whether there were any differences among mathematics teachers from South Korea, Turkey, and United States in terms of their ratings of mathematically

gifted students' characteristics. The independent variable was the teachers' country while the dependent variables were our three factors (Mathematics Perspective for the Real World, School Smart Mathematics Student, and Creative Problem Solvers). The Wilk's lambda statistic showed a significant statistical difference in attitudes among mathematics teachers in South Korea, Turkey, and United States. Wilk's lambda was .571,  $F(6, 1884) = 101.547$ ,  $p < .001$ ,  $\eta^2 = .244$ . Since there was statistical significance in the multivariate analysis, we individually examined the dependent variables (School Smart Mathematics Student, Mathematics Perspective for the Real World, and Creative Problem Solvers) and performed univariate analyses. Researchers differ on whether Discriminate Function Analysis or ANOVAs are more appropriate for post hoc analysis of significant multivariate results. We chose the latter because we were more interested in differences on the individual factors. Each of the factors was significant as shown in Table 8.

Since there were three groups in the sample and there were significant differences in the factors, a Scheffé post-hoc analysis was conducted. The Scheffé post-hoc accounts for increased Type I error due to multiple analyses. This analysis showed the means of each country differed significantly ( $p < .05$ ) from each other (see Table 9 for effect sizes). Turkish mathematics teachers valued all three factors the highest among the three countries. South Korean teachers were the

**Table 8:** Univariate analysis of dependent variables for countries.

Source	Dependent Variable	SS	df	MS	F	Sig.
COUNTRY	School Smart Mathematics Students	7.762	2	3.881	210.618	<.001
	Mathematics Perspective for the Real World	1.435	2	.718	52.639	<.001
	Creative Problem Solvers	1.531	2	.765	52.540	<.001
Error	School Smart Mathematics Students	17.396	944	.018		
	Mathematics Perspective for the Real World	12.869	944	.014		
	Creative Problem Solvers	13.754	944	.015		



least likely to value the School Smart Mathematics Students and Mathematics Perspective for the Real World factors. United States teachers valued the Creative Problem Solvers factor the lowest. See Table 10 for means and standard deviations prior to and after data transformation. The data analysis used the transformed scores; however, the non-transformed scores are easier to interpret since they represent the measurement metric used with the survey.

Finally, we were interested in whether the

mathematics teachers from these three countries differed in their view of mathematics and the way they thought mathematics should be taught. We conducted one-way ANOVAs with Scheffé post-hoc follow up. In each of the nine variables we measured, there was at least one significant difference among South Korean, Turkish, and United States teachers. A graphic representation of these results is shown in Figure 1. ANOVA results and group means and standard deviations are shown in Table 11.

**Table 9:** Effect Size Differences Using Cohen's *d*.

Country	Turkey	USA
Factor 1: School Smart Mathematics Students		
South Korea	1.585	1.036
Turkey	--	0.522
Factor 2: Mathematics Perspective for the Real World		
South Korea	0.773	0.545
Turkey	--	0.265
Factor 3: Creative Problem Solver		
South Korea	0.418	0.398
Turkey	--	0.810

**Note:** All were significantly different from each other. Calculations were based on transformed data.








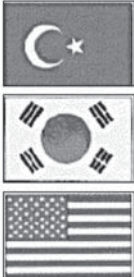

**Table 10:** Descriptive statistics for rating of gifted mathematics students characteristics factors by South Korean, Turkish, and U.S. teachers.

Country	Non Transformed			Transformed		
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Factor 1: School Smart Mathematics Students						
South Korea	3.221	.819	296	.276	.137	296
Turkey	4.298	.570	389	.490	.132	389
USA	3.993	.626	262	.419	.139	262
Total	3.877	.814	947	.403	.163	947
Factor 2: Mathematics Perspective for the Real World						
South Korea	3.695	.573	296	.351	.113	296
Turkey	4.117	.579	389	.443	.124	389
USA	3.998	.507	262	.412	.110	262
Total	3.952	.586	947	.406	.123	947
Factor 3: Creative Problem Solver						
South Korea	4.215	.500	296	.465	.119	296
Turkey	4.401	.534	389	.516	.125	389
USA	4.016	.523	262	.418	.116	262
Total	4.236	.543	947	.473	.127	947

**Table 11:** ANOVA results and means and standard deviations for teachers attitudes about how to teach mathematics.

	S. Korea		Turkey		USA	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Mathematics is primarily an abstract subject. <i>F</i> (2, 934) = 24.810, <i>p</i> < .001, $\eta^2 = .050$	2.818	.684	2.824	.864	2.425	.717
Mathematics is primarily a formal way of representing the real world. <i>F</i> (2, 931) = 10.467, <i>p</i> < .001, $\eta^2 = .022$	3.105	.553	3.222	.662	3.000	.583
Mathematics is primarily a practical and structured guide for addressing real situations. <i>F</i> (2, 931) = 39.178, <i>p</i> < .001, $\eta^2 = .078$	2.922	.588	3.341	.644	3.096	.612
If students are having difficulty, an effective approach is to give them more practice by themselves during the class. <i>F</i> (2, 929) = 148.557, <i>p</i> < .001, $\eta^2 = .242$	3.122	.639	2.858	.891	2.031	.725
Some students have a natural talent for mathematics and others do not. <i>F</i> (2, 937) = 23.367, <i>p</i> < .001, $\eta^2 = .048$	3.003	.721	3.372	.722	3.222	.629
More than one representation (picture, concrete material, symbol set, etc.) should be used in teaching a mathematics topic. <i>F</i> (2, 939) = 77.161, <i>p</i> < .001, $\eta^2 = .141$	2.922	.614	3.368	.680	3.554	.550
Mathematics should be learned as sets of algorithms or rules that cover all possibilities. <i>F</i> (2, 930) = 115.643, <i>p</i> < .001, $\eta^2 = .199$	2.810	.669	3.053	.752	2.167	.760
Basic computational skills on the part of the teacher are sufficient for teaching mathematics. <i>F</i> (2, 938) = 97.438, <i>p</i> < .001, $\eta^2 = .172$	1.686	.648	2.329	.927	1.485	.806
A liking for and understanding of students are essential for teaching mathematics. <i>F</i> (2, 939) = 55.375, <i>p</i> < .001, $\eta^2 = .106$	3.108	.695	3.594	.627	3.580	.631

**Note:** The means of each country differed significantly ( $p < .05$ ) from each other.

<p>Mathematics is primarily an abstract subject.</p> 	<p>Mathematics is primarily a formal way of representing the real world.</p> 	<p>Mathematics is primarily a practical and structured guide for addressing real situations.</p> 
<p>More practice is an effective approach.</p> 	<p>Some students have a natural talent for mathematics and others do not.</p> 	<p>More than one representation should be used in teaching a mathematics topic.</p> 
<p>Mathematics should be learned as sets of algorithms or rules that cover all possibilities.</p> 	<p>Basic computational skills on the part of the teacher are sufficient for teaching mathematics.</p> 	<p>A liking for and understanding of students are essential for teaching mathematics.</p> 

**Figure 1:** Differences in teachers' views about mathematics and the teaching of mathematics are represented by vertical differences in country flags.

## Discussion

### Characteristics of Talented Mathematicians

The more years teachers taught mathematics, the more likely they were to report students' arithmetic skills, their ability to relate mathematics to everyday life, and their ability to generate multiple and unique solutions to problems as indicators of mathematical talent. Experienced teachers may be better able to identify gifted students with these characteristics and possibly see connections between mathematics and its applications.

The opposite was true for highest level of mathematics taught. The higher the grade level of mathematics taught, the less teachers valued each of these factors. This was unexpected. We expected teachers who taught more advanced courses (which would appear in higher grade levels) would be less impressed with students' arithmetic skills, but not less impressed with students ability to relate mathematics to everyday life or ability to generate a variety of possible solutions to problems. One possible explanation is the restriction of range with our Turkish and

South Korean sample. Turkish teachers mostly taught grades 9-11 (most high schools in Turkey only serve students through grade 11), and South Korean teachers mostly taught grades 10-12. Because the ANOVA results showed Turkish teachers most positive about the three factors and South Korean teachers least positive, their limited grade teaching range may have influenced the regression results. We had hoped to analyze the country variable with the demographic variables but limited cell sizes precluded this option.

It may be that the higher the grade level, the higher the stress level for university entrance exams. Teachers and students may worry about covering the necessary curriculum to prepare students for college entrance exams. This may be more of a concern in South Korea and Turkey. This high stress environment at higher grade levels may leave little room for teachers to appreciate Mathematics Perspective for the Real World and Creative Problem Solvers. A stressful atmosphere may not, therefore, create a friendly environment for gifted students to show their talents at higher grade levels. This is a possible area of future research considering the rising popularity of high-stake testing within the United States.

We were not surprised teachers with advanced degree were less impressed with arithmetic skills. While not found, we thought a relationship might exist between level of degree earned and appreciation of students' ability to relate mathematics to everyday life and students' ability to generate multiple and unique solutions to problems.

As previously stated, Turkish teachers expressed stronger acceptance of each of the factors. This may be because the Turkish Ministry of Education conducted the survey which could have caused the teachers to be more accepting. U.S. teachers tended to be followed by South Korean, except for the multiple solutions to problems factor, which South Korean teachers rated higher than U.S. teachers. As expected, the teachers overall in each country rated each of the factors high ( $M=3.221$  to  $4.401$  on a 5-point scale). Creative problem solving received the greatest support, and the traditional school-smart arithmetic skills received the least support.

### **Ways Mathematics Was Viewed and Should be Taught**

South Korean teachers, whose country's students score near the top on international mathematics exams, are less likely to view mathematical talent as innate. They view mathematics as an

abstract subject in which students experiencing difficulties should be given time in class to practice by themselves. They are less likely to see mathematics as a practical topic or a formal way of representing the world. They are less likely to use a variety of representations (pictures, concrete objects, and symbols) when teaching mathematics.

Turkish teachers, whose students score low on international tests, also see mathematics as an abstract subject. However, they are more likely to believe some students have a natural mathematical talent. They see mathematics as relating to the real world. They also are more likely to believe it should be taught as a series of algorithms and that the possession of basic computational skills by the teacher is sufficient to teach mathematics.

United States' teachers, whose students score somewhere between South Korean and Turkish students on international tests, are least likely to see mathematics as abstract. They are also least likely to support individual practice during class time and less likely to place an emphasis on teaching algorithms. They also are more likely to disagree that possession of basic mathematics skills is sufficient to teach mathematics.

### **Limitations of the Study**

Several limitations exist in this study, including survey return rates, reliance on self-reporting, and voluntary participation. Although the U.S. survey return rate was low (26%), the questions on our survey imported from TIMSS received similar responses to those administered by TIMSS, perhaps indicating the study data collected in the U.S. is probably representative of U.S. teachers. Responses for Turkey were also moderately related to TIMSS. The relationship with the South Korean data was also somewhat related, although less than the data from the U.S. and Turkey. Based on this, survey data appear to be representative of the opinions of teachers in the countries surveyed.

The nature of the self-reporting data is a concern in Turkey because the Ministry of National Education collected the data. Teachers in Turkey may have wished to please their supervisors who conducted the survey, although we have no reason to believe this was the case.

The surveys were effectively translated from English to Turkish and Korean and retranslated to English. Reliability coefficients for the three factors in each language were similar.



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## Conclusions

Identifying and providing services to gifted mathematicians is of paramount importance in a rapidly shrinking global economy that requires advanced technological skills. We found the most valued characteristic for young mathematicians to possess is creativity in approaching problem solving. Gifted education has been in the forefront of developing student creativity skills. Educators of the gifted should continue this practice while expanding it to encompass academic content. In other words, mathematics instructors should help promising mathematicians develop their creativity and apply it to solving mathematics problems. This research demonstrated that more experienced teachers were more likely to value this trait in young gifted mathematicians. On the other hand, those who taught higher grade levels of mathematics did not. If diverse thinking is, in fact, a valuable skill for gifted mathematicians to possess, then instructors of higher-level mathematics should appreciate and consider incorporating this type of thinking into the courses they teach.

Traditionally, Asian culture places a high value on effort over ability. The South Korean teachers' responses support this. These teachers, whose country's TIMSS scores are the highest of the three countries we studied, appear to support more traditional approaches to teaching mathematics and believe that students' mathematical skills are developmental. The current trend in the United States is toward less traditional approaches to teaching mathematics (NCTM, 2000). Teachers in the U.S. are also more likely to see mathematic talent as innate. These are areas in the United States that require additional research and dialog.

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# Satisfaction With School Among Gifted Israeli Students Studying in Various Frameworks

Hava Vidergor and Shunit Reiter

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## Abstract

The study was aimed at assessing gifted students' satisfaction with school. The research sample comprised 229 Israeli elementary and junior high school gifted students, studying in separate classrooms, pullout programmes and pullout programme dropouts, and 140 regular students studying at the same schools. Satisfaction was measured using a self-report questionnaire comprised of the following factors: Teachers' characteristics, level and pace of studies, teaching methods, academic self-concept, and general self-concept. The study concludes that a male gifted junior high school student, who had dropped out of a pullout programme, and whose mother is a high school graduate, will express the lowest level of satisfaction with school. Practical implications, with respect to students' preference of school enrichment practices, are described.

**Keywords:** Segregated classrooms, pullout programmes, pullout dropouts, satisfaction with school, enrichment preferences, teachers' characteristics, teaching methods, level of studies, academic self-concept, general self-concept.

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## Background

Gifted students take part in various programmes such as segregated classrooms in regular schools and pullout programs in gifted education centers, which are amongst the most common ones. In Israel, the majority of gifted students participate in pullout programs located in rural gifted education centers, while the rest study in segregated classrooms in urban areas. It was observed that the problem of dropping out of pullout programs during junior high school has recently increased. Hence, this study was aimed at assessing gifted students' satisfaction with school, preference of enrichment practices and reasons for dropping out of pullout programs. Data gathered may shed light on new provisions favoured by students which can be applied in regular schools as supplementary or comprehensive programs.

### *Segregated Classrooms*

Segregation can take place in a range of educational settings including, e.g., self-contained classrooms where gifted children study all year round or in regular classrooms where ability grouping can take place in a more flexible and less permanent setting. Placement in such settings take students' ability and other factors into account, such as motivation, interests,

instructional level and an individual's willingness to invest in learning (Renzulli & Reis, 1991).

There are various arguments for and against segregation. For example, Davidson, Davidson & Vanderkam (2004) advocate for gifted programmes. Commenting on self-contained classrooms, they point out that by concentrating the brightest students in one class the costs incurred are no more than teaching many students in mixed ability classrooms throughout a school district.

Researchers found that when gifted students are segregated and grouped with others of similar ability their self-esteem tends to drop (Hoge & Renzulli, 1993). The drop in self-esteem is explained by changes in the social comparison dynamics operating within the group attending the gifted programme. The changes tend to affect areas of self-concept specific to academics (Swiatek & Lupkowski-Shoplak, 2003). It is, however, usually temporary (Shore, Cornel, Robinson & Ward, 1991).

Students learning in segregated classrooms report having more social problems than those learning in classrooms in which they felt supported and protected. From this perspective, it appears that a heterogeneous or mainstreamed environment



offers some distinct advantages for the gifted student (Zeidner & Schleyer, 1999a, 1999b).

### ***Pullout Programmes***

Schiever & Maker (1997) identified three particular kinds of pullout programmes:

1. Process-oriented programmes that focus on creative problem solving and critical thinking, often not in context of a specific subject matter.
2. Content-oriented approaches offering mini-courses or mentorship in a specific subject area.
3. Product-oriented approaches involving students in projects, reports and presentations, which combine process and content elements.

These programmes can take place in various places. Two of the most prevalent appear to be those where students spend time in a gifted resource room at school or travel to a center for gifted education. The resource room provides students with enrichment guided by a professional teacher for ninety minutes to several hours a week (Davidson, Davidson & Vanderkam, 2004). Such endeavors may be expensive due to special teacher costs. Levels of achievement may also depend on the number of students and contact hours per week (Bernal, 2003). Critics note that even the most exciting curriculum accomplishes little if exposure lasts for only several hours a week (Feldhusen, 1997; Gagne, 1995; Winner, 1997).

Davidson, Davidson & Vanderkam, (2004) also found pullout programmes in school to be more dependent on age than interest and ability. In other words, the gifted are rarely grouped according to interest in mixed-age classes.

Although not strictly a pullout programme, the Schoolwide Enrichment Model (Renzulli & Reis, 1985, 1994, 1997) is one of the most familiar approaches to the education of gifted children. It would qualify as a pullout programme in terms of the third categorization by Schiever & Maker (1997). SEM consists of 3 phases: exposure, development of critical and creative thinking skills, and opportunity to pursue a self-selected area of study. This model is effective when used with gifted in regular schools (Renzulli & Reis, 2003).

Empirical studies concerning pullout programmes (as cited in Moon, Feldhusen and Dillon, 1994), revealed positive effects in a variety of areas including: achievement (Aldrich & Nills, 1989; Kulik & Kulik, 1992); critical thinking (Beckwith, 1982; Carter, 1986; Neilsen, 1984); creativity (Kollof &

Feldhusen, 1984; Starko, 1988); encouragement in fields of interest (Humes & Campbell, 1980); and interaction with students (Humes & Campbell, 1980). Moreover, studies show long-term positive effects of pullout programmes on elementary school students (Feldhusen & Moon, 1992; Moon, 1991). For example, Moon, Feldhusen and Dillon (1994) found most students loved pullout programmes for being significantly different from regular school and, at times, effecting schoolwork perceived as boring.

### **Student Participation in Programmes**

A study conducted by Swiatek and Lupkowski-Shoplik (2003), using data gathered by a questionnaire administered to gifted elementary and middle school students, found pullout programmes to be the most common practice in gifted education (40%), which is consistent with results of past research (Winner, 1997). However, pullout programmes may not be sufficient to meet these students' needs (Feldhusen, 1997). In the Swiatek and Lupkowski-Shoplik's (2003) study, students noted other programmes in which they participated. They included: academic competitions (32%); after school programmes (23%); subject based or self-contained gifted classes (23%); summer academic programmes (21%); and work at higher grade level in the regular classroom (21%). Surprisingly, thirty-seven percent of the gifted students reported no involvement in any in-school gifted programme, while seventy-five percent reported receiving no form of acceleration, e.g., opportunities to work with intellectual peers, grade skipping or advancement in a subject area.

### **Impact of Programmes on Gifted**

Hertzog (2003) interviewed 50 gifted college students about their prior experiences in gifted programmes and the impact these experiences had on their lives. Students noted "gifted programmes had an overwhelming positive impact on their lives, regardless of specific programme" (p.139). However, the greatest impact was perceived to occur in secondary school programmes, honors, advanced placement and competitions. Notable benefits included: better preparation for college and for future career paths as life-long learners, promotion of learning abilities, and acquisition of skills. Most students preferred challenging academic experiences, but observed they felt harassed and different as a result of their participation in pullout programmes and segregated classrooms.

## Satisfaction with school

Gifted students in separate classrooms expressed more positive attitudes relating to school atmosphere, level of studies, teacher- student interaction, and teacher characteristics, than regular students and gifted in pullout programmes (Zeidner & Schleyer, 1999a, b). Studies indicate they have a higher self and academic concept as a result of positive experiences at school (Chapman & McAlpine, 1988).

## Programmes in Israel

Programmes for the gifted were first administered in Israel in the early 1970s. Currently, approximately 15,000 gifted students are identified by the Department of Gifted Education and take part in a variety of programmes. About 1,700 of these students study in special gifted elementary and secondary classrooms in regular schools.

Segregated classrooms are located in the comprehensive high schools found in urban areas. These classrooms offer the gifted an accelerated programme in a regular school that enables them to take part in social activities with non-gifted students.

More than five thousand students are provided the choice of a variety of enrichment topics offered in the weekly pullout programmes offered by the 51 centers for gifted education located in the various districts throughout Israel (Department of Gifted Education, 2007). Students attend these centers once a week on a regular school day. However, since they are away from their regular school, they have to make up the work including homework, tests and other requirements and, or assignments given by the teachers on that specific day.

Dropping out of a gifted programme in Israel is mainly associated with pullout programmes at gifted education centers. There is a tendency for gifted elementary or junior high school students to choose to stop their studies at the center and return to the regular classroom. From that point on they are not involved in any gifted programme. They can be identified in many classrooms around the country, but the exact number of pullout programme dropouts is not available.

## Focus of Study and Main Hypotheses

In light of current knowledge, this study attempted to examine the connection between how gifted students are educated, i.e., the particular school framework within which the students operate, and students' satisfaction. The main hypothesis was that differences would be found among groups from various frameworks with respect to satisfaction with school and preference of school enrichment practices. Reasons for dropping out of pullout programmes were also considered.

### The study raised three hypotheses:

1. In comparison among gifted groups, pullout dropouts will express the lowest level of satisfaction with school.
2. In comparison between gifted students (3 groups) and regular students, the former will express a lower level of satisfaction with school.
3. Relating to preference of school frameworks, pullout dropouts will prefer the existence of more challenging activities at school, compared to gifted students participating in pullout programmes.

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## Method

### Participants

To answer the study hypotheses four groups were selected. These four groups comprise the variable Frameworks.

#### *Group #1 (Special Classes):*

Gifted elementary and junior high school students studying in separate classrooms in regular schools (N= 70).

#### *Group #2 (Pullout):*

Gifted elementary and junior high school students participating in pullout programmes one day per

week and heterogeneous classrooms for the rest of the week (N= 70).

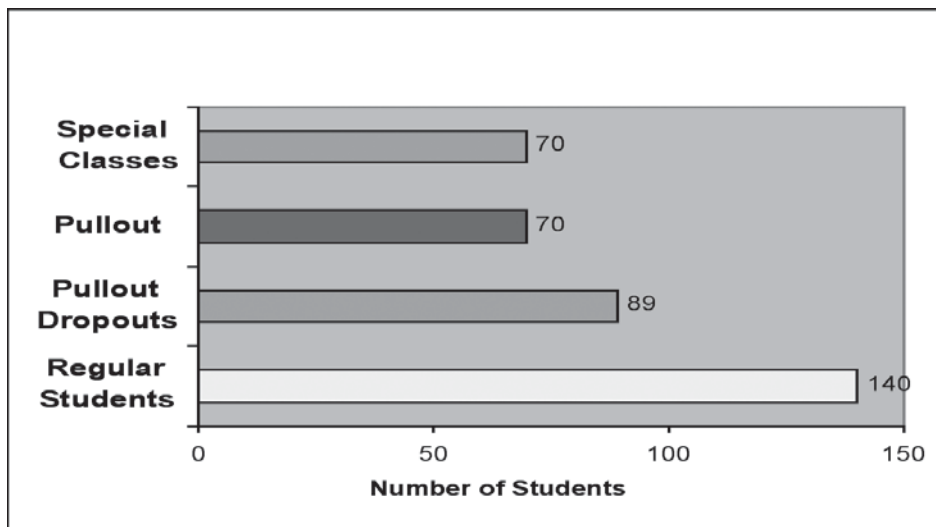
#### *Group #3 (Pullout Dropout):*

Gifted elementary and junior high school students who had dropped out of pullout programmes (N= 89) to study in regular schools in heterogeneous classrooms.

#### *Group #4 (Regular Students):*

Control group: Regular elementary and junior high school students studying in the same heterogeneous classrooms (N= 140).

**Table 1:** Study participants by groups and numbers.



## Sampling

The method applied use of disproportional stratified sampling to assess differences between groups not proportional to their sizes in population (Salant & Dillman, 1994).

## Tools and Variables

The questionnaire was constructed of four parts. Regular students responded to parts 1 and 4 only, since other parts were intended for gifted students

**The first part** consisted of 44 closed-ended items on a six-point Likert –type scale from 1 = “completely disagree” through to 6 = “completely agree” measuring satisfaction with school.

The dependent variable **satisfaction with school** was divided into five dimensions:

1. Teachers’ characteristics and functioning (15 items,  $\alpha = .81$ );
2. Studies – level, pace and interest (9 items,  $\alpha = .70$ );
3. Variety of teaching methods (10 items,  $\alpha = .70$ );
4. Academic self-concept (4 items,  $\alpha = .72$ );
5. General self-concept (6 items,  $\alpha = .77$ ).

Independent variables including **framework**, i.e., special classes, pullout programme, pullout dropouts, regular students; **type of school**, i.e., elementary/ junior high school; **gender**; and **parents’ education**, e.g., high school/university

graduates; were examined. Reliability was calculated for the study sample ( $\alpha = .86$ ) and factor analysis performed yielded five dimensions. One item yielding low reliability was dropped.

**The second part** was intended for gifted students studying in pullout programmes at the time of this research and in the past. It addressed the preference of nurturing frameworks.

**The third part** was intended for gifted students taking part in pullout programmes in the past. It aimed to gather information relating to participation in pullout programme and reasons for dropping out.

**The fourth part** consisted of demographic information relating to framework, type of school, gender, and parents’ education.

## Data Analysis

Data reduction in the form of Principal Component with Varimax rotation was performed to build dimensions comprising general satisfaction. Dimensions were calculated as mean of items loaded on the same factor.

ANOVA and Tukey’s post-hoc tests were performed for comparison among the four study groups. MANOVA procedures were used to affirm the relevance of independent variables such as framework, type of school, gender and parents’ education. Multiple regressions were performed to establish effect of independent variables on overall satisfaction with school, and the variables comprising it. All hypotheses were examined in the same statistical analysis.

## Procedure

The questionnaire was reviewed for content validity by two experts in the field of gifted education. In the first stage, the questionnaire was pre-tested on a sample of regular students who studied in the same elementary and junior high schools as pullout programme students and pullout programme dropouts (N = 140).

In the second stage the questionnaire was administered to gifted students (N=229) in addition to the 140 regular students participating

in the pilot test. The gifted responded to the questionnaire in their original study groups at school, or pullout programme at gifted education center. The elementary and junior high schools and gifted education centers were located in the rural area of the Haifa region in northern Israel. Special and segregated classes were located in the city of Haifa.

The questionnaire was administered and collected on same day by the researcher. Time allocated for filling in the questionnaire was approximately 15 minutes.

## Results

### General Satisfaction

The main hypothesis in the current study was that there would be differences among groups relating to satisfaction with school. The following table shows general satisfaction by framework in mean values ranging between 1-6 (see Table 2).

Based on findings, regular students expressed the highest level of satisfaction with school (M=4.07, SD=.53). The gifted from pullout programmes and gifted from special classes and expressed almost the same level of satisfaction (M=4.01, SD=.46 & M=3.98, SD=.35 respectively). Pullout dropouts expressed the lowest satisfaction with school (M=3.87, SD=.56).

ANOVA and Tukey's post-hoc tests performed for comparison among four study groups, revealed significant differences between groups ( $p=.035$ ). The most significant difference was between the regular class students and pullout dropouts (.20),  $p<.05$ . Calculated effect size ( $d = .38$ ). No significant differences were found between other groups.

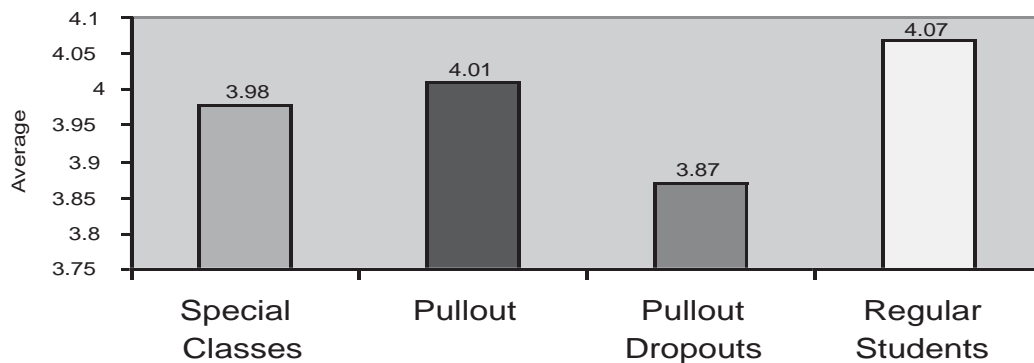
### Satisfaction According to Various Dimensions

In order to examine satisfaction with school in depth, the following five dimensions comprising satisfaction based on literature were built: 1. Teachers' characteristics and functioning; 2. Studies – level, pace and interest; 3. Variety of teaching methods; 4. Academic self-concept; and 5. General self-concept. Table 3 shows significant differences found among groups in three dimensions in mean values.

By comparing dimensions among four study groups, significant differences were found in three of the four, i.e., evaluation of studies, variety of teaching methods, and general self-concept.

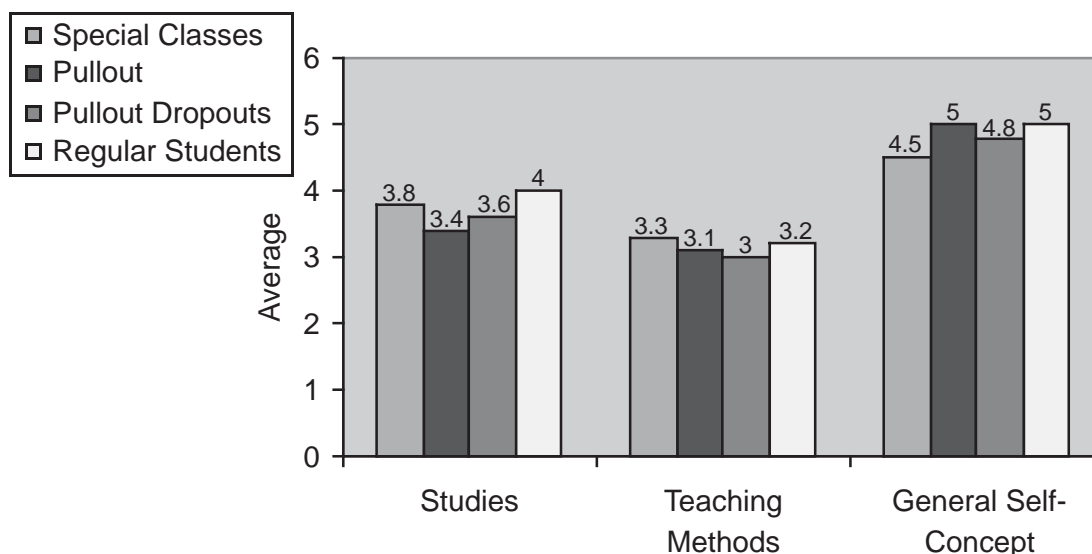
**Evaluation of studies:** The gifted studying in separate classes evaluated studies, i.e., level, pace and interest, highest among gifted groups (M=3.76, SD=0.63). Pullout dropouts expressed the lowest evaluation of studies (M=3.43, SD=0.92). A significant medium effect was detected between gifted from special classes compared to pullout dropouts ( $F [3,365] =9.43$ ,

**Table 2:** General satisfaction by framework.





**Table 3:** Satisfaction with school: Significant differences among groups.



$p < .001$ ,  $d = .41$ ). Regular students (control group) indicated highest evaluation of studies among all groups ( $M = 3.98$ ,  $SD = 0.72$ ).

**Variety of teaching methods:** Gifted from special classes reported the highest variety of teaching methods ( $M = 3.33$ ,  $SD = 0.67$ ). A significant medium effect was found compared to gifted from pullout programmes ( $M = 3.01$ ,  $SD = 0.58$ ) who expressed the lowest satisfaction with variety of teaching methods used at school ( $F[3,365] = 3.20$ ,  $p < .05$ ,  $d = .51$ ).

**General self-concept:** Regular students ( $M = 5.04$ ,  $SD = 0.77$ ) and gifted from pullout programmes ( $M = 5.04$ ,  $SD = 0.67$ ) presented the same level of general self-concept, whereas, pullout dropouts ( $M = 4.76$ ,  $SD = 0.81$ ) expressed a slightly lower general self-concept. A significantly high effect was found comparing gifted from pullout programmes and gifted from special classes ( $F[3,365] = 9.43$ ,  $p < .001$ ,  $d = .85$ ), who possessed the lowest general self-concept of all research groups. This finding is supported by research literature.

Tukey's post-hoc paired comparison tests were performed in order to examine significance of differences among groups in the following three dimensions ( $p < .05$ ):

- Evaluation of studies: A significant difference was found between the regular students and gifted from pullout programme (.34) and pullout dropouts (.54). A positive significant difference was also found between gifted from special classes compared to pullout dropouts (.33).
- Variety of teaching methods: A significant difference was found between gifted from special classes and gifted from pullout

programmes (.33) indicating that gifted from special classes have access to a greater variety of teaching methods.

- Academic self-concept: A significant difference was found between gifted from pullout programmes and regular students (.36) indicating that gifted from pullout programmes have a higher academic self-concept.
- General self-concept: A significant difference was found between gifted students participating in pullout programmes and participants in special classes (-.50). Students from pullout programme had a higher general self-concept. Two other significant differences were found, one between regular students and gifted from special classes, in favor of regular students (.50), and regular students and pullout dropouts, again in favor of regular students (.28). Regular and gifted students from pullout programmes were found to possess similar levels of general self-concept.

#### Comparison by Background Variables

The study examined background variables and their relevance to the evaluation of the various dimensions comprising satisfaction. These variables, i.e., framework, type of school, gender, and parents' education, were examined separately and underwent multiple regression tests to predict general satisfaction among the various groups. MANOVA procedures were used to examine relevance of variables.

#### Comparison by Gender

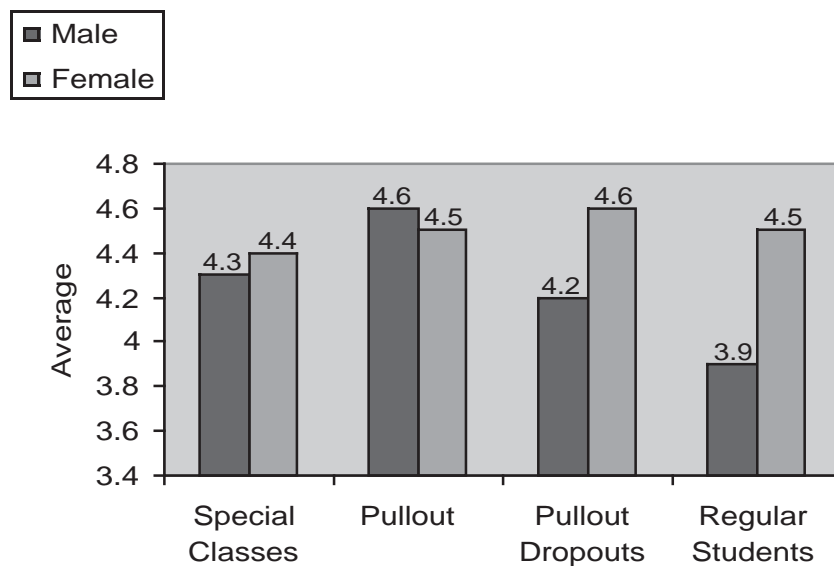
The multivariate test in the MANOVA for framework and gender yielded several significant effects (see Table 4). There were significant main effects for

framework, and gender. The main effects for academic self-concept ( $F[3,361]=7.87, p<.001, \eta^2 = .061$ ), general self-concept ( $F[3,361]=8.44, p<.001, \eta^2 = .066$ ), and evaluation of studies ( $F[3,361]=2.75, p<.05, \eta^2 = .022$ ), stemmed from differences in framework, while students' gender yielded a main effect on academic self-concept only ( $F[1,361]=6.42, p<.05, \eta^2 = .017$ ). The main effect of framework by gender stemmed from the difference in the evaluation of studies ( $F[3,361]=4.00, p<.01, \eta^2 = .032$ ), general self-concept ( $F[3,361]=3.24, p<.05, \eta^2 = .026$ ), and academic self-concept ( $F[3,361]=2.74, p<.05, \eta^2 = .022$ ).

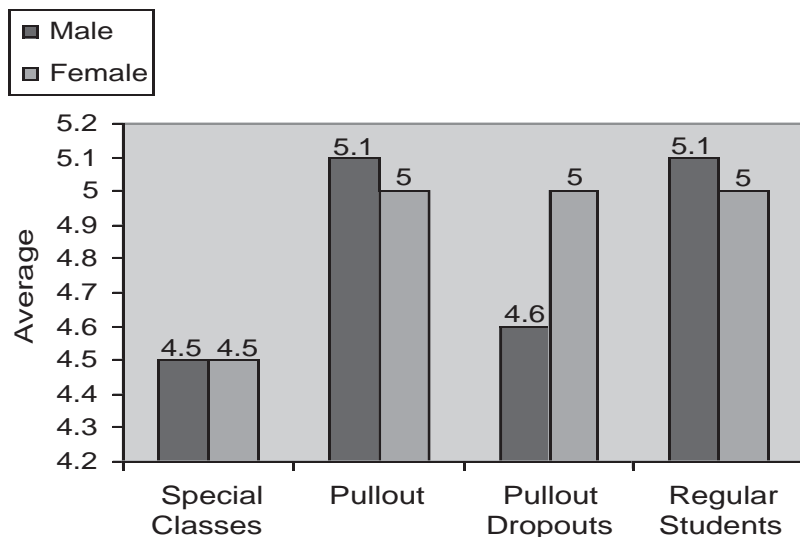
Examining boys' academic self-concept reveals

regular students possess the lowest academic self-concept ( $M=3.9, SD=.97$ ), pullout dropouts ( $M=4.2, SD=1.14$ ) and gifted from special classes ( $M=4.3, SD=.54$ ) also exhibit a lower academic self-concept, compared to gifted from pullout programmes ( $M=4.6, SD=.74$ ) and is equal to the academic self-concept of girls who had dropped out of pullout programmes ( $M=4.6, SD=.96$ ). Girls in general, exhibit a higher and more stable academic self concept. In the gifted programmes, i.e., special classes and pullout programme, boys' and girls' academic self-concept is quite similar, whereas, among the pullout dropouts and regular students a meaningful gap can be detected.

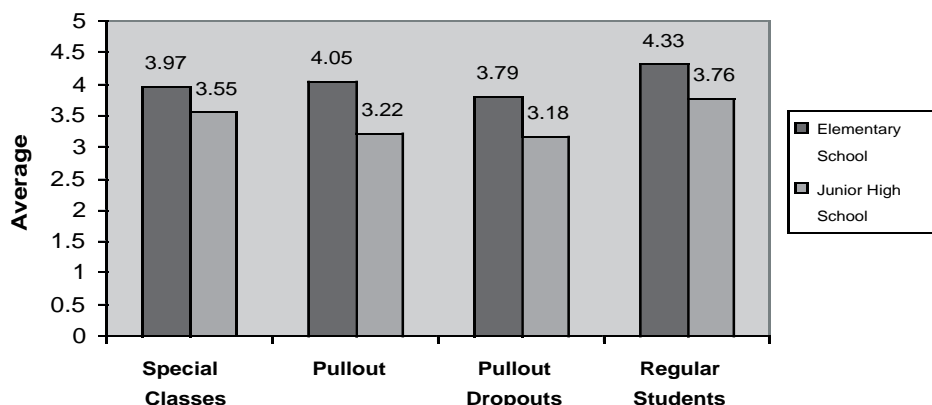
**Table 4:** Academic self-concept by framework and gender.



**Table 5:** General self-concept by framework and gender.



**Table 6:** Evaluation of studies by framework and school type.



Examining general self-concept by framework and gender reveals that regular students and gifted from pullout programmes have the highest self-concept in both sexes (boys  $M=5.1$ ,  $SD=.72$  and girls  $M=5$ ,  $SD=.59$ ), and is similar to girls' self-concept from pullout dropout group ( $M=5$ ,  $SD=.62$ ). Girls are consistent in their self-concept in three frameworks. The self-concept of both boys and girls drops in special classes (boys  $M=4.5$ ,  $SD=.45$  and girls  $M=4.6$ ,  $SD=.69$ ) and is similar to boys' self-concept after dropping out of a pullout programme ( $M=4.6$ ,  $SD=.87$ ) (see Table 5).

#### Comparison by Type of school

The multivariate tests in the MANOVA for framework and type of school yielded several significant effects. The main effect for teachers' characteristics ( $F [1,361] =70.55$ ,  $p<.001$ ,  $\eta^2=.176$ ), evaluation of studies ( $F [1,361] =60.14$ ,  $p<.001$ ,  $\eta^2=.127$ ), variety of teaching methods ( $F [1,361] =45.53$ ,  $p<.001$ ,  $\eta^2=.115$ ), and general self-concept ( $F [1,361] =14.28$ ,  $p<.001$ ,  $\eta^2=.048$ ), stemmed from type of school. Although the same dimensions examined by framework were also found significant, some of them were lower depending on the type of school (see Table 6).

Examining the evaluation of studies by framework and type of school indicated a clear difference between elementary school students and junior high students among all groups, but in favor of the former. The lowest evaluation of studies indicated was among pullout dropouts ( $M=3.18$ ,  $SD=.71$ ).

Independent variables, i.e., framework, gender and type of school, included in the MANOVA model were found relevant to the study design and examined problems.

#### General Satisfaction Prediction

Multi regression tests predicting general satisfaction with school by background variables (gender, type of school) according to framework in B values, indicate 22% explained by the different variables ( $F[4,321]= 22.36$ ,  $p<.001$ ,  $r^2 = .22$ ). Explained variance percentage for all gifted groups was higher; pullout programme 36% and pullout dropouts 37%. Type of school ( $F[4,321] = 22.36$ ,  $p<.001$ ,  $B =-.39$ ,  $r^2 = .22$ ) was found to be crucial in predicting satisfaction, indicating an opposite effect (i.e., progressing in grade level results in lower satisfaction). Gender ( $F[4,321] = 22.36$ ,  $p<.001$ ,  $B =-.20$ ,  $r^2 = .22$ ) will significantly influence pullout dropouts and regular students, indicating boys will be less satisfied than girls. Father's education ( $F[4,321] = 22.36$ ,  $p<.001$ ,  $B =-.17$ ,  $r^2 = .22$ ) will also have a slightly lower effect on the student's satisfaction with school. Father's education will affect pullout dropouts ( $B =-.23$ ,  $p<.05$ ), while mother's education was found a significant predictor among gifted from special classes ( $B =.28$ ,  $p<.001$ ). Direction of B values indicates the least satisfied student would be a pullout dropout male, studying in junior high school, whose mother is a high school graduate.

#### Preference of Nurturing Frameworks in Regular School

In addition to general satisfaction with school and the dimensions of which it is comprised, gifted students from pullout programmes and pullout dropouts were requested to comment on issues such as preference of enrichment framework, e.g., at a pullout center or regular school; mode of enrichment, e.g., individual or group project, single

hours, full day, time; and teachers in school or out of school. Answers ranged from 1 ("not true at all") to 6 ("completely true"). Significant differences were found between the two groups concerning preference of enrichment framework. Students from pullout programme indicated not settling for afternoon enrichment programmes (Mean=2.1, SD=.92,  $F[1,148] = 21.99, p < 0.001, d = .83$ ) were in favor of pullout programme in a special gifted education center (Mean=4.47, SD=1.06,  $F[1,148]=28.5, p < 0.001, d = .88$ ) and were not sure about a pullout programme at regular school (Mean=3.0, SD= 1.32,  $F[1,148]=31.46, p < 0.001, d = .92$ ). Pullout dropouts, on the other hand, indicated that they were not against pullout programme at gifted education center (Mean=3.30, SD= 1.52,  $F[1,148] = 28.5, p < 0.001, d = .88$ ) but definitely in favor of pullout enrichment programme at regular school (Mean= 4.22, SD=1.33,  $F[1,148] = 31.46, p < 0.001, d = .92$ ).

Multivariate tests in the MANOVA for framework and type of school indicated both independent variables were significant with preference for pullout programme at regular school by framework ( $F[1,146]=43.32, p < .001, \eta^2 = .211$ ) and type of school ( $F[1,146]=28.87, p < .001, \eta^2 = .181$ ). Elementary school students participating in programmes in a pullout center or regular school

were more supportive of pullout enrichment programme at regular school, although junior high school students also indicated being in favor of such a programme. No gender-related differences were found between groups.

### ***Reasons for Dropping Out of Pullout Programme***

The last part of the questionnaire, intended for pullout dropouts, aimed at collecting information relating to their participation in pullout programme, i.e., number of years, grade at time of dropping out, satisfaction with programme, and reasons for dropping out. Findings show that 80% of students dropped out of pullout programmes after sixth grade, i.e., when they moved from elementary school to junior high school, after having participated for about two years. Seventy percent indicated being satisfied with the programme. Given a choice of reasons for dropping out of pullout programmes students particularly mentioned: studies overload (48.3%); lack of interest in the programme (37.1%); and lack of a friend in the pullout programme (20.2%). Other reasons noted included: moving to a new school, moving to a new city, or termination of programme (10.1%).

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## **Discussion**

### ***General Satisfaction***

The study examined the degree of satisfaction according to different frameworks for gifted students. Since differences were found, the main hypothesis was partially confirmed, but only between pullout dropouts and regular students. No significant main effects were found among gifted groups, although pullout students and gifted from special classes indicated the highest level of satisfaction, and pullout dropouts expressed the lowest.

Given pullout dropouts and regular students share the same framework, i.e., a heterogeneous class in a regular school, it seems obvious pullout dropouts might feel less satisfied. Dropping out of a pullout programme with no prospect of any challenge at regular school, may result in feeling that needs are not met, boredom and even underachievement.

### ***Dimensions Comprising Satisfaction***

Examination of the five relevant dimensions which comprise satisfaction, established three significantly impact students' levels of satisfaction. Evaluation of studies among gifted from special classes was the highest. This is supported by the literature, and is due to their perception that the level and pace of study fits them. The significant main effect found between regular students and gifted from pullout programme or pullout dropouts, stresses the notion that studying in the regular classroom with no differentiation has a negative effect on the gifted.

A significant main effect found between gifted from special classes and those from pullout programmes with respect to the variety of teaching methods, might result from less exposure of students in regular classes to enriching and unique methods perceived as more appropriate to the needs of gifted students, e.g., problem solving and high order thinking activities.



A third significant main effect was detected between regular students and pullout students and is associated with academic self-concept. It suggests gifted students have a higher perception of their academic abilities as a result of positive experiences and achievements at school.

With respect to general self-concept, regular students and gifted from pullout programmes exhibited the same level, whereas a significant main effect was found between gifted from special classes and pullout dropouts. An additional significant main effect was detected between pullout dropouts and regular students. The literature is inconclusive about the general self-concept of gifted. Some found it to be higher (Chan, 1988, Davis & Cornell, 1985), whereas others (Brody & Benbow, 1986) claim that there is no difference between gifted and regular students. Schleyer (1996) found gifted participating in pullout programmes had a higher general self-concept than those in special classes and regular students. This study concludes that the general self-concept of pullout students is similar to that of regular students' but not higher. Their high ability remains, however as a result of their needs not being catered for in the regular classroom their general self-concept seems to be affected by the social comparison.

### ***Background Variables***

Examination of frameworks by gender showed girls consistently evaluated all satisfaction variables higher compared with boys. Overall, in comparison to the boys, girls who had dropped out of pullout programmes were less affected in their evaluation of studies, academic self-concept and general self concept. This finding may be due to the fact that girls adjust better to staying in the regular classroom and, compared to boys, perceive going out to a pullout center less important.

A surprise finding concerned the lowest general self-concept of boys who had dropped out of pullout programmes. It indicated they were affected more than girls from the same group. They had a hard time accepting and adjusting to the situation. The affect seems similar to boys and girls from special classes.

Examination of data by type of school indicated pullout dropouts, from both elementary and junior high school, presented the lowest evaluation of studies, variety of teaching methods, and teachers' characteristics. Having belonged to a special group in the past but reduced to having no support or nurturing of their abilities and talents at present, resulted in the notion that studies,

i.e., level, pace, interest, and methods used, are inadequate. In junior high school, this perception also affected their general self-concept.

### ***Preference of Pullout Enrichment***

Pullout students were in favor of programmes being held at gifted education center. On the other hand, pullout dropouts, who had stopped participating, seemed less enthusiastic. The issue of the pullout programme at regular school yielded opposite results. Pullout dropouts, particularly elementary school students, who felt less satisfied with studies at regular school, were definitely in favor of pullout enrichment programme on site. Perceptions that a pullout programme is required at regular school stem from lack of specialized services, and the gap between academic abilities of gifted and slow pace of learning experienced in regular elementary school classrooms.

### ***Reasons for Dropping Out of Pullout Programmes***

Findings indicated that 80% of the gifted had dropped out after 6th grade, although the majority (70%) was quite satisfied with the programme. The main reasons for dropping out were school overload (50%) and lack of interest in the programme (37%). These findings indicate that the problem of dropping out is complicated. Gifted students who miss a day a week at the regular school find it hard to cope with two requirements simultaneously, i.e., being obliged to make up for the day they have missed and still maintain good grades. This is exacerbated by the fact that there is no system or person in charge of facilitating or bridging the gap between the two frameworks (pullout programme and regular school) or requirements. As a result, the students reach a point where they have to drop out in order to maintain their good grades for future purposes, e.g., matriculation exams and university enrollment.

Thus, a situation where gifted students are forced back to the regular classroom and left with no programme to nurture their abilities and talents, affects their academic and general self-concept as they grow older. This situation impacts boys to a greater extent compared to girls who showed a better adjustment capability. Levels of satisfaction with school among pullout dropouts should be considered in light of the current study and measures should be taken to develop a suitable programme at the regular school to accommodate their needs.

## Limitations and Implications

Our study examined gifted students' satisfaction with school. It raises some crucial issues with respect to the education of gifted students in general. But more specifically, the group of gifted students that tends to be forgotten – the pullout dropouts, is in particular need of consideration.

Participants in the present study were representative of the different frameworks for gifted students sanctioned by the Ministry of Education in the northern region of Israel. Data collected is based on self-report. In the future, other sources such as parents or teacher could contribute to better understanding of the issue. Semi-structured or deep interviews might provide a more comprehensive view of the situation.

## Considerations arising from this study

Policy makers and practitioners are encouraged to examine the possibility of incorporating enrichment programmes for gifted and talented students into the regular elementary and junior high school curriculum. A teacher education programme is essential to supply regular teachers with tools for curriculum differentiation particularly emphasizing the needs of gifted students. Services for gifted students should be enlarged to include a gifted specialist in each school to cater for the needs of the gifted. Special programmes should be built to address the needs of the specific population at school supported by the local authorities and, in Israel, the Ministry of Education.

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# Blending Creativity, Science and Drama

Howard Nicholas, and Wan Ng

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## Abstract

Blending the arts into students' learning of science concepts through role-play and drama is unusual pedagogy in schools. For seven Australian Year Five students seeking extended learning, advanced scientific concepts were learned during the creative process of script writing and production of a science play called *Hectic Electric*. A mentor and two parents were involved in the students' learning and the script creation processes. The script was transformed into a dramatic play involving other members of the class and submitted for a science drama competition. The play was awarded the winning prize in the primary school section. Based on this situation, this study indicated that by providing the initial 'thinking activation' and promoting self-efficacy in the students, they were able to draw on and further develop their communicative, creative and higher order thinking skills in bringing abstract science concepts to a more concrete and visual form leading to a novel outcome.

**Keywords:** Creativity, self-efficacy, role-play, thinking skills, science, drama.

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## Introduction

For centuries, drama has been used to convey and explain ideas. The inherent creativity of drama contrasts with the stereotypic view of science and science learning as the dry accumulation of facts. In recent times, movies like *Jurassic Park*, *Contact* and *The Day after Tomorrow* have attempted to present scientific concepts through fiction and in so doing have raised science awareness among the public. Prizes, such as the European Public Awareness of Science awards are offered to encourage television drama on scientific issues (Whitfield, 2002). At the school level, use of drama to demonstrate science concepts is gaining popularity as a form of science education. It is particularly popular in the UK. Organizations such as the UK Biotechnology and Biological Sciences Research Council and the British Society for the History of Science encourage this form of education by promoting science drama competitions, activities or resources. In Australia, the science drama competition organised by the Science Teachers Association of Victoria has become an annual event. In Punjab, India, the State Institute of Science Education organises similar science drama competitions (Tribune News Service, 2004). In Singapore, a Singapore Drama Educators Association was set up in 2002 to promote and advance drama education in Singapore, and apply it as a tool for learning.

## Role-plays in science as a creative art for conceptual learning in the classroom

In science education, role-playing is an interaction between 'play', 'games' and 'simulation' – either in combination or by themselves, with the child performing the role and achieving the intended learning outcomes (McSharry and Jones, 2000). By role-playing, students are engaged physically and intellectually in learning while expressing themselves in a scientific context and exploring a particular (and different) way to 'interpret their place in the world' (Cayton, 1989 cited in McSharry and Jones, 2000, p. 2)

Subjects like Science and Mathematics are often viewed as being dry, boring and far too academic, resulting in a lack of motivation in learning these subjects. But science is actually creative - not a subject devoid of emotions or passion. For example, the advancement of medicine, with its scientific knowledge base, has been brought about by the passion of scientists, doctors and nurses looking for ways to reduce the distress of the emotionally-laden experiences of people who are ill. Medicine is not unique. Accounts of scientific discoveries are replete with the passions of the players involved (e.g., Gribbin, 2002; Watson, 1968). This recognition acknowledges the fundamentally human, as opposed to technical, nature of science.



In the classroom, the process of science learning is humanised by utilising role-plays to give students opportunities to express their thinking via actions and movements instead of through pen and paper. McSharry and Jones (2000) cited other reasons for promoting role-plays as a valuable educational tool. One of them is giving students ownership of their own learning through script writing or translating into action what they have understood (or misunderstood) of what has been learnt. Another reason is to provide opportunities for students to link the creative and emotional side of learning with the cognitive manipulation of factual material, for example students assuming the role of a television weather reporter in describing the water cycle to their peers.

It is evident that learning through role-playing can be active and student-centred as well as experiential. In this way, role-plays and drama in science are pedagogical tools for assisting students to learn abstract concepts in a visual

and creative manner. In this context, for example, writing a script for a drama play that translates abstract scientific principles into action and a storyline would pose a creative challenge for students.

This paper describes a challenge to critical and creative thinking accepted by a group of Year 5 students. They, along with two parents and the support from a secondary science mentor, produced a creative science drama play that won a state science drama competition prize. The theoretical framework underlying the study blends self-efficacy and components of creativity as important features leading to successful learning integrating science and drama. The description of the creative process of writing a science drama script will be a narrative account based on observations of the 'journey' in creating a script for a science drama play and the reflections of the mentor who guided the process.

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## Theoretical Framework

### *Self-efficacy beliefs*

Believing in one's ability to be academically successful and/or creative is more likely to lead to the desired outcome because self-efficacy beliefs motivate individuals to be persistent and to achieve (Bouffard, Bouchard, Parent & Larivee, 1991; Zimmerman, Bandura and Martinez-Pons, 1992) and to use effective means of regulating one's own learning such as cognitive and metacognitive strategies (Pintrich and Garcia, 1991) to achieve the desired goal. Hence strategies to improve students' self-efficacy beliefs in relation to their creative potential are worth investing in given that this set of beliefs serves as a powerful motivational tool for success. In thinking of role-plays and dramas to convey concepts of science, an individual's belief that (s)he is able to blend two different learning domains, i.e., the arts and the sciences, in a creative and meaningful manner is paramount for a successful outcome. By incorporating creative thinking strategies into teaching, e.g., showing students how to question and be selective in their questioning, to make connections as widely as possible and by encouraging lateral thinking in interpreting or representing facts and experiences, levels of students' self-worth and confidence could be elevated. Fostering creativity in this way can lead to the exploration of new meaning-making strategies both by mentors and students as they explore the learning process.

In describing his experiences with the use of poetry in science teaching and learning, Watts (2001) claimed, "As in science, so it is in the science classroom, [...] poems allow learners not only to use familiar language codes and to use the registers of science but also to test their 'thinking-not-yet-finished'" (p. 201).

Similar to Watts (2001) the intention of this paper is to report on some experiences that widen the scope of traditional science teaching and show, not only how some important science concepts can be taught, but also how the same process may be used to promote creativity and to break down, what Watts identifies as, Koestler's (1959) cold war between the cultures of the arts and sciences while showing some ways in which Koestler's call for 'creative trespassers' between those cultures can be realised. In so doing, we hope to provide some evidence that creativity can be taught, to both children and adults.

### *Creativity*

Lay definitions of creativity emphasize the production, in an imaginative manner, of an original entity useful to 'everyday problems and challenges' (Britannica Online Dictionary, Dictionary.com, World Artist Directory). These definitions are consistent with definitions at the academic level. Cropley and Urban (2000, p. 486) cited Morgan (1953) who said, "The only constant factor in all definitions of creativity is novelty." Bruner (1962) later added the 'surprise'

factor as well as the elements of relevance and effectiveness as components of creativity. The combination of these elements has led to today's common definition of creativity as the "production of relevant and effective novel ideas" (Cropley and Urban, 2000, p. 486). The study of creativity is as complex as human learning processes. Current theories of creativity have been based on creative outcomes and the identification of what people know, think, do and believe in order to arrive at these outcomes. Some theories of creativity assert the environment is more important than are cognitive attributes in fostering creativity in individuals (Csikszentmihalyi, Rathunde and Whalen, 1993; Gardner, 1994; Ochse, 1993; Olszewski-Kubilis, 2000; Simonton, 1994). Other personality theories address the contribution of genetic endowment, parental and other confidence building assistances (Therival, 1999) and family balance (Csikszentmihalyi, 1993) in developing creative individuals. For our purposes, the focus is whether or not features of the environment contribute to fostering creativity and thus we draw on a number of these theories. Drama-based science provides a flexible and open-ended way of addressing the multiple dimensions of these theories.

The motivated-mind theory asserts that the mental working of creativity is manifested in the motivational dynamics of the individual (Amabile 1996, Csikszentmihalyi 1996, Rea, 2001). The theory describes achievement motivation as having two complementary aspects, serious-mindedness and fun-mindedness, i.e., the more students experience serious-fun mindedness the more motivated they will be in developing a capacity for creativity. In the context of learning science through drama, this serious-fun motivational aspect of creativity, coupled with the confidence building assistance motivated by the personality theory, provides an important dimension for teaching students to be creative thinkers in learning science through drama. Aspects of the motivational and personality theories, e.g., non-conformity behaviour, tolerance for ambiguity and intrinsic and extrinsic motivations, are also incorporated into other theories of creativity. Two examples are the Componential Model of Creativity (Urban, 1990) and the Stage Theories of Creativity (Cropley, 1997).

Urban's (1990) theory identifies six components: thinking divergently about a topic, having a good general knowledge and thinking base, having knowledge and skills in the specific area, openness and tolerance of ambiguity, focusing and task commitment and motives and motivation. Cropley's (1997) staged model of creativity focusses on the process of creativity.

Davis and Rimm (2004) view this process as a "change in perception – literally 'seeing' new idea combinations, new relationships, new meanings or new applications that simply were not perceived a moment before" (p.212). The seven stages of Cropley's (1997) theory are an expansion of Wallas' (1926) four-stage model of creativity. Cropley's seven stages are: preparation, information, incubation, illumination, verification, communication and validation.

In demonstrating creativity, the components of creativity are incorporated into the different stages of the creativity process (Cropley and Urban, 2000). For example, during the incubation stage, the individual engaging in divergent thinking is motivated by a freedom from constraints and a tolerance of ambiguity. This person may demonstrate personality characteristics like non-conformist behaviour and being adventurous. Such a process is crucial for creative thinking in science drama where deviating from traditional strategies for learning science and embracing the arts requires the individuals involved to think divergently, possess an adventurous spirit and feel freedom to fantasise and tolerate ambiguities.

#### *The objective of the study*

The objective of the study was to explore whether the task of developing the drama play would either or both provide a context for creativity and/or foster improved learning of the scientific concepts involved. This could be manifested either in student learning behaviour or in the activities of mentors or parents associated with the students. The evolving development of the drama play involves a constructivist approach to learning science through drama where students are actively engaged with the construction of meanings influenced by past knowledge and experiences (Ng & Nicholas, 2004).

#### **Background information of the study**

The participants of this study are seven Year 5 students and two parents attending a government, co-educational primary school with a student population of about 200, located in a middle-class suburban area in Melbourne, Australia. The school had a culture of providing extension programs to meet the different learning needs of its students. Engaging students of high ability with activities fostering and challenging their critical and creative thinking and problem solving abilities (Tebbs and Subhi-Yamin, 2006) are important elements of extension programs.

Programs at the school were all selective. At the time of this research study, there was little science

teaching in the school and what was done was based mainly on environmental-based studies and project work. The physical sciences had a limited presence in the school curriculum. Even so, the school was interested in an extension program that would challenge the students intellectually through the exploration of concepts substantially beyond the normal level for students of this age. The science drama creation project was made possible by a volunteer in secondary school science who acted as a mentor to the Year 5 students (we will refer to them as ‘learners’ in this paper) and two mothers who described home duties as their occupation. The creative dimension had a further aspect: neither of the mothers had a science background although one of them was very interested in science.

The study described will be a narrative account, incorporating some of Cropley’s (1997) stages of creativity and based on observations and reflections of the mentor guiding the ‘journey’ in creating a script for the science drama play, *Hectic Electric*. The project was part of an extension program for this group of students. It involved a series of meetings with the mentor outside class time ensuring minimal disruption to the learning of the students in class. The main purpose for the mentor was to stimulate creativity and higher order thinking skills in the students and parents by encouraging the integration of skills and knowledge from many areas across the school curriculum, e.g., language, science, drama, music and songs. Given the discipline backgrounds of the parents and children, the challenge was to engender the required scientific creativity from ‘the outside’, i.e., to stimulate creativity where there appeared to be potential, but where it had no prior history.

## The process of creating *Hectic Electric*

### *Preparation*

An initial meeting with the learners sought to identify the problem and set goals. The initial ‘thinking activation’, provided by the mentor as a means of beginning the process was a series of questions somewhat akin to the ‘big picture’ view of Davis and Rimm (2004):

- What ideas do you have for a science drama?
- What topics have been studied in class during the year?
- What would you like to learn, something more on what’s already been covered or something new?

- What will you do with the science drama outcome – since it is a drama play will there be a target audience or should it just be confined to the class?
- Who will be playing the roles in the play, the seven students or other members of the class as well?

The group decided to create a drama play based on electricity. The reasons were based on novelty and relevance. It was a topic that was new, important and relevant to the students since they came into contact with electricity in so many areas of their daily lives. The learners agreed that the whole class should be involved with the learning and participation in the drama. They also agreed that they should aim for the state Science Drama competition as a motivational goal. The preparation stage gave a purpose for creating a script for a science play and set goals for the task ahead.

### *Gathering information*

The learners were invited to put forward to the group any knowledge about electricity they had. The group knowledge was sparse. The age differences between the adults and children made no difference in terms of content knowledge for this topic. Apart from various uses of electricity, none of the group could put forward other insights into it. The need to learn more about the topic was the next step in their learning process. The specific knowledge base (Feldhusen, 2002; Urban, 1990), a crucial component of creativity, is the information they have to recall, gather and learn on the topic. This knowledge is then combined through sharing the relevant information and closing the knowledge gaps.

To focus the gathering of the information, the learners had to pose some research questions based on the mentor’s broad question of *what is it about electricity that they would like to know?* The group of learners raised questions that showed their initial knowledge state was very basic but which helped them connect electricity with their everyday experiences:

- What is electricity?
- How is it made?
- Who invented (discovered) it?
- How does it make things work?
- How does it get from the wall to the electrical appliances?
- What happens during power failure?

The learners were asked to search for information

on any of the questions raised, or on any aspect of the topic that interested them. The questions provided relevance to their learning and the open nature of the task provided them with motivation and ownership of the knowledge essential for the creation of a storyline for the drama.

The information found by individual learners was shared with the group. Four of the learners had looked up general information about electricity but focused more on the work of scientists associated with electricity – Luigi Galvani, Benjamin Franklin, Alexander Volta and Michael Faraday. The others presented information on the structure of the atom and how a power station works, thereby bringing in both the human and the technical dimensions of science and transforming themselves from learners to teachers.

In discussing what information to use and how to use it for a drama play, the interactions provided the learners and mentor with means of gaining specific knowledge that was new or that filled in gaps within the individual's knowledge. Visual and hands-on learning made use of pictures of simple circuits and taking apart the audio devices possessed by the students. A lack of science equipment prevented experimental-type activities using cells, light bulbs, wires and switches to explore electrical circuits. However, it was easy to demonstrate static electricity by rubbing balloons against different types of materials and 'raising' hair or bending a small stream of water coming out of a tap. The students were shown how a rubbed balloon, when placed next to the metal end of a fluorescent tube could produce a flash of light in the tube visible in a darkened room. The learners decided that it would be fun to include this event in the drama that they would produce.

### ***Script planning and writing***

Planning for the script and developing the storyline required a focus. The mentor initiated this by suggesting that when students begin to learn about electricity it is important for them to understand the concept of a 'complete circuit'.

Mentor: What are the things in a complete circuit? Give us examples of situations where there are complete circuits.

Student 2: Television, electricity from the switch.

Student 3: Wires from switch to television.

Student 5: My walkman, it needs batteries.

The ensuing conversation established that there is an energy source, the need for an object or load to be powered in order to work and the presence of wires in most devices. It also raised the next

question: "Which of these items do you think are the most important?"

The group was full of ideas which were energetically debated. One involving a play on words about a "power struggle" between power and electrical energy was thought to be a simple but important and relevant way to teach an audience with little knowledge of the topic.

An aspect of the 'activation to think' creativity is responsibility for the mentor to teach the learners how to 'play around' with and relate science words and concepts to actions. Consider these examples:

- When the interaction between protons and electrons was introduced the concept of positively charged protons was dramatically described with cheers and "Yeas!" while electrons expressed their negativity with a big sigh.
- Learners associated the word 'conductor' of electricity to a music conductor waving a baton while directing the music.
- Copper atoms were visualized as 'cops', i.e., as in male or female police officers, and initiated the idea that the copper atoms found in electrical wires could be characters dressed in police uniform who take on a similar role in the science drama play.

All of these examples show how an activated 'spark' of thinking from the mentor could produce flow-on effects in the creative thinking of the learners. In this regard, it demonstrated that some of the processes of creativity can be either taught or encouraged by motivated mentors. The examples also demonstrate how the creative process crosses many disciplinary boundaries, involving creativity by conceptual association, linguistic analogy and behavioural parallels. Creativity does require a focus or channel however, to turn it into the "production of relevant and effective novel ideas" (Cropley and Urban, 2000, p. 486).

Trying to integrate into the script information students found in terms of the historical aspect of electricity became somewhat of a problem. It raised the question: How could the learners bring the scientists of the past into the play?

Mentor: Let's look at it this way, who is going to win the power struggle between the energy source, the electrical wires and the load?

The question initiated a dispute between the learners since none of the three items identified could be a winner on its own. This realisation indicates that one of the core understandings, i.e., the idea of the circuit, had been at least recognised by the learners,



but how could the dispute be resolved? One of the mothers suggested the 'ghost' of Christmas past to come into the science play – an idea that resulted in bringing in the 'three wise men' of the past to resolve the dilemma. This mother's lack of disciplinary knowledge did not prevent her applying other creative processes to the development of new processes of generating understanding by drawing on familiar cultural resources.

A general plan for the story for this science drama play was then created. One of the factors driving the direction of the play was the assignment of a role for each of the seven students involved. Three became the wise men - Michael Faraday, Luigi Galvani and Alexander Volta, two were copper atoms (wires), one took the role of the battery (energy source) and the last student the role of a globe (load).

In this stage of the creative process, the learners were uninhibited in their discussions and their thinking. They were encouraged to transfer their knowledge as far as possible. The environment created was 'safe' and there was tolerance of ambiguity and freedom from traditional constraints. The adults posed no threat to the students appearing to feel the same sense of safety and participated as partners in the creative process. The fun-serious experiences as suggested by the motivational theories of creativity were driving forces for the learners to express freely and make associations in order to translate concepts of science into a story and a play. In order for all this to happen, it was vital for some of the normal relations between adults and children to be suspended in the context of a learning activity to allow new and more equal relationships to be explored. This was difficult for both the children and the adults involved, but, as

was evident from what was produced, all parties were able to rise to the challenge.

The collective group of learners took over the script writing by assigning the students to write something, according to the general plan, about what they would like to say and do in their roles. The group met to complete the script draft and the mentor did not meet up with the learners until the draft was completed about three weeks later. The ownership of the creative process had been handed over to the learners. During the script writing process however, the mentor was available to clarify any student queries and provide additional information about the scientists and their discoveries.

The title of the drama was one of the last stages of the script construction. After a good discussion the group decided on *Hectic Electric*.

### ***Production of Hectic Electric***

The script was explained to other members of the Year 5 class and opportunities for them to participate in the play itself were provided. For example, several additional students acted as the copper atoms in a piece of wire transferring electrons and played the roles of an insulator and fluorescent tubes. This creative outcome was further enhanced and validated when the class teacher agreed to provide class time for the production of the play. The school principal also gave permission for the play to be performed before the whole school community. The school performance was video taped and sent to a science drama competition for judging and was selected to compete in the finals of the competition. *Hectic Electric* was performed in front of a large public audience and won the science drama award in the primary section for that year.

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## **Discussion and Conclusion**

This study demonstrates how creativity can be taught to high ability students by stimulating their thinking and providing the initial spark of activation to engage in creative and critical thinking. In this particular case, the focus was on the use of novel 'solutions' to bring scientific concepts to life and aid understanding by the development of a script and dramatic action. For example, in the context of positively charged protons and negative electrons, a positive spin was put on the negative with the line; "...but don't be so negative because our electrons pass the energy along." A song was also created to help explain the flow of electrons in a connected circuit - "They've got direction."

The creative outcome, the script in this case,

demonstrated how the learners were able to apply a number of the concepts about electricity initially suggested during earlier brainstorming sessions. The final draft also showed how a science historical perspective may be incorporated into the drama. However, apparently the precision of two of the historical events in the script could have been improved! Feedback from science educators after the performance indicated that some of the lines were a little inaccurate. For example, "I was experimenting with a dead frog one day and when I touched its leg with a metal knife it twitched" (See line 47 of script in the Appendix). In reality the twitching frog was observed by Galvani on his balcony, and not during an experiment; "This is my first battery - thin sheets of copper and zinc

separated by paper soaked in acid” (See line 52 of script in the Appendix). In fact, the first battery was soaked in brine, not acid.

The opportunity to blend an adequate range of science concepts accessible to Year 5 students into the development process rendered the drama play effective. The resulting script was relevant and a practical way of engaging additional Year 5 students and ensuring the participation of several more parents either through acting or creating props and costumes for the production. Designing these props and costumes plus the selection of the music all entailed further creative thinking. The whole learning process lasted for several months from the initial meeting to the final presentation at the competition. The integrated nature of such an activity across the curriculum was seen as a big plus within the school community. Interviews with the high ability students more than validated the value of this project, in terms of cognitive stimulation, academic learning and fun.

One implication of this study is that in order to cross discipline borders certain elements of creativity, specifically, willingness to take risks and tolerate ambiguity, are essential. Some base knowledge of the various disciplines featured in the activity is also important. These aspects, in part, contribute to the creative and intellectual challenge inherent in cross discipline-based extension programs such as the one described in this paper. These programs, designed for high ability and gifted students, can enhance the development of their higher order thinking abilities while fostering cooperative and social skills so essential if they are to develop into well-rounded, well-adjusted individuals in society.

## Appendix

Science Drama script: Hectic Electric

### SCENE 1

A darkened stage with a backdrop to show up colours in costumes.

To the sound of thunder and lightning - with flash if possible. Three figures Globe, Copper 1 and Copper 2 sitting head down. Battery leaps heavily onto the stage, tough like the battery in the ‘Energiser’ advertisement.

**Battery:** I am the all powerful! I’m here - its **meee** - **batteree!** Really I’m a cell but most people know me as battery. I am the source of all your electrical energiee!

**Copper 1 and 2 together:** (*lift head and stand up*) Cell? Battery? What’s the difference?

**Battery:** A cell is just a cell like a cell in your torch or watch but a group of cells together is called a battery - you know, like a car battery.

**Copper 1:** But you are not the source of all power. You’re just a small thing. There are many sources of electric power these days much bigger than you. What makes you so special?

**Battery:** Well, I’m still a good source of electrical energy. I can provide power to any of the gizmos and gadgets you put before me.

*Globe wakes.*

**Globe:** Are you calling **me** .... a gizmo or gadget, indeed. I am much brighter than that. I am a great source of light. I can light up many dark corners in the world.

**Battery:** I can provide power to many things. Without me your toys won’t work, your television, computers, washing machine, etcetera, etcetera, won’t work and.... your cars won’t run. What kind of a world would that be???

**Copper 2:** Hey, listen.....

**Globe:** I myself am a source of light, but I represent a **load** of good things.

**Copper 1:** (*aside to audience*) sometimes a load of old rubbish, if my sources are correct.

*Other loads - fan, toy, TV parade in:* What about us?

**Battery:** You are just a great load. I am the source of the force.

**Copper 1:** Just a minute you two. We are the copper atoms in copper wires. We are the ones with the positively charged protons (*copper atoms cheer*), 29 of them in fact. We also have 29 negatively charged electrons (*atoms sigh, groan*). But don’t be so negative because our electrons pass the energy along.

**Copper 2:** We’re the ones with all the connections.

**Battery:** But I am the source of the power. (*poses in superior fashion*)

**Copper 2:** Listen, you guys.....

**Copper 1:** We **carry all** the power. We do the real work; our electrons carry the real power.

*Copper atoms pose in superior fashion.*

**Globe:** But I am it. I am the part that works. I am the big load.

*Commotion and noise as battery, globe and copper 1 continues to shout and argue.*

*At this stage Copper 2 is feeling frustrated for not*

being heard and puts on policeman's hat. It turns its Cu sign at the front of its body to COP. Whistles to get attention.

**Copper 2:** (assertively) Now listen, I can see that we're not going to do any good arguing like this. So, before I can press any charges let's take a trip back through the mists of time. Let us consult some of the wise men from the history of electricity and see if they can help us.

**Globe:** Yes, perhaps they can spread some light on this subject.

*The three of them pass through mist (provided by a misting machine) and confront a panel of wise men who relate to each other in a much more conciliatory fashion.*

## SCENE 2

**Battery:** You are Alessandro Volta, you invented the first electric battery in 1794. You tell them please, that I have got to be the most important!

**Volta:** Ay, I did invent the first electric battery but not without the help of my friend Luigi Galvani who made a very important discovery by accident.

**Galvani:** Yes, I was experimenting with a dead frog one day and when I touched its leg with a metal knife it twitched. (*demonstrate action with frog pinned up on display board*). I was very excited then as I thought I have discovered a special 'animal electricity' but Volta proved me wrong.

**Volta:** You see, Galvani didn't realise that when the tin plate which the frog was lying on and the steel knife that he was holding were connected by the fluids of the frog's leg, electricity was produced. (*points to battery on table*) This is my first battery - thin sheets of copper and zinc separated by paper soaked in acid. It was known as Volta's pile back in 1794.

**Galvani:** We now know that the electricity produced in your car batteries or the cells in your calculators and transistor radios is a result of chemical reactions changing chemical energy to electrical energy.

**Battery:** (*looking proud*) I told you so, I am the most important! (*change in attitude and looking puzzled and not so sure of itself*) Metal sheets inside me? Acid inside me?? Yuk!

**Globe:** But I can't see anything happening to you. If you can produce electricity why aren't you making me glow? (*teasing*)

**Battery:** (*looking defeated*) I don't know. (*waves hands at globe*) Light up, Globe, light up. I am the power, do as I say. (*nothing happens. Battery impatient and hysterical*) Light up, I say ...

**Faraday:** It is no use, Battery. You will never light Globe up unless you are connected to him.

**Battery:** Connected? Over my dead body! I am power and I have the power to command Globe to light up!

Faraday: Unfortunately it doesn't work that way, Battery, you, Globe and Copper must all be connected.

**Battery:** (*challenging*) Who are you anyway?

**Faraday:** I am Michael Faraday and I have been responsible for producing current electricity by means of movement in a magnetic field. I discovered that if you move a magnet inside a coil of copper wire, (*demonstrate*) you can generate a small current of electricity that will flow through the wire. Hence the first electric generator.

**Galvani:** But you don't need a generator to light Globe here. You, Battery, are a source of electricity and you can push electrons to flow through copper wire to light up globe.

**Copper 2:** (*changing hat to conductor*) Come along guys, get connected!

*(Copper waves baton and hit it against table, as in conducting music, and signals for Battery, globe and copper wire to get in order. Copper atoms pass electrons along and light up Globe. Electrons keep moving and copper atoms sing)*

We're copper atoms

Just watch all our electrons

They travel round a circuit

They're driven by a battery

They're leaving the negative

And heading for the positive

Now they know where to go

They've got direction!

*(Insulator - plastic or wood - comes along)*

**Insulator:** What are you guys doing? This looks interesting. Can I join in?

*(pushes its way in, electrons stop, globe unlit)*

**All in the circuit:** No! Don't do.....

**Globe:** I have lost my glow! What is happening?

**Copper 2:** This is insulator, he is made of plastic and no electrons can get passed him but I'll fix your problem, Globe.

*(Waves baton and music starts. Insulator moves out as conductor moves in to take its place and electrons move freely again, globe lights up)*

(a group of 6 -8 fluorescent tubes enter and talking amongst themselves)

**Fluorescent:** What is this fuss all about?

**Battery, Globe and Copper together:** We make a complete circuit and electric current is flowing

around us. This makes Globe glow.

**Fluorescent:** But we can glow without the need for an electric current. Watch!

(stage lights dim. Fluorescent lights up using static electricity)

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# A Survey of Korean Elementary Teachers' Perceptions of and In-service Needs for Gifted Education

HeeJung Kim, and Marcia Gentry

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## Abstract

The purpose of this study was to examine Korean elementary teachers' knowledge of and interest in gifted education, in-service training needs, and perceptions of gifted education to provide implications for developing in-service teacher training programs. *Korean elementary teachers completed the survey, Korean Elementary Teachers: Perceptions of Gifted Education and In-service Needs in Gifted Education.* The results of this study show teacher training is an essential factor for improving knowledge of and interest in gifted education. When in-service training for gifted education is planned, the findings of this study can help provide guidelines for the training including employing qualified staff who are experts in the gifted education field, developing appropriate length of training sessions, finding the best time for training, and providing relevant content during training.

**Keywords:** Korean elementary teachers, interest, gifted education, in-service training needs, and perceptions of gifted education.

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## Background

In Korea, only 0.28 % of elementary and middle school students in Korea participate in gifted education programs (Kim, 2004). Korean gifted students, like American gifted students, spend most of their time in regular classrooms (Cox, Daniel, & Boston, 1985). General classroom teachers often identify gifted students' potential first (Jenkins-Friedman et al., 1984). Callahan, Cooper, and Glascock (2003) supported the idea that classroom teachers need more specific knowledge related to educating gifted children. Some researchers have argued that teachers of both gifted and general students need to have training in gifted education (Cramer, 1991; Davison, 1996; Gentry & Owen, 1999; Greenlaw & McIntosh, 1988).

Research indicates training in gifted education is key to the effectiveness of teachers who work with gifted children. Hansen and Feldhusen (1994) found teachers who had received training in gifted education more effective in working with gifted students than untrained teachers. Another study demonstrated that outstanding teachers of gifted students expanded their professional expertise by taking courses and workshops (Whitlock & Dacette, 1989). Gross (1994) and Whitton

(1997) found teachers trained in gifted education experienced positive shifts in attitudes toward gifted students. Overall, teacher competence, skills, and knowledge are influenced by training and teacher education programs (Feldhusen, 1999) and studies show teachers trained in gifted education use more teaching strategies to reduce boredom, provide time for students to pursue personal interests, and support the extension of the learning situation outside of the classroom (Hanninen, 1988; Sonnenberg & Perryman, 1985).

Meyers (1984) discovered classroom teachers expressed high levels of anxiety when they lacked information about gifted programs, but Bransky (1987) and Morris (1987) reported a positive relationship between the degree of teachers' knowledge and their attitude toward gifted programs. Other studies show that continuing professional development in gifted education helps teachers meet the needs of gifted students (Cashion & Sullenger, 2000; Croft, 2002; Gentry & Keilty, 2004; Gross, 1994). In fact, researchers found specific knowledge, skills, interests, and attitudes related to educating the gifted are characteristics of gifted education teachers

(Feldhusen, 1999; Whitlock & DuCette, 1989). In addition to teachers' knowledge, teachers' interest is also a critical factor associated with an expression of enthusiasm for teaching (Breen, 1979; Drechsel, Prenzel, & Kramer, 2001; Mills, 2003). Moreover, Long and Hoy (2006) found teacher interest positively associated with student learning and motivation, and they argued that teacher training programs help teachers expand their interests in a topic.

Some studies have shown that when in-service teacher training programs for gifted education are being developed, it is important to allow opportunity for the exploration of teachers' perceptions, strengths, and needs to take place (Boyd, 1992; Buell, Hallam & Gamel-McCormick, 1999; Weiss & Gallagher, 1986). The components of a successful in-service training program should be related to the specific needs of participating teachers (Dettmer & Landrum, 1998; Oliver, 1976; Schlichter & Olenchak, 1992) and include teacher-planned instruction and activities (Marks, 1980).

More than twenty years ago, Guskey (1986) developed a model of professional staff development for teacher change. He believed that "professional development is defined as those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (Guskey, 2002, p.16). However, today general teacher education offers little information about the needs of gifted students in detail (Dettmer & Landrum, 1998).

Dettmer and Landrum (1998) guided staff development for educators of gifted students. They asserted that staff development for gifted education should have one or more of five purposes: professional development, personal growth, job retention, role modification, and inspiration. It should also include the following components as an interactive structure: needs assessment, definition of the target audience, awareness of identification procedures, understanding of program goals and learning options, staff selection and preparation, budgetary matters, curriculum development, program management, and accountability and evaluation. In this context, a five-year study (Gubbins et al. 2002) conducted at the National Research Center on the Gifted

and Talented (NRCG/T) revealed a successful professional development model for all students not just those considered gifted. In this study, professional development was extended by using pedagogical approaches associated with gifted education, i.e., curriculum modification, curriculum differentiation, and enrichment.

In addition to Korean research, the studies conducted elsewhere in the world have demonstrated the importance of teacher education for gifted education. An Australian researcher, Chessman (2005) claimed that education for gifted educators should include identification procedures and instruments to analyze students' profiles of talents and that this education is a key to applying practices and strategies for gifted students. Wu (1996) showed that the course taken or the training attended influenced Taiwan in-service teachers' attitudes and knowledge regarding gifted handicapped students. Kalantan (1992) investigated relationships between in-service training in gifted education and teachers' perceptions of scales used to identify gifted students in Bahrain. The results of this study revealed that in-service training had a positive effect on teachers' perceptions concerning the use of these identification scales.

In 2002, the Law of Advancement for Gifted Education was enacted by the Korean government to establish a legal system for implementing gifted education in order to improve educational services for gifted students. The supply of teachers in Korea for gifted students, however, is currently limited (Gu et al. 2001), Korean teachers' attitudes toward gifted students are often negative (Lee, Cramond, & Lee, 2004), and teachers involved in gifted education do not feel confident in their abilities to meet the needs of gifted students (Cho, Kim, Park, & Chung, 2002). It is evident that in order to address these concerns, the current Korean gifted education system needs better teacher training (Cho, Kim, Seo, & Chung, 2004; Lee, Cramond, & Lee, 2004)

The purpose of this study was to examine Korean elementary teachers' knowledge of and interest in gifted education, in-service training needs, and perceptions of gifted education to provide guidance for developing in-service teacher training programs for Korean teachers.

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## Method

### Participants

Korean elementary teachers completed the survey, *Korean Elementary Teachers: Perceptions of Gifted Education and In-service Needs in Gifted Education*. Participants included 74 male and 59 female teachers from 6 school districts in 4 Korean provinces. Of these teachers, 79 (59%) had a bachelor's degree and 54 (41%) had a master's degree. Thirty-nine (29%) teachers reported previous training in gifted education. Within the group of participants, the range of teaching experience was between 1 and 33 years (mean = 14.23, SD = 8.76); seven teachers did not report their teaching experience. Regarding to experience with gifted and talented students, 23 teachers (17%) had 0 to 3 years of experience (mean = 0.26, SD = 0.62). No experience was reported by 106 teachers (80%), and 4 teachers (3%) did not respond to this item. The number of teachers who are working with gifted students were 100 (75%), and 28 (20%) of the teachers worked in schools that had a gifted program. Table 1 shows the participating teachers' demographics and background data.

### Instrument

*Korean Elementary Teachers: Perceptions of Gifted Education and In-service Needs in Gifted Education*, the survey used in this study, was developed by adapting an instrument by Weiss and Gallagher (1986) and by considering reviews of relevant information and related studies concerning the Korean educational system. The survey was developed after team evaluations with a professor and a graduate student in gifted education. The survey included questions about each teacher's background in gifted education, knowledge of and interest in gifted education, training needs, and perception of gifted education. The five-point Likert-type scale is supported by research demonstrating reliability and validity (Birket, 1986; Preston & Colman, 2000).

The survey included 31 items with a Likert-type response scale about knowledge of and interest in gifted education with additional yes/no and open-ended questions. A Likert-type scale with 1 designating "low" to 5 designating "high" was used. A demographic section of the survey assessed teacher background including gender, number of years teaching, grade level taught, experience with gifted students, and past training in gifted education. A copy of the English version of this instrument can be found in the Appendix.

The survey was translated into a Korean version that corresponded to the English version. To accurately translate the survey, two Korean visiting professors studying gifted education reviewed the translated Korean version of the survey and agreed that the translation was both clear and accurate.

### Procedure

After obtaining Institute Review Board permission, the researcher contacted Korean elementary teachers via email or telephone to recruit participants. To collect data from a variety of teacher perspectives, suburban, urban, and rural elementary school teachers were contacted. In addition, teachers both in schools with gifted programs and in schools without gifted programs were contacted. Seven of the teachers contacted by the researcher volunteered to distribute the survey to colleagues, as well as complete the survey themselves. The researcher distributed it to these seven teachers via email. These teachers printed the survey and distributed it to potential subjects. The survey was completed anonymously. The teachers then gathered the completed surveys returning them to the researcher via mail to maintain anonymity.

### Data Analyses

Data were analyzed using SAS 9.1. For the first part of the survey, the *knowledge and interest scale*, the mean and SD on each item were computed to examine the extent of Korean elementary teachers' knowledge and interest in gifted and talented education. Using the mean of total knowledge items and the mean of total interest items, analysis of variance (ANOVA) was also used to compare teachers' degree of knowledge and interest in gifted and talented education based on 8 independent variables: gender, highest degree earned, training completed in gifted/talented education, currently teaching with gifted students, school has a program for gifted students, district, teacher would like to come to a U.S. university for the in-service, and experience in teaching gifted students. Effect size was reported using  $\eta^2$  to help interpret the magnitude of the results (Cohen, 1988). On each item of the knowledge and interest scale, teachers trained in gifted and talented education and non-trained teachers were compared using mean, SD, and effect size Cohen's *d*.



**Table 1:** Demographic and background data for Korean elementary teachers.

		Number of Respondents (N=133)	Percentage
Gender	Female	74	55.64
	Male	59	44.36
Highest Degree earned Training completed in gifted/talented	BA/BS	79	59.40
	MA/MS	54	40.60
	None	92	69.17
	District in-service	21	15.79
	Workshop outside district	3	2.26
	Course(s) at college/ university	10	7.52
	Yes, but unknown institute Educational degree in area	5	3.76
	N/A	0	0
Grade level now teaching	Kindergarten	2	1.50
	1	1	0.75
	2	15	11.28
	3	17	12.78
	4	16	12.03
	5	17	12.78
	6	24	40.60
	unknown	15	11.28
Years of teaching experience	1-5 years	28	21.05
	6-10	22	16.54
	11-15	17	12.78
	16-20	21	15.79
	21-25	20	15.04
	26-30	11	8.27
	31-33	13	9.77
	N/A	9	6.77
Teaching experiences with gifted students	No	7	0.05
	1	106	80.00
	2	13	10.00
	3	9	6.77
	N/A	1	0.75
Currently working with gifted students district	No	4	3.01
	Yes	100	75.19
	Asan, Chungnam	33	24.81
	Daegu	19	14.29
	Dalsung, Daegu	19	14.29
	Iksan, Junbuk	14	10.53
	Kimchun, Kyungbuk	23	17.29
	Youngju, Kyungbuk	25	18.80
Others	28	21.05	
A gifted program in school	No	5	3.76
	Yes	100	75.19
	N/A	28	20.05
		5	3.76

For the second part of the survey, yes/no questions and open-ended questions about training needs and perceptions of gifted education

were calculated by percentages, per question, according to the number of teachers who gave each response-type.

**Table 2:** Knowledge and interest scores.

	Knowledge		Interest	
	Mean	SD	Mean	SD
1. Characteristics of gifted and talented children	3.05	1.11	3.57	1.07
2. Identification of gifted children	2.82	1.03	3.36	1.07
3. Adapting curriculum utilizing				
- Purdue Three Stage Model	2.14	1.09	2.67	1.24
- The Renzulli Schoolwide Enrichment Triad Model	2.28	1.23	2.78	1.24
- Sternberg's Triarchic componential Model	2.29	1.16	2.76	1.2
- Gardner's Multiple Intelligences	3.25	2.75	3.3	1.27
- VanTassel-Baska Integrated Curriculum Model	2.1	1.14	2.58	1.23
4. Program structures for gifted students				
- Cluster grouping	2.71	1.07	3.12	1.09
- Self-contained classes	2.7	1.18	3.2	1.17
- Pull-out program	2.94	1.19	3.28	1.1
- Magnet schools	2.76	1.2	3.1	1.1
5. Classroom organization for individualizing and grouping activities	2.89	1.08	3.3	1.09
6. Classroom behavior management techniques	2.88	1.19	3.29	1.1
7. Assessing and planning for the individual child	2.95	1.09	3.3	1.06
8. Assessment of individual students and group progress	2.82	1.04	3.32	1.01
9. Making use of school and community resources	2.77	1.1	3.18	1.11
10. Coordinating G/T planning with other teachers and staff	2.61	1.01	3.04	1.07
11. Working with gifted students who are				
- underachieving	2.61	1	3.23	1.12
- learning disabled	2.52	1.04	3.1	1.11
- culturally diverse	2.49	1.1	3.1	1.09
- emotionally disturbed	2.57	1.12	3.2	1.12
12. Specific content areas				
- Language Arts	2.67	1.09	3.18	1.13
- Mathematics	3.07	1.23	3.43	1.23
- Science	2.97	1.22	3.36	1.14
- Social studies	2.63	1.07	3.1	1.09
13. Specific skill areas				
- creativity	3.22	1.1	3.68	1.09
- problem solving	3.16	1.09	3.57	1.11
- independent study	2.94	1.02	3.37	1.01
- research skills	2.78	1.01	3.31	1
- communication	2.81	1.03	3.25	1.13
14. The use of computers in schools and classroom	3.34	1.04	3.55	0.96
Total	2.76	0.30	3.21	0.25

## Results

### Knowledge and Interest Scale

The results of the knowledge and interest scale indicated the mean of knowledge on each item ranged from 2.14 to 3.25 out of 5 and SD 0.3 to 2.75. The mean interest on each item ranged from 2.58 to 3.57 and SD 0.25 to 1.27. The mean of total knowledge items was 2.76, and the mean of total interest items was 3.21. For knowledge items, only 6 item-means among a total of 31 items exceeded 3 points; however, for interest items, 27 of the 31 item-means exceeded 3 points. No means exceeded four points. Table 2 (previous page) shows the results of the knowledge and interest scale with mean and SD.

With the mean of the total knowledge items and the mean of the total interest items, ANOVA was used to explore differences as independent variables: gender, highest degree earned, training completed in gifted/talented education, currently teaching with gifted students, school has a program for gifted students, district, teacher who would like to come to a U. S. university for the in-service, and experience in teaching gifted students. A Bonferroni adjustment was used to adjust the significance level of 0.05 to a more reasonable level of .006, thus accounting for the increased probability of Type 1 error associated with multiple tests of the same data.

For knowledge of gifted education, there were statistically significant differences on only the training variable among 8 independent variables. The results show the mean of the total knowledge items of teachers with training about gifted and talented education was significantly higher than the mean of untrained teachers [ $F(1, 132) = 7.8, p = 0.006, \eta^2 = 0.0570$ ]. However, there were no statistically significant differences among group

means in the following categories: gender, school district, highest earned degree, wanting to come to a U.S. university for the in-service, currently teaching gifted students, GT programs in school, and teaching experience with gifted and talented students.

For interest in gifted education, teachers with training in gifted education had significantly higher means on the total interest items [ $F(1, 132) = 7.99, p = 0.005, \eta^2 = 0.0583$ ]. On the other hand, for interest in gifted education, no statistically significant differences existed among the following independent variables: gender, school district, highest earned degree, wanting to come to a U.S. university for the in-service, currently teaching gifted students, GT programs in school, and teaching experience with gifted and talented students. Table 3 shows the results of one-way ANOVAs on the mean of total knowledge items and the mean of total interest items.

Among 8 independent variables in the above ANOVAs, the independent variable, whether teachers have been trained in gifted and talented education, was the only independent variable to yield statistically significant results. In short, training in gifted education resulted in greater knowledge and higher interest among the teachers who had received the training when they were compared with their colleagues who had not received such training.

Means, standard deviations, and effect sizes were used to examine which items in the knowledge and interest scale are different between the trained and untrained teacher groups. First, four knowledge items had a large effect size (Cohen's  $d > .79$ ), in which the mean scores of the teachers with gifted education training exceeded the mean scores of

**Table 3:** One-way ANOVAs on total knowledge items and total interest item means.

Factor	Knowledge				Interest			
	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$	<i>df</i>	<i>F</i>	<i>p</i>	$\eta^2$
Gender	131	2.64	0.106	0.0197	131	0.5	0.820	0.0004
GT training	129	7.8	0.006	0.0570	129	7.99	0.005	0.0583
District	126	1.42	0.210	0.0635	126	1.86	0.092	0.0815
Come to U.S. for in-service	131	2.94	0.088	0.0219	131	4.32	0.036	0.0319
Degree	131	1.89	0.171	0.0215	131	0.87	0.353	0.0066
Now teach GT	131	2.47	0.118	0.0185	131	5.52	0.020	0.0404
GT program in school	126	0.63	0.427	0.0050	126	5.62	0.019	0.0427
GT teaching experience	127	2.16	0.143	0.0168	127	6.53	0.011	0.489

**Table 4:** The Mean, SD, and effect size on each knowledge item between the trained group and the untrained group

	Trained Teachers (Na=39)		Untrained Teachers (N=92)		Effect Size
	Mean	SD	Mean	SD	Cohen's <i>d</i>
1. Characteristics of gifted and talented children	3.60	1.0	2.79	1.07	0.8
2. Identification of gifted children	3.31	0.91	2.59	1.0	0.8
3. Adapting curriculum utilizing					
- Purdue Three Stage Model	2.49	1.03	1.98	1.09	0.5
- The Renzulli Schoolwide Enrichment Triad Model	3.02	1.13	1.93	1.12	1.0
- Sternberg's Triarchic componential Model	2.61	1.02	2.4	2.18	0.1
- Gardner's Multiple Intelligences	3.34	1.15	2.90	1.33	0.5
- <b>VanTassel-Baska Integrated Curriculum Model</b>	<b>2.41</b>	<b>1.07</b>	<b>1.96</b>	<b>1.14</b>	<b>0.4</b>
4. Program structures for gifted students					
- Cluster grouping	3.22	0.88	2.47	1.06	0.8
- Self-contained classes	3.10	1.16	2.52	1.15	0.5
- Pull-out program	3.29	0.93	2.77	1.26	0.4
- Magnet schools	3.05	1.20	2.63	1.17	0.4
5. Classroom organization for individualizing and grouping activities	3.07	1.01	2.80	1.09	0.2
6. Classroom behavior management techniques	3.02	1.04	2.80	1.25	0.6
7. Assessing and planning for the individual child	3.15	0.95	2.86	1.11	0.6
8. Assessment of individual students and group progress	2.98	0.91	2.74	1.08	0.2
9. Making use of school and community resources	3.02	0.94	2.65	1.14	0.4
10. Coordinating G/T planning with other teachers and staff	2.93	0.88	2.46	1.03	0.6
11. Working with gifted students who are					
- underachieving	2.80	0.95	2.52	1.00	0.3
- learning disabled	2.68	0.96	2.43	1.06	0.2
- culturally diverse	2.71	1.10	2.39	1.08	0.3
- emotionally disturbed	2.73	1.05	2.49	1.14	0.2
12. Specific content areas					
- Language Arts	2.71	0.98	2.64	1.13	0.1
- Mathematics	3.32	1.17	2.95	1.24	0.3
- Science	3.20	1.21	2.86	1.22	0.3
- Social studies	2.66	0.96	2.62	1.11	0.4
13. Specific skill areas					
- creativity	3.44	0.95	3.12	1.14	0.3
- problem solving	3.41	0.97	3.03	1.12	0.4
- independent study	3.20	0.93	2.83	1.03	0.4
- research skills	3.00	0.95	2.67	1.01	0.3
- communication	3.07	0.96	2.68	1.03	0.4
14. The use of computers in schools and classroom	3.49	0.84	3.26	1.10	0.2

Note. Effect sizes as "small,  $d = .2$ ," "medium,  $d = .5$ ," and "large,  $d = .8$ " (Cohen, 1988)

Bold and Italic font = large effect size, Bold = medium effect size.



**Table 5:** The Mean, SD, and effect size on each interest item between the trained group and the untrained group.

	Trained Teachers (N=39)		Untrained Teachers (N=92)		Effect size
	Mean	SD	Mean	SD	Cohen's <i>d</i>
1. Characteristics of gifted and talented children	3.63	0.93	3.54	1.13	0.1
2. Identification of gifted children	3.48	0.99	3.31	1.09	0.2
3. Adapting curriculum utilizing					
- Purdue Three Stage Model	2.61	1.09	2.69	1.20	-0.1
- The Renzulli Schoolwide Enrichment Triad Model	2.76	1.14	2.78	1.29	-0.0
- Sternberg's Triarchic componential Model	2.59	1.05	2.84	1.25	-0.2
- Gardner's Multiple Intelligences	3.32	1.12	3.28	1.33	0.0
- <b>VanTassel-Baska Integrated Curriculum Model</b>	<b>2.5</b>	<b>1.06</b>	<b>2.60</b>	<b>1.30</b>	<b>-0.6</b>
4. Program structures for gifted students					
- Cluster grouping	3.10	1.09	3.12	1.08	-0.0
- Self-contained classes	3.22	1.23	3.19	1.19	0.0
- Pull-out program	3.27	1.03	3.27	1.04	0.0
- Magnet schools	3.24	0.94	3.03	1.16	0.2
5. Classroom organization for individualizing and grouping activities	2.98	1.06	3.44	1.08	-0.4
6. Classroom behavior management techniques	3.07	1.13	3.38	1.07	-0.3
7. Assessing and planning for the individual child	3.18	1.15	3.45	1.01	-0.2
8. Assessment of individual students and group progress	3.27	1.05	3.34	0.99	-0.1
9. Making use of school and community resources	3.07	1.06	3.22	1.23	-0.1
10. Coordinating G/T planning with other teachers and staff	3.00	1.05	3.04	1.08	-0.0
11. Working with gifted students who are					
- underachieving	3.39	1.14	3.15	1.10	0.2
- learning disabled	3.29	1.15	3.01	1.09	0.2
- culturally diverse	3.05	1.14	3.11	1.06	-0.1
- emotionally disturbed	3.32	1.19	3.14	1.08	0.2
12. Specific content areas					
- Language Arts	3.05	1.24	3.24	1.07	-0.2
- Mathematics	3.08	1.29	3.58	1.18	-0.1
- Science	3.10	1.15	3.47	1.12	-0.3
- Social studies	2.80	1.02	3.22	1.09	-0.4
13. Specific skill areas					
- creativity	3.80	1.08	3.62	1.09	0.2
- problem solving	3.46	1.05	3.60	1.12	-0.1
- independent study	3.20	0.98	3.43	1.01	-0.4
- research skills	3.02	1.02	3.43	0.97	-0.1
- communication	3.15	1.22	3.29	1.12	0.1
14. The use of computers in schools and classroom	3.50	1.01	3.57	0.94	-0.1

Note. Effect sizes as "small,  $d = .2$ ," "medium,  $d = .5$ ," and "large,  $d = .8$ " (Cohen, 1988)

Bold and Italic font = large effect size, Bold = medium effect size.

the teachers without gifted education training. The four items included: Characteristics of gifted and talented children, Identification of gifted children, Adapting curriculum utilizing the Renzulli Schoolwide Enrichment Triad Model, and Cluster grouping program structures for gifted students. Six knowledge items had a medium effect size (Cohen's  $d > .49$ ), in which the mean of teachers with gifted education training exceeded the mean of teachers without gifted education training on the following items: Adapting curriculum utilizing Purdue Three Stage Model and Gardner's Multiple Intelligences, Self-contained classes as program structures for gifted students, Classroom behavior management techniques, Assessing and planning for the individual child, and Coordinating G/T planning with other teachers and staff. Table 4 illustrates the mean, SD, and effect size on each knowledge item between the trained group and the untrained group.

In contrast to knowledge results, one interest item had a medium effect size ( $d = -.06$ ), which meant the score of the average person in the untrained group exceeded that of the trained group. This item was Adapting curriculum utilizing the VanTassel-Baska Integrated Curriculum Model.

Table 5 on previous page illustrates the mean, SD, and effect size on each interest item comparing the trained group and the untrained group.

#### ***Questions about training needs and perceptions of gifted education***

The second part of the survey included yes/no questions and open-ended questions about training needs and perceptions of gifted education. The teachers were asked to choose one answer about the best instructor, the best time and duration for training, and coming to the U.S. for the in-service. One-hundred three (77 %) teachers reported that experts in the gifted field are the best instructors; 18 (14%) preferred teachers as instructors for the in-service. For the best time for a training, half (52%) of the teachers chose the middle of January, 25% of the teachers chose the end of January, and 17% of the teachers chose the beginning of February. In the case of the best duration for a training, almost all teachers selected one week (46%) or two weeks (44%). Sixty-two percent of the teachers responded "Yes" when asked if they would be interested in attending in-service in the United States. Table 6 shows the results of yes/no questions about training needs and perceptions of gifted education.

**Table 6:** The results of yes/no questions about training needs and perceptions of gifted education.

		Number of Responses (N=527)	Percentage
Best instructors	Teachers	18	13.53
	Expertise	103	77.44
	Professors	5	3.76
	Others (the above three together)	4	3.01
Best time for a training	The middle of January	70	52.63
	The end of January	33	24.81
	The beginning of February	22	16.54
	Other times	6	4.51
	N/A	2	1.50
Best duration for a training	2-4 days	6	4.51
	1 week	61	45.86
	2 weeks	58	43.61
	Other	5	3.76
	N/A	1	0.75
Come to the U.S. for the in-service	Yes	83	62.41
	No- The Ministry of Education	15	11.28
	No- District institute	12	9.02
	No- Domestic university institute	17	12.78
	No- Others	5	3.76
	N/A	1	0.75

**Table 7:** What do you see as barriers or obstacles to providing services to gifted and talented children in your current teaching situation?

		Number of Responses (N=112)	Percentage
GT Program	Lack of GT programs	24	21.43
	Difficulty of developing GT programs	4	3.57
	Curriculum	3	2.68
	Lack of institutes for GT students	1	0.89
	Subtotal	32	28.57
Education Environment	Learning environment	6	5.36
	Perception of parents, teachers, and communities	5	4.46
	Time	4	4.57
	Traffic	3	2.68
	Financial problems	2	1.79
	Lack of learning materials	2	1.79
	Interest, value, and funds in gifted education	1	0.89
	High expectations of parents	1	0.89
	Misunderstanding of parents	1	0.89
subtotal	25	22.32	
Identification	Identification	22	19.64
	Assessment problems	1	0.89
	Definition of giftedness and characteristics of GT children	1	0.89
	Subtotal	24	21.43
Teacher	Lack of teachers of GT students and teachers' Knowledge	16	14.29
	Teacher Training	2	1.79
	Burden on teachers	2	1.79
	Teaching method	1	0.89
	Misconceptions about GT students	1	0.89
subtotal	22	19.64	
Education system	Focusing on math and science	3	2.68
	Too many students per classroom	2	1.79
	Education system	1	0.89
	Mediocrity of education	1	0.89
	Differences among grade levels	1	0.89
	Equal opportunity	1	0.89
	Legislation	1	0.89
subtotal	10	8.93	

**Table 8:** What would you like a gifted education in-service session to address?

		Number of Responses (N=107)	Percentage
GT program	Developing GT programs	8	7.48
	GT Programs	6	5.61
	GT Curriculum	2	1.87
	Various gifted education programs	2	1.87
	Subtotal	18	16.82
Practical teacher training	Teaching strategies	9	8.41
	Teaching method	6	5.61
	Program about teaching GT children	4	3.74
	Program observation	2	1.87
	Teaching opportunities	1	0.93
	Contents of teaching	1	0.93
	Practicum	1	0.93
	Teacher training	1	0.93
	Case studies	1	0.93
	GT education in regular classrooms	1	0.93
	Subtotal	31	28.97
Specific Subjects	Creativity	7	6.54
	Fine Art	7	6.54
	Music	6	5.61
	Math	6	5.61
	Science	4	3.74
	P.E.	4	3.74
	Computer	3	2.8
Identification	Identifying gifted children	11	10.28
	Characteristics of GT children	2	1.87
	Subtotal	14	13.08
Others	Affective education program	1	0.93
	Philosophy	1	0.93
	Basic knowledge of gifted education	1	0.93
	Intelligence theories	1	0.93
	Counseling	1	0.93
Subtotal	4	3.74	



**Table 9:** Comments and suggestions.

		Number of Responses (N=21)	Percentage
Characteristics of teacher training	Need teacher training for gifted education	4	19.05
	Need training for all teachers	2	9.52
	Want practical programs, not theoretical programs	1	4.76
	Want identification of music, art, and kinetic gifted	1	4.76
	Want information about underachievers	1	4.76
	Want information about GT students as resources	1	4.76
	Want information about characteristics of GT students	1	4.76
	Need programs supporting GT students	1	4.76
	Lack of studies related to gifted education	1	4.76
	Reflects Korean education condition	1	4.76
	Subtotal	15	71.43
Survey itself	Contents of this survey is too difficult	2	9.52
	Hard to complete survey because of no basic knowledge about gifted education	1	4.76
	Subtotal	4	19.05
Others	GT education should avoid increased burden on teachers	1	4.76
	All students have opportunity for identifying giftedness	1	4.76
	Subtotal	2	9.52

Teachers responded to the following open-ended questions:

- 1) What do you see as barriers or obstacles to providing services to gifted and talented children in your current teaching situation?
- 2) What would you like a gifted education in-service session to address?
- 3) Comments and suggestions.

First, the teachers made 112 comments in response to the question regarding barriers or obstacles to providing services to gifted and talented children in their current teaching situation.

Twenty-nine percent of comments related to GT programs as barriers, 22% concerned problems related to education environment, 21% were linked to identification of gifted students, and 20% related to teachers themselves. Table 7 depicts a

summary of teachers' comments about barriers or obstacles to providing services to gifted and talented children.

The second open-ended question, *What would you like a gifted education in-service session to address?* received 107 comments. According to the results, teachers would like to have a training program that includes specific subject areas for gifted students (35%), practical teacher training (29%), GT program (17%), identification of gifted students (13%), and other various topics addressed (4%). Table 8 shows the detailed results of this question.

The third open-ended question, *comments and suggestions*, resulted in only 21 comments of which 71% related to characteristics of training in which teachers would want to participate. Another 20% of the responses related to the quality of the survey itself. Table 9 contains a summary of teachers' comments and suggestions.

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## Discussion

The purpose of this study was to examine Korean elementary teachers' knowledge of and interest in gifted education, in-service training needs, and perceptions of gifted education to provide implications for developing in-service teacher training programs.

Findings indicate that teacher training in gifted education influences teachers by increasing their knowledge of, and interest in gifted education. This finding is supported by previous research by Copenhaver and McIntyre (1992) who also demonstrated that teachers' perceptions of gifted students are associated with teacher education.

This study demonstrates that teachers' knowledge and interest are positively associated with training in gifted education; whereas teachers' knowledge and interest are not related to teachers' degrees, teaching experience with gifted students, willingness to be trained in gifted education, opportunity to access gifted program in school, districts where teachers work, and gender. As in previous studies (Cramer, 1991; Dettmer & Landrum, 1998; Hansen & Feldhusen, 1994; Rowley, 2003), this study shows teacher training in gifted education is an essential component for gifted education programming. With regard to teaching experience (not experience with gifted students), this study confirmed Cramond and Martin's (1987) findings that teaching experience does not change attitudes towards gifted students.

Common answers resulted from the three open-ended questions (barriers of gifted education, desirable component of in-service session, and comments & suggestions): developing GT programs or curriculum, practical teacher training including teaching strategies for gifted students, identifying gifted children, specific subject matters for gifted students, and teachers' fundamental knowledge of gifted education. These answers are related to effective teachers' characteristics for gifted children and are related to main goals and contents of teacher training in previous research (Callahan, Cooper, & Glascock, 2003; Cross & Dobbs, 1987; Dettmer & Landrum, 1998; Feldhusen & Hansen, 1988). The answers also conform with results of Chan's (2001) Hong Kong study about effective teachers' characteristics and other Western research findings.

The results of this study could act as a guide to the administration of teacher instruction for gifted education. According to the overall results Korean elementary teachers have slightly low knowledge scores concerning gifted education, and they

have more interest than they have knowledge. In addition, training in gifted education is positively associated with teachers' knowledge of, and interest in, gifted education. For instance, as depicted in tables 4 and 5, items with large effect sizes could be considered important content of teacher in-service in gifted education. Also, since the level of trained teachers' knowledge and interest is different than that of untrained teachers, several levels of teacher education would be needed to meet everyone's levels and needs. Hence, by providing in-service training that addresses the need for knowledge of gifted education as demonstrated in this study, teachers' knowledge of, and interest in, gifted education may increase.

This study, in particular, provides important considerations when developing in-service teacher training programs for Korean teachers to improve educational services for gifted students. The results show teacher training is an essential factor for improving knowledge of, and interest in, gifted education. Because few gifted programs and few teachers of gifted education exist in the Korean elementary school system, the education of gifted children is left in the hands of general classroom teachers. Accordingly, all elementary teachers would benefit from quality training about gifted child education and, thus, better provide an appropriate education to gifted students in their general classrooms.

According to suggestions in the literature (Joyce & Showers, 1980; 1987; Schlichter & Olenchak, 1992), in-service training is positive when teachers' in-service needs are met. When training for gifted education is planned, this study can help provide ideas for the in-service, such as the need to employ experts in gifted education, providing in-depth sessions of one to two weeks, offering sessions during the most convenient months and addressing content areas that help address teachers' preferences and needs. Specific content for in-service sessions, as suggested by study participants, include: developing gifted and talented programs, identification of gifted students, practical training, and basic knowledge of gifted education. It may also be useful to address obstacles as mentioned by the participants during the in-service training. These include: the prevailing educational environment, identification of gifted students, and the teachers themselves.

This study examined only Korean elementary teachers' perceptions of and in-service needs for gifted education. However, as Korean teacher

participants in this study wanted to have teacher training for gifted education at an American university, this study also supports planning staff development programs at universities interested in providing teacher education for diverse groups.

Certainly, limitations to this study exist. The participants rated their knowledge with a 1 (low)

to 5 (high) scale, which may not have allowed for clear definitions of their ratings. The survey was conducted in just six school districts in Korea, not including Seoul, a city with many teachers. Therefore, in order to generalize the results of this study, nationwide research in Korea is warranted.

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## Appendix

### *Korean Elementary Teachers: Perceptions of Gifted Education and In-service Needs in Gifted Education*

#### Teacher information

1. Gender     Male     Female

2. Highest Degree Earned

- BA/BS                       MA/MS                       Ph.D./Ed.D.  
 Professional Diploma     Other \_\_\_\_\_

3. Training completed in gifted/talented  
(Check all that apply)

- None     District inservice     Workshop outside district  
 Course(s) at college/university     Educational degree in area

4. Grade level now teaching \_\_\_\_\_

5. Years of teaching experience \_\_\_\_\_

6. Teaching experience with gifted students

- Yes -- How long? \_\_\_\_\_     No

7. Are you currently working with gifted students?

- Yes – How much time per week do you work with G/T students? \_\_\_\_\_     No

8. Are you currently working with gifted students?

- Yes – How much time per week do you work with G/T students? \_\_\_\_\_     No

#### School information

1. Which district does your school belong to? \_\_\_\_\_

2. Does your school have a program for gifted students?

- No  
 Yes—What type of program does your school have? \_\_\_\_\_



## Knowledge and Interest

Please rate your knowledge and interest of the following by circling the appropriate response (1=low, 5=high).		Knowledge					Interest				
		Low				High	Low				High
1.	Characteristics of gifted and talented children	1	2	3	4	5	1	2	3	4	5
2.	Identification of gifted children	1	2	3	4	5	1	2	3	4	5
3.	Adapting curriculum utilizing										
	- Purdue Three Stage Model	1	2	3	4	5	1	2	3	4	5
	- The Renzulli Schoolwide Enrichment Triad Model	1	2	3	4	5	1	2	3	4	5
	- Sternberg's Triarchic Componential Model	1	2	3	4	5	1	2	3	4	5
	- Gardner's Multiple Intelligences	1	2	3	4	5	1	2	3	4	5
	- VanTassel-Baska Integrated Curriculum Model	1	2	3	4	5	1	2	3	4	5
4.	Program structures for gifted students										
	- Cluster grouping	1	2	3	4	5	1	2	3	4	5
	- Self-contained classes	1	2	3	4	5	1	2	3	4	5
	- Pull-out program	1	2	3	4	5	1	2	3	4	5
	- Magnet schools	1	2	3	4	5	1	2	3	4	5
5.	Classroom organization for individualizing and grouping activities	1	2	3	4	5	1	2	3	4	5
6.	Classroom behavior management techniques	1	2	3	4	5	1	2	3	4	5
7.	Assessing and planning for the individual child	1	2	3	4	5	1	2	3	4	5
8.	Assessment of individual students and group progress	1	2	3	4	5	1	2	3	4	5
9.	Making use of school and community resources	1	2	3	4	5	1	2	3	4	5
10.	Coordinating G/T planning with other teachers and staff	1	2	3	4	5	1	2	3	4	5
11.	Working with gifted students who are										
	- underachieving	1	2	3	4	5	1	2	3	4	5
	- learning disabled	1	2	3	4	5	1	2	3	4	5
	- culturally diverse	1	2	3	4	5	1	2	3	4	5
	- emotionally disturbed	1	2	3	4	5	1	2	3	4	5
12.	Specific content areas										
	- Language Arts	1	2	3	4	5	1	2	3	4	5
	- Mathematics	1	2	3	4	5	1	2	3	4	5
	- Science	1	2	3	4	5	1	2	3	4	5
	- Social studies	1	2	3	4	5	1	2	3	4	5
13.	Specific skill areas										
	- creativity	1	2	3	4	5	1	2	3	4	5
	- problem solving	1	2	3	4	5	1	2	3	4	5
	- independent study	1	2	3	4	5	1	2	3	4	5
	- research skills	1	2	3	4	5	1	2	3	4	5
	- communication	1	2	3	4	5	1	2	3	4	5
14.	The use of computers in schools and classroom	1	2	3	4	5	1	2	3	4	5

**Please answer the following:**

What do you see as barriers or obstacles to providing services to gifted and talented children in your current teaching situation?

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What would you like a gifted education inservice session to address?

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Who are the best instructors to deliver an inservice session?

- Teachers    Specialists    Professors    Others\_\_\_\_\_

What time during winter vacation is best for you to participate in an inservice training for gifted education?

- The middle of January    The end of January    The beginning of February  
 Other times\_\_\_\_\_

What length of an inservice session is best for you?

- 2-4 days    1 week    2 weeks    Other\_\_\_\_\_

Would you like to come to a university in the U.S. for the inservice?

- Yes    No

If you answered No to the above question,

which host do you consider to be the best option for giving inservice training for gifted education?

- The Ministry of Education    District institute  
 Domestic university institute    Others\_\_\_\_\_

Would you need funding to attend an inservice training?

- Yes    No

Comments:

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Thank you

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## About the Authors

**Dr. HeeJung Kim** was an elementary teacher for 11 years in Korea. She was GERI (Gifted Education Resource Institute) Super Saturday coordinator for 2 years. She earned her Ph.D. in gifted education program at Purdue University, graduating in May 2008. Her dissertation is entitled: Learning style preferences of gifted and general elementary school students in Korea and the U.S. with cross-cultural validation of the translated Learning Style Inventory (LSI). Her research interests include learning style, cross-cultural validation of instruments, and measurement. She received Dean's doctoral student scholarship (2007-2008) during her studies at Purdue, a merit-based award for quality research.

**Dr. Marcia Gentry** is the Director of the Gifted Education Resource Institute. Marcia joined the faculty at Purdue in 2004 after spending 8 years as a professor in Minnesota where she began her research into student perceptions of school experiences and directed graduate programs in gifted education. She accepted the role of GERI director in January of 2008. Her research has focused on the use of cluster grouping and differentiation; the application of gifted education pedagogy to improve teaching and learning; student perceptions school, and on non-traditional services and underserved populations— areas in which she has over 50 publications. Marcia is chair-elect of the American Educational Research Association Special Interest Group, Research on Giftedness and Talent. She has also served on the National Association for Gifted Children's Board of Directors and is recipient of its Early Scholar Award. She frequently contributes to the literature, regularly participates in international, state, and regional venues concerning gifted child education and educational research, and she serves on the editorial review boards of 4 journals in her field. Prior to her work in higher education Marcia taught math and science to middle school students, enriched curriculum to gifted elementary students, and she served as a regional administrator for gifted programs.



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# Assessing the High School Teachers' Emotional Intelligence in Karak District of Jordan

Mousa Alnabhan

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## Abstract

The main aim of the current study was to assess the level of the emotional intelligence (EI) of high school teachers in Karak district of Jordan. A sample of 222 teachers was randomly selected and filtered on the basis of an inconsistency index. A scale of 55 items measuring empathy, emotions regulation, interpersonal management, self management, and adaptability was applied. Both exploratory and inferential statistical analyses indicate female teachers exhibit higher levels of interpersonal management than their male counterparts. On the other hand, male teachers were better on adaptability and emotions regulation components. An interaction between gender and education background were found to be significant on all components of the emotional intelligence.

**Keywords:** Emotional Intelligence, teachers, Jordan, Karak

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## Background

Traditional theories of intelligence are gradually being replaced with those that are new. For example, Howard Gardner (1983) introduced his theory of Multiple Intelligences (MI) and Emotional Intelligence (EI) theory has been the focus of Bar-On (1988), Mayer & Salovey (1990) and Goleman (1995). IQ can no longer be considered the sole measure for success and job satisfaction. It only counts for 20%. In addition to luck, greater importance is now attributed to Emotional and Social Intelligences (Goleman, 1995; Hunter and Hunter, 1984).

When psychologists began to write and think about intelligence, for the most part, cognitive aspects were the focus, e.g., memory and problem solving. Even so, quite early-on, some researchers recognized the importance of non-cognitive aspects. David Wechsler, for example, defined intelligence as “the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment” (Wechsler, 1958, pp:444-445).

Wechsler was not the only researcher who viewed non-cognitive aspects on intelligence as important for adaptation and success. Robert Thorndike (1920), to take another example, was writing

about “social intelligence” in the late thirties. It seems unfortunate that the work of these early pioneers was largely forgotten or overlooked until 1983 when Howard Gardner began to write about “multiple intelligences”. Gardner (1983) proposed “intrapersonal” and “interpersonal” intelligences are as the type of intelligence. He described Logical – Mathematical and Verbal - Linguistic as the two intelligences typically measured by IQ tests. Intrapersonal and interpersonal intelligences are much more to do with the affective component and are not typically tested via IQ tests.)

It is crucial to keep in mind that cognitive and non-cognitive abilities are very much related. In fact, some research suggests emotional and social skills actually help toward improving cognitive functioning (Shoda, Mischel, & Peake, 1990). To be sure, a high IQ score may contribute powerfully to one's career prospects, yet it is of greater importance to possess the ability to persist when faced with difficulties and to interact with colleagues and subordinates in healthy ways.

It is known that there are several components of emotional intelligence (EI), e.g., empathy, self management, emotions regulation, interpersonal management, adaptability, and some others (Bar-



On, 2002). Therefore, for the purposes of this study and in the context of education, the concept of emotional intelligence relates to a teacher's ability to understand and use wisely the power of his/her own emotions, i.e., in a teaching situation demonstrate competence in, and appropriate use of empathy, self management, emotions regulation, interpersonal management, and adaptability. The operational definitions of the EI components in the current study as follows:

- (1) **Empathy:** an awareness and appreciation of the feelings of others, i.e., a sensitivity to others' feelings and ability to understand why they feel the way they do.
- (2) **Emotions Regulations:** being balanced emotionally and express an ability to control feelings, i.e., being consistent.
- (3) **Interpersonal Management:** a) having the capacity for intimacy or being able to give and receive affection; b) being flexible in terms of affecting and attracting others; and c) being able to demonstrate these skills in teaching management and leadership.
- (4) **Self –Management:** having the ability to express their feelings, i.e., teachers are independent, strong, and confident in conveying their ideas and beliefs.
- (5) **Adaptability:** Being able to find good ways of dealing with everyday difficulties.

### The Research problem

Some teachers believe the lesson plan and learning are more important than any feelings. The usual attitude is that the lesson plan should be followed, no matter what the emotional cost. While keeping strict adherence to the lesson plan, the needs of students tend to be ignored (Hein, 2000). Learners with unmet emotional needs are usually regarded as potentially disruptive to class generally and to the completion of the lesson plan specifically. However, there is some research to suggest that if feelings of young students were to be consistently addressed and validated and their emotional needs met, they may tend to be much

more cooperative and respectful in class. This is important since the young need both emotional and intellectual development.

In the same context, a positive relationship between the instructor and the learner is crucial if students are to be successful. When students perceive their teachers' motivation as a sincere interest in helping them to succeed, the motivational and emotional impact of the feedback tends to be more positive (Tucker, Sojka, Barone, & McCarthy, 2000).

### Purpose of the study

This study is based on the notion of "The success in schooling is heavily dependent on the quality of emotional characters of the teachers on the school environment" (Hein, 2000). With this in mind its main purpose is to explore aspects of emotional intelligence possessed by teachers. It is founded on the premise that:

- (1) Understanding the emotional climate in the school will help the school management to initiate the effective training courses to develop specific domains of the emotional intelligence
- (2) Assessing the level of emotional intelligence in view of education background and experience will help the Ministry of Education human resources management unit to develop the recruitment criteria accordingly
- (3) Investigating the emotional intelligence status of the teachers will strengthen the education system efforts in identifying the key persons, creating more effective work teams, and enhancing teachers' acceptance of radical changes.

### Research question

The current study tries to answer the following overall research question: "How does the level of Emotional Intelligence and its components of the Karak high school teachers differ due to their gender, years of experience, and educational background at (0.05) level of significance?"

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## Method

### Study sample

Two hundred and fifty high schools teachers were randomly selected from the Education District surrounding Jordanian city of Al-Karak. Based on the results of the calculated Inconsistency Index<sup>1</sup> (II) 222 individuals scored less than (10) on the index. These 222 teachers represent 89% of the original sample. The sample selection took variables such as gender, job levels, years of experiences, and education background into account ensuring the adoption of a stratified sample representative the general population (Gay, Mills, & Airasian, 2006).

Of the sample (N=222), 46 were males and 176 females. The basic annual salary distribution ranged from 3000 to 4500 JD (1 JD = US \$1.5). With respect to years of schooling experience of these 222 participants, 16.2% recorded less than five years, whereas 79.8% had five years and more. Thirty participants (15.2%) were educated at a level lower than bachelor degree compared with 167 (84.8%) whose education was at a bachelor level or higher.

### Instrument

The 55-item scale used in the study was developed by the group of researchers from the Ministry of Education at the United Arab Emirates. The tool was piloted, then reviewed and assessed by experts in psychology, business and psychometricians in Jordan. It was published in 2004 by the United Arab Emirates Ministry of Education and Youth.

Two approaches have been adopted to assess the reliability of the scale. An internal consistency done by Cronbach's alpha ranged from .53 (self management) to .84 (empathy) with an overall internal consistency coefficient of (.81). In addition, test-retest reliability was (.79) with three weeks as a time interval.

Validity studies were conducted and then reported by the publisher for factorial, convergent, and discriminant validity. Both indices of reliability and

validity indicate high levels of confidence in using the scale in the current study (Crocker & Algina, 1986; Nunnally, 1978). Keeping in mind that social and cultural background of people in Jordan and United Arab Emirates is totally alike.

### Assumptions

The study was based on assumptions that; a) the higher the educational background; and b) the longer period of experience associated with teachers the higher levels of emotional intelligence. In other words, educators more highly educated and better experienced are more emotional intelligent.

### Analysis of data and study findings

Data obtained in this study was analysed in a number of ways, e.g., descriptively and use of oneway and three-way ANOVA procedures.

Based on descriptive analysis, thirty-three (15%) of high school teachers working in the Karak district were found to show a high level of emotional intelligence overall. The majority of teachers (161 or 72%) showed high scores on the interpersonal management but scores lower than the cut-off score with respect to empathy, emotions regulation, self management, and adaptability.

Thirty-eight percent (38%) of teachers indicated high levels of ability in terms of understanding the feelings of others. They are empathetic, able to give proper consideration to others.

A large percentage (75%) of the teachers scoring high on interpersonal management, appeared to have excellent social skills and good interpersonal relationships by giving and receiving affection.

Questionnaire items associated with Adaptability examine how successfully a teacher copes with environmental demands, based on one's ability to effectively size up and deal with problematic situations. The results indicated that the majority (90%) of high school teachers working in the Karak district lack adaptability.

Analysis of data using one-way ANOVA to examine the gender effect on the Emotional Intelligence and its components, revealed no statistical significant differences between males and females teachers with respect to empathy, self management, emotions regulation, and even the Emotional Intelligence as a whole. On the other hand, statistically significant differences were found with respect to interpersonal management and adaptability.

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<sup>1</sup>The inconsistency index (II) score measures response inconsistency. It has been calculated by summing the differences in scores between the responses of eight pairs of similar items. If a respondent scores higher than 10 on the inconsistent index, the results are most likely invalid. In addition to indicating random responding, elevated inconsistency scores suggest people who are indecisive, unsure of themselves, or lack self-awareness (Bar-On, Reuven 2002).

Based on these results, the ability and skill to communicate with others is more apparent in female high school teachers than in their male counterparts. Males apparently behave better than females when response to a new or sudden situation is required. However, the gender of a teacher is not significant in terms of self management, emotions regulation, and empathy.

Investigation of how high school teachers' scores on Emotional Intelligence and its five components differ by years of experience using one-way ANOVA revealed a statistically significant difference across adaptability in favor of teachers with more experience ( $\geq 5$  years). No statistical significant differences were found with respect to length of experience on the other components. Based on this finding, the more experienced teachers respond to the pressing or sudden situations more appropriately than colleagues with less experience.

In assessing how teachers' scores on Emotional Intelligence components differ according to education background, one-way ANOVA results have shown a statistically significant difference across emotional regulations favoring teachers with higher levels of education, e.g., a Bachelor's degree. No statistically significant differences were found with respect to the other components. Based on this result, it appears that the more educated teachers are able to control their emotions more efficiently than those with lower levels of education. The more educated teachers appear more balanced emotionally and tolerant of stress – perhaps more able to deal with working pressures in a balanced way.

To answer the study main research question, a 2x2x2 three-way ANOVA was run five times- one for each component of the EI as shown in the tables (1 to 5) below. The total score of each component is considered as the dependent variable with gender, years of experience, and education background are the independent or categorical variables.

**Table 1:** Three-way ANOVA results of the effect of gender, years of experience, and education background on empathy.

Source	Sum of Squares	df	Mean Squares	F	Sig.
Gender	4.180E-03	1	4.180E-03	0.000	0.995
Experience	198.67	1	198.67	1.989	0.160
Education	326.677	1	326.677	3.271	0.072
Gender * Exp	1.078	1	1.078	0.011	0.917
<b>Gender * Education</b>	<b>546.351</b>	<b>1</b>	<b>546.351</b>	<b>5.470*</b>	<b>0.020</b>
Exp * Education	3.416	1	3.416	0.034	0.853
<b>Gender * Exp * Education</b>	<b>353.781</b>	<b>1</b>	<b>353.781</b>	<b>3.542*</b>	<b>0.048</b>
Error	18078.804	181	99.883		
Total	705839.00	189			

**Table 2:** Three-way ANOVA results of the effect of gender, years of experience, and education background on emotions regulation.

Source	Sum of Squares	df	Mean Squares	F	Sig.
Gender	18.255	1	18.255	.868	.353
Experience	0.328	1	0.328	.016	.901
<b>Education</b>	<b>67.995</b>	<b>1</b>	<b>67.995</b>	<b>3.23</b>	<b>.041</b>
Gender * Exp	54.581	1	54.581	2.597	.109
<b>Gender * Education</b>	<b>65.2</b>	<b>1</b>	<b>65.2</b>	<b>3.101</b>	<b>.044</b>
Exp * Education	0.615	1	0.615	.029	.864
Gender * Exp * Education	32.067	1	32.067	1.526	.218
Error	3804.587	181	21.020		
Total	212979.837	189			

**Table 3:** Three-way ANOVA results of the effect of gender, years of experience, and education background on interpersonal management.

Source	Sum of Squares	df	Mean Squares	F	Sig.
Gender	146	1	146	3.97	.041
Experience	79.772	1	79.772	2.171	.142
Education	15.644	1	15.644	.426	.515
Gender * Exp	1.539	1	1.539	.042	.838
<b>Gender * Education</b>	<b>127.021</b>	<b>1</b>	<b>127.021</b>	<b>3.456*</b>	<b>.049</b>
Exp * Education	83.273	1	83.273	2.266	.134
Gender * Exp * Education	71.500	1	71.500	1.946	.165
Error	6651.875	181	36.751		
Total	409389.136	189			

**Table 4:** Three-way ANOVA results of the effect of gender, years of experience, and education background on self management.

Source	Sum of Squares	df	Mean Squares	F	Sig
Gender	37.289	1	37.289	2.353	.127
Experience	27.852	1	27.852	1.758	.187
Education	0.259	1	0.259	0.016	.898
Gender * Exp	14.641	1	14.641	0.924	.338
<b>Gender * Education</b>	<b>35.147</b>	<b>1</b>	<b>35.147</b>	<b>3.354</b>	<b>.049</b>
Exp * Education	25.062	1	25.062	1.582	.210
Gender * Exp * Education	9.600	1	9.600	0.606	.437
Error	2868.142	181	15.846		
Total	136898.000	189			

**Table 5:** Three-way ANOVA results of the effect of gender, years of experience, and education background on adaptability.

Source	Sum of Squares	df	Mean Squares	F	Sig.
Gender	51.241	1	51.241	2.376	.125
<b>Experience</b>	<b>81.707</b>	<b>1</b>	<b>81.707</b>	<b>3.788*</b>	<b>.041</b>
Education	6.482	1	6.482	0.301	.584
Gender * Exp	64.546	1	64.546	2.992	.085
<b>Gender * Education</b>	<b>127.560</b>	<b>1</b>	<b>127.560</b>	<b>5.914*</b>	<b>.016</b>
Exp * Education	1.003	1	1.003	0.047	.830
Gender * Exp * Education	12.930	1	12.930	0.599	.440
Error	3904.113	181	21.570		
Total	215297.7	189			

As may be observed, the results as described in the preceding tables reveal a significant interaction effect between gender and education background on the total scores on empathy, interpersonal management, adaptability, and

emotional intelligence as a whole. In addition, an interaction between gender, experience, and education background is significantly found in case of empathy and EI only. No significant main effect is observed.

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## Conclusion

Emotions play a major part in all our lives. They are critical to our physical and mental health. Our overall development, including physical, social, mental, linguistic and spiritual growth, depends largely on our emotional well-being.

An emotionally intelligent teacher must be able to resist or delay the drive or temptation to act impulsively when dealing with others. A teacher with low frustration tolerance, impulsiveness, anger control problems, abusiveness, loss of self-control and explosive and unpredictable behavior

is not going to be successful. They must be able to tolerate and deal with the stress associated with teaching.

In this study, the majority of participating male and female high school teachers demonstrated low ability levels in terms of emotional intelligence and most of its components. This leads to the conclusion that given the importance attributed to emotional intelligence and in order to improve the level of emotional intelligence in teachers, provision of training sessions is imperative.

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# Methods and Procedures in Screening Gifted Mayan Students

Pedro Sánchez Escobedo

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## Abstract

Instruments, procedures, and criteria for the screening of Mayan students in Yucatan, Mexico are depicted and evaluated by analyzing the results of their use on 242 students in five different regions of Yucatán. These 242, 8th grade students were selected from a pool of 1,530 potentially gifted students.

Participants responded to a variety of standardized and non-standardized tests and underwent an additional qualitative assessment through interviews and observations. Results of this study demonstrate diverse difficulties in screening gifted Yucatec Mayan students arising from the lack of valid and pertinent standardized tests and the lack of teachers' understanding regarding the concept of giftedness. Of the 242 evaluated students, evaluators identified only 21 students as gifted; these students were later registered to receive eventual attention in a state project. Challenges regarding the screening, misidentification and management of gifted Mayan students are discussed in light of this experience.

**Keywords:** Giftedness, Mayan Students, experiences, detecting methods.

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## Introduction Framework

The purpose of the study was to screen and identify gifted children in a Mayan region characterized by its socioeconomic disadvantage in the state of Yucatán, Mexico. Specifically, the study intended to screen Mayan children using the traditional criteria for evaluating gifted students: cognitive skills, scholarly motivation and creativity. The traditional criteria for evaluation seemed to provide the logical starting point in attempts to identify gifted students in rural areas of Yucatan. However, given certain limitations and the particular characteristics found in the sample of children studied, evaluators found it necessary to adjust the criteria.

Throughout Mexico, children in rural, marginalized areas often fail to realize their full potential because of scarce opportunities and lack of educational services. However, due to the socioeconomic situation in rural areas, serving gifted children is

considered an act of social justice. The belief exists that these children constitute an important resource for Mexico's sustainable development. Screening gifted children in rural zones may enhance the emerging trend to service and stimulate gifted children in the hope being that when their full potential is achieved, they will be incorporated into the country's scientific, industrial, and entrepreneurial efforts.

Current intervention programs for gifted students in Mexico are limited to 5th and 6th graders. Once students complete sixth grade, follow up studies are terminated and services to gifted students are withdrawn. This project, however, focused on junior high school students and aimed to create a preliminary data base registering gifted children who will receive benefits from a variety of programs, ranging from enrichment courses to college scholarships.

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## Gifted Mayan Students

For this work, it was particularly important to review the concept of giftedness in the Spanish language, as various terms are often used interchangeably to refer to a group of gifted students. Likewise, the same term may be used to refer to various student abilities and profiles. In general, there is considerably more conceptual confusion in Spanish literature when approaching the gifted.

A gifted person is someone who shows, or has the potential for showing, an exceptional level of performance in one or more areas of expression (Baum, 1986; NAGC, 2003). Some of these abilities are very general and can affect a broad spectrum of the person's life, such as leadership skills or the ability to think creatively (Gale Encyclopedia of Psychology, 2001). Some are very specific talents and are only evident in particular circumstances, such as a special aptitude in mathematics, science, or music (Gardner, 1995). The term giftedness provides a general reference to this spectrum of abilities without being specific or dependent on a single measure or index. (Castro, Oyadel, Paez, & Quintanilla, 2000). It is generally recognized that approximately five percent of the student population, or three million children, in the United States are considered gifted (Silverman, 1976-2007).

Teachers in Mexico are usually not trained to teach gifted students, and school systems often lack programs and teachers to search for talented students (Kaplan, 2003). Thus, in this research, emphasis was placed on gifted students, following Lopez's (1994) general idea of screening students with a high IQ and high levels of general academic competence, motivation and creativity (Renzulli, 1978). Considering contextual issues (Arjona, Buendía, Ceballos, et. al., 2002), such as the desire to motivate these students to pursue higher education, it was particularly important to

screen children for high academic and scientific potential.

In the Spanish language, Sánchez Cerezo (1975) in Sanchez (2006) attempted to distinguish between the gifted and the talented, but name labels are still used loosely. Certain terms for describing gifted children are commonly found in the literature: 'sobresalientes' (Hernández, 2003), 'sobredotados' (Delgado, 2003) or 'talentos especiales' (Sánchez, Cantón & Sevilla, 1997).

Despite the lack of universally agreed upon terminology, this work follows the general guidelines provided by the World Health Organization (WHO, 1948) and the National Association for Gifted Children (NAGC, 1997). Giftedness, intelligence, and talent are fluid concepts and may look different in diverse contexts and cultures. Indeed, the term giftedness has taken on multiple meanings and much nuance across cultures (<http://www.nagc.org/index.aspx?id=574&ir>).

In Mexico, as Zacatelco (2003) broadly indicated, the concept of giftedness remains unclear. Much work is needed both in research and educational practice to distinguish between the concepts of talent and gift. As some authors assert, giftedness may be as simple as the ability to solve real life problems in a creative manner (Castro, Oyanadel, Paez & Quintanilla, 2000, p.13).

For the purpose of the study, the investigator made a clear distinction between giftedness and talent while looking for children with expressed natural abilities, i.e., aptitudes or gifts, who were placed among the top 10% of his or her peers. These natural abilities were assumed to have a clear genetic substratum (Heward & Orlansky, 1992), and observable in every task children with which children are confronted during schooling (Gagné, 1985).

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## Screening for Gifted Children

Deciding on appropriate criteria to identify gifted Mayan students was a major challenge in this study. Identification of giftedness should not be confounded by the means by which it is observed or assessed. For example, parents, teacher, or student recommendations, a high mark on an examination, or a high IQ score may not qualify a student as gifted, although these indicators may be a signal that giftedness exists. Some of these indices of giftedness are more sensitive than

others with regards to differences in the person's environment.

In Mexico, establishing criteria for screening gifted children has often been overlooked since there has been an emphasis on special education with services focused on children at risk of school failure (Castillo, Marquez & Ruiz, 1996; López & Sánchez, 2003; Sánchez, Acle, De Agüero, Jacobo & Rivera, 2003). This is a tremendous

problem in a country with an illiteracy rate of 10%, a general education of 7.6 years, and a 50% failure rate at 10th grade (SEP, 2006).

Sáenz (1997) has depicted the various needs of gifted children in Mexico and has discussed the dubious preparation of most Mexican teachers in dealing with these children. Authors such as Johnsen & Corn (2001), Sánchez, Cantón & Sevilla (1997); Shea & Bauer (2000) concur, agreeing that to be labeled as gifted, students must perform significantly higher in various tests and routines. This methodology permits evaluators to screen students in an efficient manner. In addition, Blanco (2001) claims that this allows schools reason to provide educational services and guidance to gifted children and to their respective parents.

With this in mind, the choice of strategies for screening Mayan children encompassed an assorted array of suggested techniques, e.g.,

teachers' nominations, Soto's (2003) suggested measures of creativity and intelligence and Gantus (2005) measure of task commitment. As it will be argued later, however, these measures were considered in a holistic fashion since none of the routines can, independently, lead to adequate judgments. For example, biases in teachers' nominations, as suggested by Sanchez & Schuman (2007) can significantly skew results. Furthermore, reports on customary practices and traditions among Mexican teachers and the cautionary statements made by Esquivel, Sánchez, & Valdes (2007) with regards to the standardization of the WISC-4 in Mexico were also taken into account. Certain characteristics in the Mexican school system could also undermine the accuracy of the study. Final decisions regarding giftedness were made following Kirk, Gallagher & Anastasiow's (1997) advice on using both formal and informal means of assessment.

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## Method

This is a diagnostic field study with the purpose of identifying gifted children in the rural Mayan areas of Yucatán.

### Subjects

The target population was 7th and 8th grade Yucatec students in five bilingual regions (Spanish and Mayan). Students were from 21 different counties, all of which are characterized by a high level of socioeconomic marginalization.

A conventional criterion was used to select 27 secondary schools in which access was granted to the investigator by state authorities and local principals.

Through teachers' nominations, 242 students were included in the study's initial phase. To be nominated, students had to be identified by two different teachers, plus they required the approval of the school director. Letters explaining the purpose of the study, the general characteristics of a gifted student, and the importance of identifying gifted students were issued to every teacher and principal. Special forms were used to collect teachers' nominations, principals' approval and parental consent for further testing. These students represented approximately 5% of secondary school students currently enrolled in Yucatan's rural school system. Finally, 175 students completed all tests, interviews, and requirements from the second stage.

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## Instrumentation

Individual files were created for each participant. They comprised demographic and familial information, school history, and results from standardized tests and additional gathered information. The following instruments were individually administered by trained assistants

### Motivation and task commitment test.

This instrument was especially designed for Sanchez (2007) and developed for this research. The questionnaire contained 20 items in a Lickert

scale that measured 4 dimensions of motivation: curiosity, task commitment, socialization in the school, and enjoyment of scholastic tasks. Cronbach's coefficient for this test was  $\alpha = .7632$ .

### Multi-factor creativity test

Although most reported measures of creativity refer to visomotor (visual motor) tests in Mexico, a multi-task creative test was designed and developed for this research project following the

general idea of Torrance (Duarte 1997). This multi-task creative test allowed researchers to explore three dimensions of creative thinking, each assumed to be independent from one another.

The test consisted of three routines. The first was intended to assess visomotor creativity and plastic tasks. Students were requested the student to draw a picture containing the six stimuli items given, e.g., circles, lines. The second was a test of verbal composition intended to measure verbal creativity. This test required the student to write a short essay using cue words purportedly unrelated to each other. The third and final task was an attempt to evaluate inventive capacity by asking the student to mention as many uses for two common items: a blanket and a rope. The traditional categories proposed by Torrance early work: flexibility, fluidity and originality were used to evaluate performances. Two independent judges evaluated each performance. The inter-rater reliability coefficient was  $r_k = .7462$ .

## SAGES-2

This is a test in the United States commonly used to screen and identify gifted children, particularly those with outstanding school potential. The Spanish language adaptation for Mexico is known as the Screening Assessment for Gifted

Elementary Students: SAGES-2 (Johnsen; Manual Moderno, 2003). This test was initially standardized for the Mexican population by Sanchez (2003), who later found the secondary school version (4-S) more adequate than that used for younger children (K-3) in the identification of high academic competence students. At the same time, however, Sanchez acknowledged some limitations in the psychometric properties in terms of the test's ability to assess divergent thinking previously reported by Hunsaker & Callahan (1995), and Plucker & Runco (1998). The battery consists of three subscales: Math and sciences, language and literature, and reasoning skills. This third subscale is considered the best estimate of 'g' intelligence, as it uses images and symbols. Furthermore, according to Jensen (1980), it is free of cultural influences and language competency.

## WISC-RM

The Mexican revised version Wechsler Intelligence Scale for Children (WISC-RM) is a rather old scale that had to be used, since a commercial version of a later version, i.e., WISC-4, was not yet available in Mexico. Many readers will be acquainted with this battery, since it is a widely-used device to measure levels of cognitive ability.

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## Procedures

### Stage 1: Teachers nomination

Gross (1999) argues that teachers' judgment about the students' actual or potential giftedness is an acceptable method of screening in various models. A teacher has the ability to observe student performance on a daily basis and they enjoy the advantage of a daily interaction with the student. Teachers' opinions, however, should not be used as the only criterion in the identification of gifted children since it is subject to bias, due to the positive influence of commitment, hard work and dedication on teachers' perception and external influence (González & Gotzens, 1998). Additionally, Jiménez (2000) has argued that a teacher's judgment regarding a student's potential giftedness increases with training and those using teacher evaluations is a cost efficient method in screening children. In the early years, peer opinions could be important in identifying gifted students. Díaz & Pomar (2000), Olzszewski-Kubilius & Lee (2004) warn against using parental opinion on this matter, as they have documented bias against appreciating women's giftedness and parental perceptions.

### Stage 2: Training of assistants

Data was collected with the help of twelve research assistants, all students of Esther Educational School or psychology majors. To organize the work, five testing centers were established in the cities of Mérida, Tizimín, Ticul, Peto and Valladolid. Students were selected from among volunteers with some knowledge of the Mayan language and with a strong academic history. Assistants were paid \$3 US dollars per student assessed.

### Stage 3: Data collection

Interviews and tests were administered individually in the school of each participant. Screening took place in classrooms designated by the principal for this specific purpose. Typically, the process included three consecutive sessions. The first session was used to gather general data, establish rapport, and collect contextual, academic and familial information. The second session was used exclusively for the administration of the WISC-R, and the third for the remaining tests.



## Stage 4: Data analysis

Tests and materials were scored and revised and kept in individual files. Because of the different types of data, both quantitative and qualitative analysis was conducted. SPSS, Spanish language version 11, was used for the quantitative analysis while expert interpretation of familial

and background information was used for the qualitative component.

A summary of each case was completed by the main investigator, and general criteria for classification and screening was reviewed by two experts in the field who were invited to review the data.

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## Results

This section describes the context and general characteristics of participant students. It also depicts major results in routines measuring competency, motivation, creativity and general performance of participants.

### Background information and characteristics of the students

#### *Schools*

Every school included in the study was public, with an average student population of 400 students divided in the three grades that comprise secondary education in Mexico, (approximately from 12/13 - 15 years old or the equivalent 7<sup>th</sup> to 9<sup>th</sup> grades in the US). These were modest educational settings in rural Mayan zones. They all had electricity, running water and basic computer services. Students were from low socioeconomic status, many of them bilingual, although competency in the Mayan language was generally low.

The majority of teachers were hired on an hourly basis and show great mobility, lasting on average for two years in each school. The drop out rates in this zone is 38% per year, mostly due to cumulative academic deficiencies. For example, in poor-performing primary schools students are often given an automatic pass and promoted regardless of required academic abilities (Sánchez & Schuman, 2007).

#### *Students*

Participants, generally speaking, share similar socio-demographic characteristics and family traits with the rest of the students. No distinguishing features were indicated in familial, contextual or economic data that could distinguish these potentially gifted students from their peers. All selected students had good grades. They were committed to school giving priority to school attendance and achievement. Twenty students considered themselves interested in school and eager to complete their scholarly tasks.

In general, students lived in poor economic conditions. Forty-six of these students received economic support from the federal program helping those experiencing extreme poverty - 'Oportunidades' ([www.sds.gob.mx](http://www.sds.gob.mx)). Students' houses had an average of two rooms, 94% had running water and 90% had either a toilet or latrine. Thirty-six percent of houses had phone service and 45% had paid TV.

The most part students' families were intact and nuclear (78%), with five members as a modal type. Twenty-two percent depicted an extended family structure with daily interaction with family members - mostly uncles, cousins and grandparents. Ninety-three percent of families had married parents, while 7% had divorced parents or lived in single parent households.

Interestingly, 92% of students described their relationship among family members as close, harmonic and nice. This highlights the importance given to family support in predicting high levels of academic achievement. Only 7% of participants complained about hardships with family members. Problems were generally encountered with the father but three students mentioned problems with siblings.

Reported family problems included the death of a relative, alcoholism in the father and disease in a member of the extended family. In two cases, students reported abandonment by one parent.

#### *Health and medical services*

Weight (46.87 Kg) and height (144.88 cm), distributions for these students were not significantly different from the rest of their peers. At the same time, however, they seemed healthier than the rest of their peers. Only 10% reported some kind of chronic illness, e.g., asthma. Twenty-one percent reported some kind of allergic reaction, and 27% reported having, at the time, at least one family member sick. Ten percent used glasses and an additional 6.3% complained that they did not have the glasses they needed. A third of the students mentioned not having any kind of

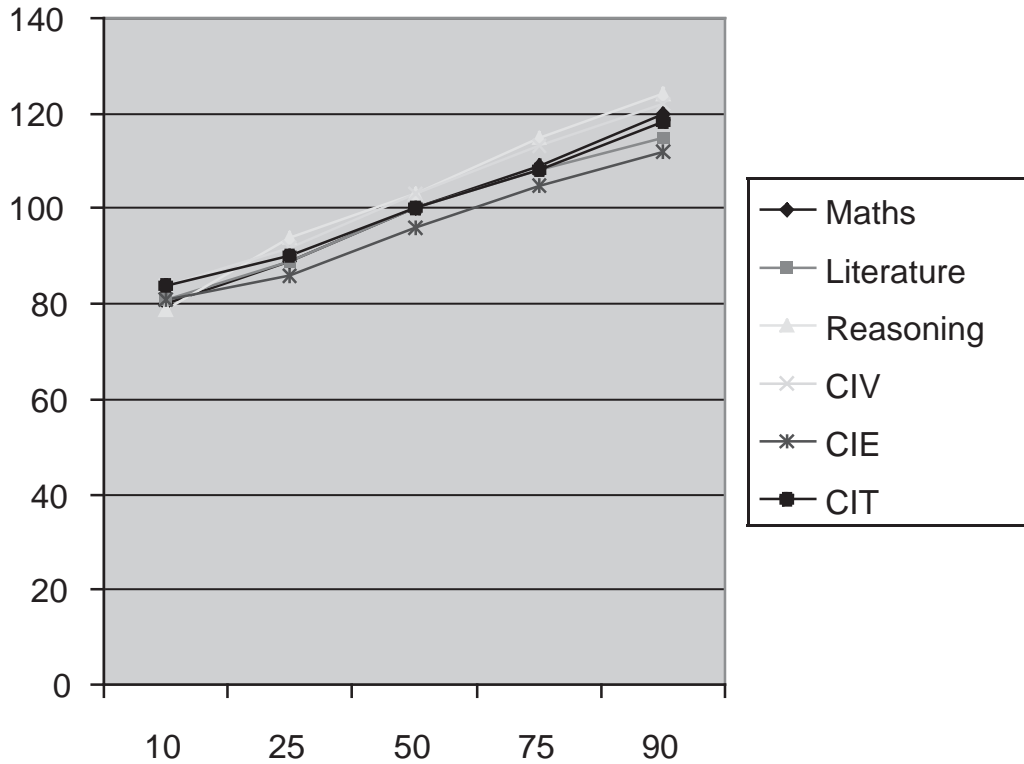


medical services; however the rest were covered by the national health system.

**Results from standardized tests**

Overall the results place the entire sample close to the mean. For the most part they indicated the referral of students by teachers was based on

their commitment and dedication rather than their talent or high aptitude. A priori, the investigator expected scores to be around one standard deviation above the norm. However, this was not the case. Figure 1 summarizes the scores indicating how they compare to the average of each test.



**Figure 1:** Comparison of scores with the average.

Furthermore, scores tended to be normally distributed, compared with findings in studies developed in the capital city of Merida. The distribution curve in those studies was clearly skewed to the left.

Hence, a reference criterion was used to select gifted children by establishing the following inclusion criteria:

- $CI \geq 120$
- $\geq$  in the 75th percentile in the creativity scale
- $\geq$  in the 75th percentile in the motivation scale
- $GPI \geq 9$  (scale in Mexico is 5 to 10).

Thirteen schools (43%) included in the study yielded gifted children. A total of 21 students from those identified by teachers met the aforementioned criteria for giftedness. Eight (38%) were male and 13 (62%) were female. Only one was significantly below the expected age for this cohort (12 years old).

In-depth analysis of the student files were carried out to identify other features that would characterize this group. Typically the fathers had received an average of 17 years of education, somewhat more than the average of the general population, i.e., 14 years. Also, there was a significantly higher number of working mothers (45%) as compared with the other participants (33%).

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## Discussion and Recommendations

After applying the basic international criteria used to identify giftedness, only 21 participants in this study or 12% of the 175 children identified as gifted by their teachers were actually gifted. This suggests teachers' perceptions are not altogether reliable as a main criterion to identify gifted children in this region.

Some mention should be made with respect to the limitations of this study. Although standardized tests were used, there are some caveats to their utility and limits to the interpretative value of these instruments considering contextual factors. For example, these children had no previous experience in responding to standardized tests and in many cases the conditions available to the investigators to carry out the test were not optimal. While teachers' perceptions may lead to an overvaluing of a child's potential, lack of experiences and practice in responding to standardized tests may lead to miss some gifted children that under achieve in such tests. For example, these children score lower than expected in scales such as the reasoning scale, theoretically free of cultural influences. Hence, caution must be excise using test elsewhere developed but with weak psychometric properties and poor reliability in this population as argued by Sanchez, Acle, De Agüero, Jacobo, & Rivera, M. (2003).

Martín, Medrano & Sánchez (2005) reported the relative difficulty in screening for gifted children in the Yucatán school system. Results from this study support those previous findings. The results also emphasize the lack of attention and services available for the gifted in the Mayan zone generally.

Results strongly imply the need for specific training of teachers in the Yucatán region. Increased knowledge in the concept of giftedness would be helpful when faced with decisions on simple interventions such acceleration. A knowledge and understanding of giftedness along with a willingness to apply the principles and concepts associated with gifted education could lead government and academic institutions to develop special programs. For example, this region is rich with unique resources, e.g., archeological sites, and tropical forest reserves. Many enrichment activities could be focused on and around these resources.

Even though the scientific study of the gifted in Mexico, especially in the bilingual rural zones, is emerging, the challenge task of discovering talent and giftedness in these regions is ever present. Further research efforts in this regard are imperative.

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# Using Learning Journeys to Develop a Challenging Curriculum for Gifted Children in a Nursery (Kindergarten) Setting

David Coates, Wendy Thompson, and Andrew Shimmin

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## Abstract

Recognising and nurturing giftedness in young children presents an important challenge to educators. This study sets out to identify and support gifted children through the provision of a rich learning environment in the Nursery (Kindergarten) setting. Practitioners in the Nursery aimed to provide cognitively challenging activities appropriate to children's needs. Learning Journeys (or stories) were developed as a way of recording and then responding to children's interests and motivations. Learning journeys can be described as observational narratives which are more systematic than an anecdotal daily record. They include everything the child does and says whilst involved in an activity. This study found that gifted children's Learning Journeys allowed insights into the types of provision which presented both challenge for them and other children in the Nursery.

**Key words:** Nursery (kindergarten) children, learning journeys.

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## Introduction

Recognising and nurturing giftedness in young children presents an important challenge to educators. This study sets out to examine the support given to gifted children through the provision of a rich learning environment in the Nursery (Kindergarten) setting. The aim was to offer cognitively challenging activities appropriate to children's needs. It has been widely acknowledged (Carr, 2001; Lave & Wenger 1992) that in order to meet the needs of all children including the gifted, practitioners need to make more explicit and well-documented observations of children which may then be used to develop challenging activities. Learning Journeys (or stories) were developed as a way of recording and responding to children's interests and motivations. The children discussed in this research were originally being assessed by means of the Curriculum Guidance for the Foundation Stage (DfEE/QCA: 2000) which covers the age phase 3 – 5 years. However, current guidance given in the Early Years Foundation Stage (DfES, 2007) provides a more explicit framework for observation and assessment. This has formed the basis of much of our analysis and discussion.

Early Years practitioners in the Nursery take pride in 'knowing their children'. It is because of this

knowledge and understanding of the children as individuals that practitioners were able to find a way through the complexity of potentially conflicting strategies and approaches to find appropriate ways of interacting with individual children. Through these interactions practitioners could promote and extend children's learning. Practitioners in particular settings may use different approaches when organising their classes and in collecting and recording information to help them understand and know their children. All will have the same aim in mind to maximise children's potential. In recent years more explicit and documented observation of children has become the expectation for practitioners, as teams work together assimilating and weighing information, hypothesising, speculating and offering new opportunities to develop children's learning

## What is a Learning Journey?

Learning Journeys or stories can be described as approaches to observational assessment which explain the 'narrative' of children's learning. The 'narrative' in this context, taken from a social constructivist perspective, describes and analyses children's active involvement in activities (Carr, 2001). Social constructivist perspectives

take into account how children learn to use the materials and language of a culture in increasingly informed and culturally accepted ways (Anning and Edwards, 2006: p.52). Learning Journeys allow practitioners to use multi-media tools to make learning visible, for example through the use of digital cameras.

In recording development and progress, relationships and actions become significant and illustrative of the progression in children's learning. The 'actions' described by Carr (2001) demonstrate children's readiness for learning through dispositions which include: children taking an interest; being involved; persisting with difficulty or uncertainty; communicating with others; and, taking responsibility (Carr, 2001). Practitioners subsequently analyse the strategies children use, consider their levels of motivation, and observe their abilities to recognise, select, edit, respond to, and, or resist learning opportunities. Assessment, in this context, becomes more than just a record of the individual child's isolated skills and structured observation is a key to success (Anning, Cullen, & Fleer, 2004, p. 73).

The resulting documented Learning Journey includes not only features of participation and interaction but is focussed on what makes sense to the child. The Journeys are complex as they are collected in natural contexts and include reference to the environment in which the learning takes place, including the role of peers and adults working within the same environment or activity (Anning, Cullen, & Fleer, 2004, p. 73).

Practitioners working from this perspective search for and construct learning opportunities which will lead to more meaningful understanding and development (Anning & Edwards 2006, p. 52). Carr (2001) describes this process as encompassing four elements of effective practice which involve describing, documenting, discussing and deciding on the next steps. This process also avoids concentration on deficit models of children's development and learning as the Learning Journey seeks to understand what a child *can do* and is therefore a more positive affirmation of his/her capabilities than some forms of assessment, for example standardized testing.

The statutory framework setting out the legal requirements for Learning, Development and Welfare of the 0-5 age phase in England is the Early Years Foundation Stage (EYFS) (DfES, 2007). This document includes guidance for assessment and monitoring standards to ensure the starting point is the 'unique child'. The EYFS (DfES 2007: Card 3.1) 'Observation, Assessment and Planning' provides examples of describing and documenting

in such a way as noting children's responses in different situations, as part of the daily routine, and finding out about their needs, what they are interested in and what they can do. This approach complements the methods used in documenting Learning Journeys. The EYFS (DfES 2007) guidance continues with recommending analysis of the observations to help plan what next for individuals and groups of children. Practitioners are advised to create records that are clear and *accessible to everybody who needs them* to ensure *the views of parents and practitioners are reflected in children's records* (DfES 2007: Card 3.1).

The discussions between children and their peers and between children and practitioners form an integral part of Learning Journeys. When documented they may be used as a tool for engagement in talk with both the children and their parents/caregivers. Examples of the strategies employed by practitioners, whilst engaging with children, involve using recall, drawing out patterns and connections in order to enhance children's learning. Thus as Moss (2004) highlights, the practitioner *is a co-creator of knowledge and values together with children; she is a cultured and curious person, which means an inveterate border crosser; and she is a researcher, with an enquiring and critical mind* (Moss, 2004: no page number).

It is the decision making (Carr, 2001) stemming from this analytical approach, which helps move forward children's thinking. This involves processes aimed at different levels. There is:

- The immediate feedback given to children whilst they are engaged in activities;
- The process of thinking about the next stage in their learning which will include sharing with other practitioners and parents the results of observation; and
- The modification to the learning environment to ensure children remain motivated and engaged.

As Seifert (2006) emphasises it is not sufficient to simply know or observe the behaviour of the children, it is what the practitioner does to ensure interest is sustained that is important. He writes: *To call myself a teacher of the young, I must connect with them somehow, which means interacting, relating, and touching their lives in valuable ways* (Seifert, 2006, p.9)

## Giftedness in the Early Years

Young children considered gifted are those who have the capacity, or the potential, to learn at a pace and level of complexity that is significantly

in advance of their age peers (Eyre, 2004; DfES, 2005; Porter, 1999). Implicit in this definition is the concept that gifted children do not always succeed. In her account of gifted children growing up, Freeman (1991) indicated support and encouragement were vital to success. In the Nursery School central to this study, practitioners were keen to identify and cater for gifted children many of whom came from homes with high levels of deprivation and un-stimulating environments. It is generally understood children from disadvantaged backgrounds do not achieve as highly as their more wealthy peers (Eyre, 2007). Intellectual giftedness, as a manifestation of high intelligence, is not fixed but develops in a nurturing environment (Gagné, 1993). Therefore, because the development of potential may not occur spontaneously, deliberate intervention practices are essential (Diezmann & Watters, 1997). The Nursery School aimed to provide a highly stimulating environment in an attempt to compensate for various deficits in the children's home circumstances (Clark, 2007).

Renzulli (1995) stated that pupils needed a combination of innate ability, creativity and task commitment before they could truly demonstrate their giftedness. Eyre (1997) has included these ideas in the following model:

**Ability + Opportunity/Support + Motivation  
= Achievement**

Practitioners working in the Nursery School therefore aimed to provide the opportunities, challenges and support which would motivate gifted children to maximise their natural ability and help them develop their gifts and talents (Baczala, 2003). Without the Nursery School many gifted children might not be successful in turning their ability into achievement.

The key to identification and meeting the needs of gifted children in the Nursery School was the provision of a rich learning environment and curriculum which offered cognitively challenging activities.

The emphasis was placed on play and oral language for the development of *literacy, attention, concentration and memory skills, physical confidence and competence, and the children's ability to build social relationships and co-operate with one another* (Walsh et al. 2006, p. 203).

An essential part of practitioners' recognition of the potential for giftedness in young children should involve observations of children's behaviour and verbal ability in different classroom settings (DFES, 2005; Smutny, 2001). Looking for persistence, creativity and precision that is on the

edge of the child's zone of proximal development (Vygotsky, 1978) would be a good indicator of a child's potential (Teachernet/G&T Wise, 2006, p.3). The emphasis should be on maximising learning opportunities allowing gifted learners to blossom (Sutherland, 2005). The classroom should be a place where all children can easily engage in activities and projects at their own level and pace (Smutny, 2001).

Accommodating for the needs of gifted children requires an environment that not only responds to their unique characteristics but also allows them to express elements of critical and creative thought (Sternberg, 1990). Such an environment would acknowledge independence and collaboration with like-minded peers and supportive practitioners as necessary components. Opportunity to engage in open-ended, exploration and knowledge-generation activities which, in turn, give children the potential for autonomy and self-selection (Baczala, 2003) is an essential feature of the nursery environment. The aim is to address the affective, social and cognitive developmental needs of the child (Diezmann & Watters, 1997). However, the nursery environment also needs to be age appropriate as some gifted children may still have fine motor skills and emotions closer to their chronological age (Baczala, 2003).

Without this stimulating provision most children will not have a context to make their gifts known (Koshy, Mitchell, & Williams, 2006). The majority of gifted children prefer to investigate in depth rather than flit from one superficial task to another (Teachernet/ G&T Wise, 2006, p.3). The open-ended nature of provision at the Nursery School gave gifted children opportunity to follow their own interests and sustain their active involvement. This flexible provision needs to feature in challenging gifted children to allow them to pursue individual goals. Gifted young children do indeed have potential, but this potential is fulfilled only *if the personal, social and cognitive facets of the child are viewed as equally important* (Snowden, 1994, p.18).

## Case Studies of Learning Journeys

Two Learning Journeys are described below followed by comments and analysis. The first one is the Learning Journey for an individual child and the second concerned a group of children working together.

### *Learning Journey One: Can I Take a Photo?*

Child A used her experience and knowledge when she was involved in working with the creative partnership sculptor. She asked if

we could take a photograph of the sculptor and as the experience unfolded she used the practitioner's camcorder to record what was happening. When Child A spotted a new camera she asked 'How does it work? Can I take a photo?'

Child A knows exactly how to operate the camera. She is confident and focused. She can play back her photos and use the zoom button. She carefully centralises her images. Naturally Child A's activity attracted other children. Child A taught a second child how to use the camera. She gave clear verbal instructions and a practical demonstration. Sadly our old camera began to let us down and we then discovered that pictures taken outside were poor quality. Child A tried to take some images, 'It is blurry' she said.

'I wonder why that is?' the practitioner said.

'Maybe it's the sun,' said Child A.

She put her hand over the camera to block the sun. This did not really make a difference so Child A suggested we try taking photographs in the shed because 'It is too bright out here and it is darker in there'.

She did this and her hypothesis proved to be correct.

Her excellent communication skills as well as her understanding enabled her to share her experiences and teach others. Other children were inspired by her and joined in the Learning Journey.

## Analysis and Comments

This Learning Journey described a child who was confident and frequently sought opportunities to extend her own learning. Child A was highly motivated by new experiences and actively sought them out. As Neihart, Reis, Robinson, & Moon (2002) noted gifted children of all ages thrive best in learning environments that precisely fit the level and pace of their development, with the joys and strengths that come from mastering challenges.

Child A was keen to investigate and use the camera in a variety of contexts, exploring how it worked in great depth, over a sustained period of time rather than flit from one activity to another (Teachernet/ G&T Wise, 2006, p.3). The open-ended nature of provision at the Nursery School gave Child A the opportunities to follow her own interests and sustain her active involvement. This flexible provision, which was influenced by constructivist and Vygotskian perspectives, was a key feature of the provision in the Nursery School.

The practitioners challenged gifted children by allowing them to pursue their individual goals. Child A showed three learning dispositions, persistence, creativity and precision, that were on the edge of her zone of proximal development (Vygotsky, 1978) and were clear indicators of her potential (Teachernet/ G&T Wise, 2006, p.3).

According to the Early Years Foundation Stage (DfES, 2007), children need sensitive, knowledgeable adults who know when and how to engage their interests and how to offer support at appropriate times. Where the environment is vibrant, purposeful, challenging and supportive, gifted children stand the best chance of developing into confident and successful learners (DFES, 2006b). Child A knew that the adults in the setting were responsive to child initiated learning. The practitioners realised that the Early Years is on the 'sharp end' of personalization and the system should bend to the individual (DFES, 2006a, p.3).

Child A was very self-confident and was more than comfortable in her environment. She knew her interests were taken seriously and valued. Child A knew adults would strive to support her in facilitating and extending her own learning. She was very inquisitive and had a sharp eye for opportunities. She was resourceful and determined. If she did not get a satisfactory answer she would continue to question until she did. Child A was using the practitioners as a resource to extend her learning (DFES, 2006a). She would ask anybody who she thought might help her. The practitioners in the Nursery School had become partners and active participants (Yelland, 2005) in Child A's learning as they encouraged her to take ownership of her own learning (DFES, 2006a, p.3). They focused on helping Child A to become resilient learner who enjoyed learning and felt that she was able to succeed (Anning & Edwards, 2006, p.54). This 'active' involvement was crucial as the practitioners wished to analyse and hypothesise about Child A's thinking and learning, purposefully and accurately (Yelland, 2005).

### *The Learning Journey Two: Safety versus Learning Opportunities (Masking Tape)*

Children B, C, D and E had been experimenting with masking tape and making enclosures within the home area and nearby book corner. They were very experimental; testing to see how far it would stretch before breaking, what it would stick to and how to cut it off at the right moment.



They needed to use scissors to achieve this and previously we had always asked the children to sit down or be still whilst cutting or using sharp tools. The practitioners had a discussion concerning safety versus learning opportunities. They decided to supervise the activity closely and discussed and emphasized safe use of tools with the children concerned.

The children continued to enclose different sections of the home area each day and their methods became more sophisticated as they became more familiar with handling of materials. They used shorter pieces and stuck them together to make them stronger. There was lots of discussion and negotiation involved over equipment and use of space and tools.

The practitioners had already been discussing shapes during the week and one practitioner noticed the children were beginning to make shapes within the carpet area. With encouragement from the staff the children could discuss the properties of the shapes—sides, corners and curves. They knew how many corners and sides were needed for each shape. They also knew that circles had no corners and mastered the art of making one on the carpet. They used positional language to describe where they were putting the next shape. They began by making small shapes within the home area working individually. Child E became much bolder and began to make large strips across a wide expanse of carpet. Child D looked on at this point. She joined these up to make gridlines on to the floor. She sustained a high level of involvement in her task seeming totally unaware of the others at this point. Staff continued to observe and noticed Child D beginning to use large strips of the tape but at a higher level above the floor attaching it to the bookcase and cupboard. This effectively blocked off the home corner so the children had great fun finding ways of getting through. Lots of positional vocabulary was used in this activity, for example, over, under.

The next day Child D and Child E moved to the home area and began to experiment with the tape again. Child B joined in making waist height gridlines across the home area. Child D then noticed a musical instrument – a triangle, on the window sill and said, “Should we stick this on?” Child E agreed. The tape was at waist level so they had a problem as the weight of the triangle made the tape sag on to the floor. They seemed to want the triangle suspended at waist height. At this point two practitioners had a discussion as to whether they should intervene and help the

children solve the problem themselves. Given the children were not getting frustrated and appeared to be negotiating and discussing the problem, they decided to only observe and intervene when it was thought necessary. The children persisted all afternoon using a process of trial and error testing their theories. Eventually they discovered that sticking on extra lengths and putting the tape further over the window sills enabled the triangle to be suspended. The sense of achievement was enormous.

## Analysis and Comments

This second Learning Journey is a good example of gifted learners’ advanced thinking skills and how the curriculum offered open-ended activities which *encouraged higher level thinking skills such as analysis, synthesis, evaluation and problem solving, and promoted intellectual risk taking* (Porter, 1999, p.173). These gifted children had the ability to create wonder from unpromising material (the masking tape). They felt safe to make mistakes and use trial-and-error to solve problems (Porter, 1999). The practitioners played a key role in developing the learning experience for the children as they were happy not to be in complete control when they allowed the children to use resources in a unique manner (DFES, 2006a). They provided a high quality environment, which provided an open use of resources, and encouraged the children to feel secure and confident to learn for themselves (DfES, 2002) and pursue their own interests (Clarke, 1997).

The practitioners allowed the children’s gifts and talents to emerge as the children were given the freedom to explore boundaries in an unrestricted manner (DFES, 2006a) and cultivate their interests extensively and in depth (Porter, 1999). They utilised every opportunity to promote children’s self-esteem, confidence, independence and imagination (CCEA, NES & BELB, 2002: 1 – 2) while providing the scaffolding essential to gifted children’s learning (Bruner, 1960). The setting up of enriched environments is critical to meeting the needs of gifted children (Teachernet/ G&T Wise, 2006: 5). Through play children can develop their higher level thinking skill and problem solving ability. Monotonous repetitious play, on the other hand, is simply hands-on and not brain-on (Wood & Attfield, 1996), offering little cognitive challenge for children. It is the role of the practitioner to recognise, intervene and facilitate where and when it is appropriate in order to promote challenging play experiences.



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## Discussion

The concept of practitioners identifying the 'next steps' in children's learning and attempting to support them in moving through these next steps has been an explicit expectation in Foundation Stage teaching since the introduction of the Foundation Stage Guidance (DfEE / QCA, 2000). There is recognition that a significantly high proportion of learning takes place during these years and children therefore need high quality care and learning experiences (QCA/ DfEE 1999). Effective pedagogy which can meet the needs of young children does not simply involve teaching but also includes the provision of instructive learning environments and routines (Siraj-Blatchford & Sylva, 2002), and the effective application of theories concerned with child development and learning (Edwards, 2005).

An appropriate learning environment for young children is one in which useful age-appropriate activities are available, interesting practical projects are carried out, teachers have high expectations of children, and children and adults work together as a team (Walsh et al. 2006, p. 219). Practitioners should provide open-ended, perhaps unusual, play materials such as masking tape, which encourage the development of ideational fluency, as the children are able to be more creative and produce more varied ideas (Suterby & Frost, 2006). Child development and learning are dynamic processes requiring practitioners to understand the continuum, observe children closely to align curriculum and teaching to children's emerging competencies, needs and interests, and then *help children move forward by targeting educational experiences to the edge of children's changing capacities so as to challenge but not frustrate them* (Bredenkamp & Copple, 1997, p.8).

Learning Journeys can help practitioners develop and monitor the application of effective pedagogy and chart children's development and learning to ensure that the needs of all children including the gifted are met. The Learning Journeys described in this article show how gifted children can be

supported in order to realise their full potential through scaffolding by proactive practitioners in an appropriate environment. The children were challenged by way of the opportunity to work on flexible activities with self-chosen peers. The practitioners only intervened when and where necessary in order to support the children's learning. The key was to form relationships that mutually influenced each other where practitioners engaged children in activities which extended their interests, motivation and abilities (Seifert, 2006). There needs to be a deliberate philosophy and acceptance that gifted children have explicit learning needs. Learning Journeys are one way in which these needs can be identified and met.

At different times some children need to repeat or 'consolidate' their learning whilst on other occasions they need to move quickly through the learning experience. Children's learning is an active, self regulated process as they construct meanings for themselves utilising existing knowledge as they interact with their environment. Because of this children have different interests and are motivated in different ways. They are capable of making meaning from their experiences through mental acts involving planning, coordination of ideas and abstraction (Malaguzzi, 1998, p.78). Well-planned play, indoor and outdoors, is one of the key ways practitioners are able to meet the needs of all children and make their learning enjoyable and challenging (Members of the British Educational Research Association Early Years Special Interest Group, 2003).

Uniformity of educational provision fails because children do not have the same needs. Equality of opportunity can only be achieved by taking into account individual needs. The role of the practitioner is crucial therefore as both a supporter and an advocate of young gifted children (Silverman, 1992). Learning Journeys can assist gifted children by recognising the need to provide opportunities for them to go beyond the normal classroom experiences and to become generators of knowledge as opposed to assimilators of more information.

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## Conclusion

As this research progressed, the potential of Learning Journeys as a method of documenting more precisely these crucial, yet almost unconscious and obscure aspects of learning and teaching interactions became increasingly apparent. Through widening the range of participants in children's learning experiences, it is apparent that Learning Journeys can enhance

the possibilities of effective interaction and support from the range of adults working with individuals or groups of children. Observations of Learning Journeys deliver powerful insights into how practitioners working with the gifted can provide an optimal learning environment that both motivates and provides challenge to their young children.

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# The Reliability and Validity of a Spanish Translated Version of the Gifted Rating Scales

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## Abstract

This study was a preliminary examination of the psychometric properties of a newly developed Spanish translated version of the *Gifted Rating Scales-School Form (GRS-S)*. Data was collected from elementary and middle schools in northeastern Puerto Rico. Thirty teachers independently rated 153 students using the *GRS-S* Spanish Form. Results indicated strong internal consistency for teacher ratings with alphas ranging from .98 to .99. Intercorrelations between scales are moderate to strong, ranging from .88 to .97. Factor testing of two separate models supported a six factor model proposed by authors of the *GRS-S*. Results provided initial support for the *GRS-S* Spanish translated version as a reliable and potentially useful screening measure to assist in the identification of island Puerto Rican gifted students.

**Keywords:** Gifted identification, Gifted Rating Scales, multi-cultural assessment.

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## Background.

The concepts of giftedness and talent have not been without controversy; in fact, the concept has engendered a level of contentiousness within society referred to by some as a “love-hate” relationship (Benbow & Stanley, 1996; Colangelo & Davis, 2003; Gallagher & Weiss, 1979; Pfeiffer, 2008). American society values unique individuals who have overcome adversity and become successful and highly accomplished, but, at the same time, our culture is firmly committed to notions of equity and the equality of all citizens (Colangelo & Davis 2003). A recent expression of this commitment to egalitarianism in the United States is seen in the Public Law 107–110, No Child Left Behind Act of 2001 (NCLB). While NCLB encourages establishing global academic goals for all children, there is little consideration of differences in students’ individual ability levels or the needs of students at the high-end of academic performance. The educational system may be commended for wanting to increase the level of academic achievement for all students, but not for neglecting the needs or failing to provide support for children with special talents and abilities.

Children with special talents and abilities in Puerto Rico have also experienced insufficient support (Pérez-Brebán 2005b). However, there has been recent interest in serving Puerto Rico’s gifted population. For example, Pérez- Brebán (2005a) reports recent initiatives to develop a division of gifted education within Puerto Rico’s educational system. One of the problems facing gifted education in Puerto Rico today is the challenge

of correctly identifying gifted students. Many contend that this is one of the most critical issues to be resolved before the field can move forward and better serve gifted students. Over a 10-year period, two different surveys rated identification as either the primary (Cramer, 1991) or secondary problem (Pfeiffer, 2003) facing the gifted field. The *National Report on Identification: Assessment and Recommendations for Comprehensive Identification of Gifted and Talented Youth* (Richert, Alvino & McDonnel, 1982) highlighted several problems with the identification process, many of which still have not been rectified. First, the great majority of instruments are designed to only measure students who are achieving academically, regardless of performance in other areas. Second, some instruments have been used to assess areas of giftedness for which they were not normed. Use of intelligence tests to qualify students for gifted programs that include non-academic components, e.g., creative arts, is an example of this practice. Third, tests typically used to identify giftedness do not necessarily predict adult expertise or success. It is common to find adults who develop an expertise in a specific field, despite failing to thrive academically during their school years (Richert, Alvino & McDonnel, 1982).

Use of teacher and parent rating scales has been common in the identification of gifted students. However, the majority of these scales suffer from limitations compromising their diagnostic value (Jarosewich, Pfeiffer & Morris, 2002). Many



widely used scales include normative samples not representative of the population, lower inter-rater reliability and lack of diagnostic precision (Jarosewich, Pfeiffer, & Morris, 2002; Siegel & Powell, 2004). Despite these problems, ratings by teachers and parents are still considered an important method to assist in the identification of gifted students (Davidson, 1986; Pfeiffer, 2002).

It is precisely because existing gifted ratings scales are subject to such limitations the *Gifted Rating Scales* instrument (*GRS*; Pfeiffer & Jarosewich, 2003) was developed. The *GRS* not only measures academic and intellectual ability, but also creativity, leadership, and artistic talent. Standardization of the *GRS* utilized a sample that matched the latest U.S. census in terms of race/ethnicity, parent education level and regional representation. Additionally, during standardization, the *GRS* was co-linked to the new *Wechsler Intelligence Scale for Children-Fourth Edition* (*WISC-IV*) and *Wechsler Preschool and Primary Scale of Intelligence-Third Edition* (*WPPSI-III*) (Sparrow, Pfeiffer & Newman, 2005). As will be discussed, a psychometrically-sound rating scale

is considered valuable, not only in the U.S., but in Puerto Rico and other countries.

Lee and Pfeiffer (2006) recently examined the reliability and validity of a Korean-translated version of the *GRS*, using both teacher and parent raters. They found strong reliability for both teacher and parent ratings in addition to substantial correlations with students' school performance. It was of particular interest to explore whether a Spanish version of the *GRS* might similarly be valid with the island-residing Puerto Rican population. The interest stems from the fact that the population is subject to the federal laws and legislation of the U.S. government, which, at this time, encourages but not mandates that states provide special programs for the gifted (Stephens, 2008). Despite these federal guidelines, there are currently no island-wide programs for gifted children (Asociación de Padres de Niños Dotados de Puerto Rico, 2004). A few privatized or teacher-initiated programs exist, however, even for them the lack of early identification remains the major problem (Pérez-Brebán 2005b).

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## Purpose of the study

The purpose of this study was to translate into Spanish and test the reliability and construct validity of the Gifted Rating Scales-School Form (*GRS-S*). The premise was that a *GRS-S* Spanish

form would demonstrate acceptable reliability and validity as a screening measure for identifying gifted students in Puerto Rico.

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## Method

### Demographics and sample

Participants were recruited from ten randomly selected public schools from the northeast shore of Puerto Rico. The average family size in this region is 3.33; 98.4% of the population is Hispanic/Latino, the majority of which are, presumably, of Puerto Rican descent (U.S. Census 2000). The median family income is \$23,412 (in comparison to U.S.: \$50,046; Island-wide: \$16,543), thus 30.7% of families live below the U.S. poverty level. Although this area is mostly an urban metropolis, five of the schools meet the criteria for "rural" schools; the other five as suburban, as southern parts of the region are elevated, thus distancing some communities from metropolitan areas. Six of the schools were elementary (grades K-5), the other four middle schools (grades 6-8). The sample consisted of 153 participants, 72 male and 81 female. The participants were from grades one

through eight and ranged in age between 7 and 14 years ( $M = 11.12$  years;  $SD = 2.32$ ); the mean age of the males was 11.24 years ( $SD = 2.27$ ); the mean age of the females was 11.06 years ( $SD = 2.34$ ). All participants were native to Puerto Rico and born of Puerto Rican parents. Participants were selected by teachers who were instructed to nominate students from varying ability levels based on their classroom performance.

Thirty teachers participated in the study and completed *GRS-S* Spanish Forms on the 153 students. All teachers completed, at a minimum, a bachelor's degree in education. Participating elementary school teachers were all "home-room" teachers and taught fundamental academic subjects (i.e. Spanish, Math, Social Studies, and Science). Participating middle school teachers were endorsed in, and taught, one of four core courses: Spanish, Math, Social Studies, and Science.



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## Instrumentation

*Gifted Rating Scales – School Form (GRS-S)*. The *GRS* (Pfeiffer & Jarosewich, 2003) is a teacher-completed instrument and includes a Preschool/Kindergarten Form (*GRS-P*) for ages 4:0 to 6:11 and a School Form (*GRS-S*) for ages 6:0 to 13:11. Only the *GRS-S* was utilized in this study. The *GRS-S* consists of six scales with 12 items each for a total of 72 items. The form yields raw score totals on all scales, which are converted to age-based *T*-scores and associated cumulative percentages.

The *GRS* is based on a multi-dimensional model of giftedness incorporating the *Munich Model of Giftedness and Talent* (Zigler and Heller, 2000) and the typology appearing in the U.S. Department of Education Report, *National Excellence: A Case for Developing America's Talent* (Ross, 1993). Below is a brief description of each of the six *GRS-S* scales:

- *Intellectual Ability*. This scale measures the teacher's perception of a student's verbal and/or nonverbal mental skills, capabilities, or intellectual competence. Aspects of intelligence measured by this scale include abstract reasoning, problem solving, mental speed, and memory.
- *Academic Ability*. This scale measures the teacher's perception of a student's skill in dealing with factual and/or school-related material. Advanced competence and high levels of proficiency in reading, math, and other aspects of the school curriculum are indicative of academic talent, as is facility in acquiring new knowledge and skills and the ability to understand complex material. Students who are academically gifted often have large stores of information including broad knowledge of the world around them.
- *Creativity*. This scale measures the teacher's perception of a student's ability to think, act, and/or produce unique, original, novel or innovative thoughts or products. Creativity can be expressed in a variety of ways: how a student solves problems, experiments with new ideas, formulates a solution to a group project, and/or uses imagination. Creatively gifted students are inventive, curious and inquisitive. They show a preference for challenge and complexity and engage in problem solving that is insightful and creative.
- *Artistic Talent*. This scale measures the teacher's perception of a student's potential for, or evidence of ability in drama, music, dance, drawing, painting, sculpture, singing,

playing a musical instrument, and/or acting. Artistic talent can be expressed in a variety of ways: how a student approaches activities, completes assignments, and/or uses art supplies or artistic media. Artistically gifted students learn artistic skills quickly and exhibit more technical sophistication.

- *Leadership Ability*. This scale measures the teacher's perception of a student's ability to motivate others toward a common or shared goal. Leaders understand and monitor social dynamics and have strong interpersonal communication and conflict resolution skills. They effectively orchestrate collective action and influence group behavior. Gifted leaders exhibit strong social judgment and prosocial values such as integrity and trustworthiness and demonstrate the drive to lead and take initiative.
- *Motivation*. This scale refers to the student's drive or persistence, desire to succeed, tendency to enjoy challenging tasks, and ability to work well without encouragement or reinforcement. The motivation scale is *not* viewed as a type of giftedness, but rather as the dynamic energy that drives or impels a student to achieve, akin to Tannenbaum's (1997) formulation that emphasizes drive as an important factor in explaining a gifted student's performance.

Each item is rated on a nine-point scale divided into three ranges: 1-3 Below Average, 4-6 Average, and 7-9 Above Average. This rating scale allows the teacher to first determine whether the child is below average, average, or above average for each item, compared to other students the same age. The rating scale then allows the teacher to determine, within the specific range, whether the child is at the bottom, middle or top of the range.

The *GRS-S* scores from the standardization sample have strong reliability and validity (Pfeiffer & Jarosewich, 2007). Coefficient alphas ranged from .97 to .99 for the scales of the *GRS-S* and 1-week test-retest reliability coefficients were .88 or greater. The *GRS-S* scales were strongly correlated with other instruments measuring competencies related to giftedness, such as intelligence, as measured by the *Wechsler Intelligence Scale for Children-Fourth Edition* (WISC-IV). Further, the *GRS-S* scale scores discriminated children identified as gifted from children identified as not gifted (Margulies & Floyd, 2004). The *GRS-S* manual provides a classification system that indicates the likelihood that a student is gifted, based on their *T* score.

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## Procedure

Written authorization was obtained from the university human research subjects committee and The PsychCorp, Harcourt Assessment Company, publisher of the *GRS*, to translate the scale into Spanish and evaluate its utility with the Puerto Rican population. Administration of the *GRS-S* was approved by the Puerto Rico Department of Education.

A rigorous translation procedure was followed in developing the *GRS-S* Spanish Form (Geisinger 1994; International Test Commission, 1993). A total of nine individuals, fluent in both Spanish and English, participated in the translation process; English was the first language for three of the participants, with Spanish as the first language for all others. Additionally, all participants had experience, either as educators or administrators, in both Puerto Rico and United States school districts, and were knowledgeable of both the Puerto Rican and North American culture.

The procedure began with an item-by-item translation of the 72 items by the primary investigator. Items were translated into Spanish by the first author of this article making necessary adaptations to ensure that each item was culturally meaningful while avoiding alteration of the original concept each item presented; the first author of the *GRS-S* was consulted throughout this initial process. A panel of seven individuals was provided a copy of the English version of the *GRS-S*, and asked to individually review and critique in writing the quality of the translation.

The panel then met as a group and reviewed each item, discussing their individual critiques, and provided suggested revisions of the translated *GRS-S*, which were taken into consideration in drafting a new revision. This new revision of the *GRS-S* Spanish Form was then translated back into English by another individual who had no previous exposure to the earlier translation process and was unfamiliar with the *GRS-S*. This “back translation” was then compared to the original version of the *GRS-S*, with input from its first author. Discrepancies were examined and final necessary adaptations were made to complete the final Spanish Form. Discrepancies were noted for few items and adaptations primarily involved selecting Spanish words that more accurately depicted the concept intended.

Principals from the randomly selected schools were contacted to solicit the participation of their schools. Once principals granted entry into the schools, informed consent was obtained from teachers who volunteered to participate in the study. Teachers who agreed to participate were instructed to select five or six students in their class: one student who was currently functioning very above grade level academically; one student who was currently functioning above grade level academically; one to two students who were currently functioning at grade level academically; one student who was currently functioning below grade level academically; and one student who was currently functioning very much below grade level academically.

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## Results

### Descriptive and Reliability Data

Descriptive statistics for the *GRS-S* Spanish Form are illustrated in Table 1. Means and standard deviations for each of the scales are reported, which ranged from 47.41 to 48.29 and 14.99 to 15.75, respectively. Cronbach’s (1951) alpha coefficients for the six *GRS-S* Spanish Form scales for the 153 participants in the Puerto Rico sample are also reported. Estimates ranged from .98 (Intellectual Ability) to .99 (all other scales). The split-half reliability scores for the teacher ratings were also quite strong, ranging from .91 to .98. Correlation coefficients between the *GRS-S* Spanish Form scales are presented in Table 2. As can be observed, intercorrelations were strong, ranging from .86 between Motivation and Artistic Talent to .97 between Academic Ability and Intellectual Ability.

### Discriminant Validity of Factors

The hypothesized six-factor model for the *GRS-S* Spanish Form was tested by confirmatory factor analysis (CFA) using LISREL 8.7 (Joreskog & Sorbom, 2004), with a maximum likelihood estimation, utilizing the variance-covariance matrix. Additionally, the scale of each latent variable was specified as having a variance of one, due to the assumption of standardizing the latent constructs. One of the goals of a CFA is to examine the relationship of a specified theoretical model to one’s sample data. It is just as necessary; however, to provide evidence that specified model indicates better fit when compared to an alternative model. Although fit indices are typically used to measure how well an empirical model compares to a baseline or independence model, it is often more precise to compare alternative

**Table 1:** Descriptive and reliability statistics for *GRS-S* Spanish form.

Scales	Mean	S.D.	Cronbach's Alpha	SEM*
Intellectual	48.18	15.25	.98	1.53
Academic	48.20	15.21	.99	1.52
Creativity	48.54	15.75	.99	1.57
Artistic	47.64	15.30	.99	1.53
Leadership	47.41	14.99	.99	1.50
Motivation	48.29	15.26	.99	1.53

\*Standard Error of Measure

**Table 2:** *GRS-S* Spanish form scale correlations<sup>a</sup>.

	Intellectual	Academic	Creativity	Artistic	Leadership	Motivation
Intellectual	—					
Academic	.97	—				
Creativity	.96	.96	—			
Artistic	.89	.90	.92	—		
Leadership	.89	.92	.91	.88	—	
Motivation	.91	.93	.91	.86	.95	—

<sup>a</sup>All correlations are significant at  $p < .01$  level

structures of the same model to each other. To this end, the original six factor solution proposed by Pfeiffer & Jarosewich (2003) was tested, along with a unidimensional (g) model of giftedness.

Several measures of fit were utilized to obtain a holistic view of the model-data performance, including the normed fit index (NFI), comparative fit index (CFI), relative fit index (RFI), the standardized root mean residual (SRMR), the root mean square error of approximation (RMSEA), and the ratio between the model chi-square and degrees of freedom.

The NFI and CFI are baseline comparison fit indices designed to measure how well the proposed model fits the data compared to an independence model, which assumes that there are no relationships, with estimates greater than .95 as evidence of good model fit. The SRMR and RMSEA should be examined as a population discrepancy fit indices, with values up to .10 as evidence of acceptable fit, though it is preferred to see estimates less than .05. Though a model chi-square and associated  $p$ -value are typically used in latent models, this statistic is particularly sensitive to sample sizes less than or greater than 300; thus, a useful heuristic is the ratio of the chi-square to the model degrees of freedom, with values less than 3.0 as evidence of good model fit. Finally, in order to compare the two proposed models to each other, the Akaike Information Criterion (AIC) was used as the log likelihood measure, with smaller values indicating better fit.

As evidenced by results reported in Table 3, the proposed six factor model fit the data well:  $\chi^2(2469, N = 159) = 5990.20, p < .01$ ; RMSEA = .10 (.095, .111; 95% confidence band); NFI = .98; CFI = .99; RFI = .98; SRMR = .02;  $\chi^2/df = 2.43$ , AIC = 7058.87. Modification indices indicated that the model could be slightly improved by setting error covariances between several items; however, the specified suggestions were between items within a particular scale and while statistical adequacy would have been achieved, conceptual parsimony would have not. Furthermore, it is generally deemed inappropriate to add such covariance terms (Bentler, 1990) with exceptions made when time variant properties warrant the addition. Structure coefficients for each item-scale relationship under the 6-factor model indicated that items were described well by the latent factors with strong ranges observed for each scale: Intellectual (.97-.98), Academic (.93-.99), Creativity (.93-.98), Artistic (.96-.97), Leadership (.92-.98), and Motivation (.97-.98). Associated effect sizes, evidenced by the  $R^2$ , indicated that significant proportion of variation for each item was explained by its proposed construct (Table 4).

Compared to this six-factor solution, the test of a single factor (unidimensional model) indicated that while several of the independence and error indices were within acceptable guidelines (Table 3), the RMSEA was nearly three times as large than the 6-factor solution, the  $\chi^2/df$  was nearly five times as large, and the Model AIC was more than 4 times greater than the original model,

indicating that the 6-factor model fit significantly better than the single, g factor model. Though structure coefficients were still strong for a latent g factor, ranging from .78-.98, the disparities between the  $\chi^2/df$ , RMSEA, and especially the model comparison index (AIC) were great enough to preliminarily conclude that the initial model was a better selection for data fit.

### Criterion Validity

The criterion validity of the *GRS-S* Spanish Form was assessed by examining the bivariate correlations between the *GRS-S* scales and student's grades in core academic classes of Math, Science, Social Studies, Spanish, and English. A subsequent total grade point average (GPA) was also calculated as a function of these estimates. The *GRS-S* Spanish ratings completed by teachers were strongly correlated with student grades (Table 5), with the strongest correlations between the *GRS-S* Spanish scales and student's total GPA. Academic Ability and Motivation scores had the strongest, and nearly identical, relationships with the selected student outcomes. Conversely, Artistic Ability scores showed the lowest correlation with student's academic performance (ranging from .67-.79).

Given the strength of the relationships between individual scales and student outcomes, it was also of interest to determine whether the *GRS-S* Spanish scales as a whole predicted overall

students' academic performance, as indicated by total GPA. Results from a multiple regression indicated that 74% of the variability in GPA could be accounted for by the *GRS-S*, a practically observed effect. Within the context of the model; however, the only statistically significant predictor of academic performance was Motivation ( $\beta = .325, p < .05$ ), when controlling for the effects of the other variables. A summary of the findings are reported in Table 4.

### Construct Validity of Scores

The scales from the *GRS-S* Spanish Form were correlated with students' grade point average (GPA) to provide evidence that the constructs from the *GRS* were observed to be related to academic achievement (i.e., convergent validity). *GRS* scores, on the other hand, were not related to gender, length of time the teacher has known the student, or how well they knew the student (i.e., discriminant validity). Results indicated that academic ability and Motivation were most strongly correlated with GPA ( $r = .85, .84$ ). Conversely, weak relationships were observed between the *GRS-S* Spanish Form and gender, length of time, and how well teachers knew students. Observed estimates are reported in Table 7.

**Table 3:** Measurement model fit indices.

	Model AIC	$\chi^2/df$	RMSEA	SRMR	NFI	CFI	RFI
6-factor	7058.87	2.43	.10	.02	.98	.99	.98
1-factor	29257.12	11.66	.26	.04	.96	.97	.96

**Table 4:** Standardized structure coefficients for *GRS-S* Spanish form.

Item	Intellectual <sup>a</sup>	R <sup>2</sup>	Academic <sup>a</sup>	R <sup>2</sup>	Creativity <sup>a</sup>	R <sup>2</sup>	Artistic <sup>a</sup>	R <sup>2</sup>	Leadership <sup>a</sup>	R <sup>2</sup>	Motivation <sup>a</sup>	R <sup>2</sup>
1	.97	.94	.93	.86	.96	.93	.96	.91	.96	.92	.98	.96
2	.98	.95	.98	.96	.97	.95	.97	.96	.96	.92	.98	.97
3	.98	.96	.98	.95	.98	.96	.97	.96	.97	.93	.98	.92
4	.98	.95	.97	.94	.98	.97	.97	.95	.97	.94	.98	.96
5	.97	.95	.98	.96	.98	.95	.97	.94	.97	.94	.98	.97
6	.98	.96	.98	.96	.98	.96	.97	.93	.98	.96	.97	.98
7	.97	.95	.98	.96	.98	.94	.96	.92	.96	.93	.98	.96
8	.98	.96	.98	.96	.98	.96	.97	.95	.96	.93	.98	.96
9	.98	.96	.99	.97	.97	.96	.97	.94	.96	.92	.97	.94
10	.98	.96	.98	.96	.97	.93	.97	.93	.92	.85	.98	.96
11	.98	.96	.98	.96	.96	.92	.97	.95	.93	.87	.98	.96
12	.98	.96	.98	.96	.93	.87	.97	.94	.97	.94	.97	.94

<sup>a</sup>All scales significant at  $z > 2$  level



**Table 5:** Concurrent validity of *GRS-S* Spanish form and student academic performance.

	Grade Point Average	Math	Science	Social Studies	Spanish	English
Intellectual	.84	.79	.79	.76	.81	.73
Academic	.86	.82	.80	.79	.83	.74
Creativity	.84	.81	.78	.76	.80	.71
Artistic	.79	.75	.73	.76	.76	.67
Leadership	.82	.78	.77	.77	.77	.73
Motivation	.86	.82	.80	.79	.82	.75

Note: All correlations statistically significant:  $p < .01$

**Table 6:** Regression analysis of *GRS-S* Spanish form scales predicting GPA.

Variable	B	Std. Error	$\beta$	$t$	$p$ -value
Intellectual	-0.001	0.013	-0.01	-0.09	0.93
Academic	0.036	0.019	0.434	1.88	0.06
Creativity	0.006	0.015	0.074	0.41	0.68
Artistic	0.004	0.008	0.051	0.50	0.62
Leadership	0.000	0.012	0.002	0.01	0.99
Motivation	0.027	0.013	0.325	2.10	0.03*

**Table 7:** Correlations between Spanish *GRS-S* scores and student GPA, gender, length of time teacher has known the student, and how well the teacher knows the student.

	Grade Point Average**	Gender	Length of Time	How Well Know Student
Intellectual	.84	.14	.01	.17
Academic	.86	.15	.00	.17
Creativity	.84	.12	.03	.19
Artistic	.79	.18	.08	.17
Leadership	.82	.17	.02	.20
Motivation	.86	.16	.03	.20

\*\* All Correlations significant at  $p < .01$  level.

## Discussion

This study provided a preliminary examination of the psychometric properties of the *GRS-S* in its Spanish-language form in the context of a Puerto Rican population. The internal consistency of scale scores for the present sample indicate that the *GRS-S* Spanish Form scores possess a high degree of internal consistency. Strong alpha coefficients are considered excellent reliability indexes (Cicchetti, 1994), and are one way to assure that scale items assess the same underlying construct. Likewise, the standard error of measure for student score variability were relatively small indicating that student ratings would not typically vary from an average rating, given the internal consistency of the measure. The present estimates of reliability measured here (i.e., internal consistency

and standard error of measures) were comparable to the U.S. standardization sample of the *GRS-S*, which resulted in internal consistency ranging from .97 to .99, and standard error of measures values ranging 1.00 to 1.73 (Margulies & Floyd, 2004; Pfeiffer & Jarosewich, 2003, 2007; Ward, 2005). Moreover, these findings are consistent with those found in separate international studies with a Korean-translated (Lee & Pfeiffer, 2006) and Chinese-translated (Petscher & Li, 2007) versions of the *GRS-S*.

Relatively strong intercorrelations among scales were obtained, particularly between the Intellectual Ability scale and the Academic Ability scale. These particular findings are consistent with



results of the standardization sample and with previous findings of very strong correlations between measures of intellectual ability and measures of academic achievement in the general population (Wechsler, 2003). A strong correlation (.95) was also found between Motivation and Leadership. Previous research found motivation for achievement to positively correlate with leadership behaviors (McNeese-Smith, 1999). However, strong correlations among other scales remain unexplained; for example, the .96 correlation between Creativity and Academic Ability. It is unclear why creativity and academic ability would strongly correlate. Although part of what could be observed are halo effects in teacher ratings, future research will want to examine this unanticipated finding.

Overall, the pattern of intercorrelations raises a question whether or not there is sufficient support for the six-factor model for the *GRS-S* Spanish Form. The present findings lend support to a conceptualization of giftedness reflecting domains sharing one underlying, common factor, perhaps *g*; however, testing for a common factor did not yield as acceptable results as did the original solution. Though partly confounded by a relatively small sample (i.e., approximately half of what would be considered minimally acceptable), perhaps future analyses should involve multiple theoretically driven modeling. Recent research by Petscher & Li (2007) showed that in a Chinese sample of students, a six-factor solution fit better than a *g* model, but also better than 2-factor, 3-factor, and multiple second-order factor models. Though evidence was observed to support the retention of two models, these results could be culturally contextual, and should be studied in greater depth with a larger sample to warrant such testing. A definitive index does not exist to determine model adequacy when understanding factor analytic results, and is often a compromise

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## Conclusion

Overall, results provide preliminary support for the *GRS-S* Spanish Form as a reliable and potentially useful screening measure for use in the identification of island-residing Puerto Rican gifted students. Rating scales such as the *GRS-S* are cost-efficient screening measures, making them attractive and practical as policies and procedures develop within gifted education programs in Puerto Rico. The availability of a scientifically sound identification measure meets an important need in the field of gifted education in Puerto Rico. At the same time, system-level issues, such as financing the program, will need to be considered in implementing gifted programs across Puerto

between statistical adequacy and parsimony. However, the current selected indices appear to lend support for the validity of a six factor model. The current sample size is less than ideal, yet at the same time, the preliminary findings suggest that the *GRS-S* Spanish Form scores retain appropriate psychometric properties.

Concurrent validity findings provide additional insights regarding the use of the *GRS-S* Spanish Form with island-residing Puerto Rican students. Correlation coefficients between the *GRS-S* scales and student academic performance were strongly associated with student's total grade-point average. Results of multiple regression analysis identified the Motivation scale as a significant predictor of students' academic performance, as measured by total grade-point average. This is an important finding since it provides initial support for the value of the Motivation scale, as proposed in the test manual (Pfeiffer & Jarosewich, 2003). A recent validation study using a Korean version of the *GRS-S* (Lee & Pfeiffer, 2006), on the other hand, reported Intellectual Ability and Academic Ability as significant predictors of student performance, but not Motivation. A more detailed examination of the role of motivation is warranted in future cross-cultural research. Such studies will want to include a battery of standardized motivation and educational tests and measures to better understand the criterion and construct validity of the *GRS-S* Motivation scale.

Future studies employing a larger and more representative sample of Puerto Rican students that incorporates differences in socioeconomic status and parent education level would be beneficial in further establishing the instrument's validity. A likely next study would be to examine the diagnostic accuracy and incremental validity of the *GRS-S* Spanish form when used as part of a battery of identification measures.

Rico. Similar to other Latin American countries, the lack of specialized programs in Puerto Rico is due to financial barriers (Soriano, Blumen-Pardo & Castellanos-Simons 2000). Very recently, the only division created for gifted children in Puerto Rico's educational system closed after only three months due to a "lack of funds" (Pérez-Brebán 2005a).

Providing students with educational opportunities to develop their gifts and talents is a costly endeavor. The Puerto Rico Department of Education reported over 630,000 enrolled students in 2004, based on a concrete estimate of two percent of a population as gifted, i.e., approximately 12,600 of these students therefore

may be considered eligible for participation in specialized programs. The Council of State Directors of Programs for the Gifted periodically reports financial statistics regarding expenditures for gifted programs across the country. In 1999 they reported that Arkansas, for example, spent \$8,529,963 in one school year to support programs for the 5,277 students identified as gifted or talented. Although expenditures will vary depending on the type of programs and services offered, this statistic helps to conceptualize the magnitude of financial resources entailed in the

service delivery of programs for the gifted and talented. Additional island-wide and national attention to this matter, along with added resources, will be essential in the development of gifted education in the island.

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# Giftedness and Intuition

Maciej Karwowski

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## Abstract

Two studies were conducted to show connections between giftedness and intuition. The first study was exploratory. A sample of 194 gifted adolescent students (N=194) included fifty-five students identified as gifted by their teachers and fifty-six percent who were female. Using the Polish version of the Myers Briggs Type Indicator, the students were screened for their preferred cognitive style, i.e., either an intuitive or rational cognitive style. By comparing gifted intuitionists and gifted rationalists, interesting differences were observed. Rationalists were significantly more conformist and less oriented towards a creative, heuristic style of behaviour than intuitionists. The second study tested the theoretical model proposing intuition both as a style and an ability. The sample used in this study consisted of 561 students whose intelligence level, creative ability and intuition was assessed, respectively, using the Raven Progressive Matrices, the Urban & Jellen Test of Creative Thinking – Drawing Production (TCT-DP), and an experimental intuition test based on the work of Westcott (1968). Results with respect to human functioning showed independence between the ability level, i.e., intelligence and creative thinking, and cognitive style preferences, i.e., towards intuition or rationality. However, preference for rational style of cognition was correlated significantly with school grades indicating higher achievement levels in school for rationalists than intuitionists. The results are discussed in the light of school functioning of gifted intuitionists and rationalists.

**Keywords:** giftedness, intuition, school achievement.

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## Introduction

Intuition is most frequently analyzed by either treating it as cognitive style or ability. In dealing with intuition as a cognitive style we must turn directly to the heritage of the Jung's theory of mind and, specifically, his ideas regarding type (1923). According to Jung, people differ in the way they receive and respond to information from their surroundings. Some receive information through their senses step by step responding to it analytically and sequentially. Other individuals receive and respond to information by means of intuition, holistically, in jumps, synthetically. These distinctions proposed by Jung remain popular in psychology because they seem to blend well with the latest achievements in cognitive psychology, especially with regards the discussion on linear and parallel processing and automatisms.

Describing someone as intuitive suggests an individual may show a tendency towards a holistic processing of information or has premonitions about how to solve problems. However, it also begs the question as regards how effective such processes and premonitions may be. In other words, if we consider intuition to be the same kind of mental process as, say, intelligence, creativity, or thinking, yet, because of its being strongly automated, a process that also takes place largely without conscious control, questions are raised. How might intuition be used? Who are the people who use it most effectively and how are they different from people who may have such premonitions, but fail to use the information successfully?

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## Intuition as an ability-Intuitive Intelligence?

Intuitive intelligence could be described as the ability to effectively draw conclusions and effectively solve problems, even when lacking necessary information and/or time<sup>1</sup>. Intuition, therefore, appears not to be unidimensional. There appears to be intuitive

intelligence and intuition - understood as a cognitive functioning style (see also e.g., Langan-Fox, Shirley 2003). Eysenck's argument (1995) while commenting on the works of Westcott (1964, 1968) seems to concur with the suggestion that we are dealing with two types of intuition.

<sup>1</sup>It is different from analytic intelligence not in terms of effectiveness of mental processes' functioning, but in conditions it appears. Whereas analytically intelligent people prefer well-defined problems, those of intuitive intelligence prefer and solve efficiently even ill-defined ones.

Treating intuition as an ability in a similar way we treat academic intelligence or creative ability, for research purposes, we need operational indicators. These indicators help make it possible



to determine differences in the effective use of intuitive intelligence.

Being highly effective in terms of solving problems based on a paucity of information (information that may or may not be available if required) is an indicator of intuitive intelligence. On the other hand, people described by Westcott (1968) as “wild guessers”, are characterized by a none-too-effective intuitive style of solving tasks and problems, i.e., they demand a low number of hints – they just make a stab at the solution.

This understanding helps build a bridge between conceptions ascribing functioning style to intuition (Agor [ed.] 1998, Jung 1923, Nosal 1992) and those emphasizing the effectiveness of its application (Dobrolowicz 1995). It is helpful because within the compass of a wide group of people who tend to use intuition in some way, we can more easily identify those who use it effectively and those whose use of intuition is not so effective. The later group we propose defining as intuitionists, i.e., people with an intuitive style of acting and problem-solving that is not always effective or nor does it necessarily facilitate spectacular success. The former group of people will be called intuitives, i.e., intuitively intelligent individuals who are able to solve problems intuitively and achieve success. At risk of confusing the reader, it should be said in this context that while each intuitive is an intuitionist not every intuitionist is an intuitive<sup>2</sup>.

The proposed theoretical division can be justified empirically. However, there is a sparsity of research where intuition that is understood as a cognitive

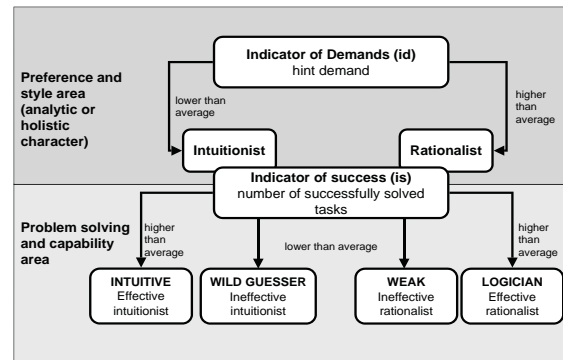


Figure 1: Intuition as a style and ability – synthetic expression.

style is combined with one understood as ability. We are therefore frequently dealing with a lack of data associated with the correlation between the various measurements of intuition. Langan-Fox and Shirley (2003) used two popular tests to measure intuitiveness when conducting research on a group of 53 students: the Myers-Briggs Type Indicator (MBTI - based on the Jungian understanding of intuition) and ACT – *Accumulated Clues Task* (Bowers et al, 1990) to examine cognitive aspects. Results showed the two measurements of intuition remaining orthogonal or independent of each other, which – according to the authors – may suggest these tests measure different dimensions of intuition or maybe even a different phenomena altogether. This underscores the worth of applying both the measurement of intuitive intelligence and intuition as a cognitive style when conducting empirical research in this context.

## The Role of Intuition in the Functioning of Gifted Students

When the characteristics of gifted individuals are analysed psychologically their similarity to experts is often apparent. Experts are people of endowed with a great stock of procedural, declarative, and, very frequently, automated knowledge. This is a very important point in the case of intuition when it is recognized as an ability. Kolanczyk’s (1987) definition is actually very similar.

<sup>2</sup>It is worth remembering that separation of the two types is to some extent an artificial procedure, driven by a desire to create a typological-profile characteristic. In reality, both the demand for a hint and achieving successes in solving tasks is a constant rather than dichotomous variable. We should perhaps be talking about a certain *continuum of characteristics* rather than discrete types in the same way as neither creative and non-creative nor intelligent and non-intelligent are polarized. We can, at best, be talking about more or less intuitively intelligent or more or less intuitive people.

At this point, it is worth mentioning the ideas of Baylor (2001). She understands intuition as an ability level, drawing a distinction between two types of intuition and separating them by level of experience and the accumulation of knowledge with respect to the problem. The author claims that when it comes to the problem solving, intuitive sensations are frequently experienced by two types of people; a) total novices who possess no knowledge with respect to the problem, and b) experts who possess a rich stock of procedural and declarative knowledge about the problem or have, at least, spent much time pondering the solution.

Baylor (2001) also makes the distinction between two qualitatively different types of intuition – immature intuition and mature intuition. Both can be presented in form of a U-shaped graph. If we describe the level of experience on the X axis, running from novice to expert, and availability of



intuition on the Y axis, the interdependence would then have a shape of a letter U.

Intuition is available at similar levels, regardless of the individual being a novice and an expert. However, it does not mean we are necessarily dealing with identical intuition. Based on two qualitatively distinct types of intuition described by Baylor (2001), in case of immature intuition, problem solving may be achieved through guessing and the serendipity of a random event. It is rather different with respect to mature intuition. Even though objectivity is involved, there is no increase in the probability that intuition will appear. The influence of mature intuition when devising a

successful solution is more to do with engaging the mind and struggling with the problem. It seems apparent that intuition is characteristic of scholars, discoverers and artists, who may undergo an intense metacognitive struggle while considering various possibilities for the best solution to a problem. According to Baylor (2001), metacognition may actually disturb immature intuition and result in a momentary lapse of control over cognitive mechanisms. Ultimately, however, its influence is not harmful. The issue arises whether intuition is connected with other mechanisms and traits of human functioning, especially personality and other kinds of abilities.

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## Study One: Intuition as a Style in the Functioning of Gifted Youths

### Method

#### *Purpose*

The aim of this first study was to attempt to: a) determine gifted youth's inclination towards intuitionism and rationalism, and b) define gifted rationalists and intuitionists in terms of their personality characteristics.

#### *Sample*

One hundred and ninety-four 16-17 year-olds were researched, of which 109 were female (56%) and 85 were male (44%). All respondents were students attending a small town high school located in central Poland. The sample consisted of students with different level of abilities – gifted as well as non-gifted ones.

#### *Instruments*

Teachers' nominations were used initially to differentiate gifted students from the overall student population. Lead teachers of the grades attended by the sample students were asked to identify gifted students in their grades. A definition of giftedness was not provided.

In addition to teacher nomination, information referring to individual student achievements in school was collected. Two creativity tests, i.e., TCI (Karwowski, 2008a, 2008b) and TCT-DP (Urban, 1996, 2004) were also used. In order to determine preferences in the context of intuitiveness-rationality, the Polish version of MBTI (Nosal, 1992) was used. Additionally, to determine the intensification of psychological needs, we Self-portrait questionnaire was used (Murray, 1953). The KANH Creative Behavior Questionnaire of Popek (2000) was also used to determine dimensions of creative and imitative attitudes.

### Results

According to teacher nominations, 55 students were considered gifted (28.4%). Significantly more females, i.e., 35% of the females included in the sample compared with 20% of the males, were identified ( $\chi^2$  [df=2]=7.6;  $p=.02$ ;  $C=.19$ ). Whether or not teachers identified individuals as gifted appeared to be very strongly dependent on school grades ( $\chi^2$  [df=4]37;  $p=.0001$ ;  $C=.4$ ). Out of all those achieving high grades, more than 38% were assumed to be gifted. In comparison, out of those not achieving high grades, only 7.7% were considered gifted. A student's nomination by a teacher as gifted also depended on the level of his or her creative capabilities ( $\chi^2$ [df=4]=11.52;  $p=.02$ ). Gifted students were clearly more frequently characterized by high levels of creative capability (34.5%) than average and non-gifted students (19% and 0% respectively). Interestingly, the correlation between good results at school and nominations as gifted was much stronger for females compared with males ( $r=.41$ ;  $p=.0001$  and  $r=0.27$ ,  $p=.01$  respectively).

MBTI-based data revealed 131 people or 67.5% of the sample were considered intuitionists, i.e., those who preferred intuition as a source of cognition. No differences were found to exist between males and females in this respect ( $\chi^2$  [df=1]=.55;  $p=.28$ ). In the context of intuitiveness and rationality, data also indicated no difference between those identified by teachers as gifted and non-gifted ( $\chi^2$  [df=2] =1.86;  $p=.39$ ). Relations between intuitiveness and creative capabilities on the other hand did prove statistically significant. Among those characterized by high creative capabilities, as many as 88.4% preferred intuitiveness over rationality, compared with only 46.5% of those whose creative capacity score was lower ( $\chi^2$  [df=2]=17.18;  $p=.0001$ ;  $C=.29$ ).

**Table 1:** Differences in psychological needs between gifted intuitionists and gifted rationalists (SD in parentheses).

Psychological Needs	Gifted intuitionists	Gifted Rationalists	<i>F</i> (1,54)	
need to create	M=5.2 (1.5)	M=3.29 (1.8)	15.84***	$\eta^2=.23$
need for order	M=5.3 (1.7)	M=4.2 (1.9)	4.05*	$\eta^2=.07$
need for exhibitionism	M=5.3 (1.5)	M=3.4 (1.5)	17.53***	$\eta^2=.25$

\*\*\* $p < .0001$ ; \*\* $p < .001$ ; \* $p < .05$ ; ^ $p < .1$

**Table 2:** Differences in creative/ imitative attitudes between gifted intuitionists and gifted rationalists (SD in parentheses).

Creative/Imitative attitudes	Gifted Intuitionists	Gifted Rationalists	<i>F</i> (1,54)	
conformity	M=9.9 (3.7)	M=12.9 (4.8)	6*	$\eta^2=.1$
heuristic behavior	M=19.7 (3.2)	M=16.6 (3)	10.2**	$\eta^2=.16$
algorithmic behavior	M=12.73 (3.4)	M=14.6 (4)	3^	

\*\*\* $p < .0001$ ; \*\* $p < .001$ ; \* $p < .05$ ; ^ $p < .1$

Further analysis was conducted on data relating to the sub-group of 55 identified as gifted. It comprised of 41 individuals considered gifted intuitionists and 14 considered gifted rationalists.

Data showed these two sub-groups were no different with respect to school results ( $\chi^2[df=2]=1.39; p=0.5$ ), but significantly different in terms of creative capabilities. It was clearly shown that gifted intuitionists were more frequently characterized by high creative capability compared with gifted rationalists (41.5% and 14.3% respectively;  $\chi^2[df=2]=15.97; p=.0001; C=.47$ ).

Among all the psychological needs, as evidenced through use of Stein's Self-Portrait, significant variations were found with respect to a need to create ( $F[1.54]=15.84; p=.0001; \eta^2=0.23$ ; intuitionists  $M=5.2, SD=1.47$ , rationalists  $M=3.29; SD=1.77$ ); a need for order ( $F[1.54]=4.05; p=.05; \eta^2=0.07$ , intuitionists  $M=5.29, SD=1.69$ , rationalists –  $M=4.21; SD=1.85$ ); and a need for exhibitionism ( $F[1.54]=17.53; p=.0001; \eta^2=0.25$ , intuitionists  $M=5.27, SD=1.48$ ; rationalists  $M=3.36, SD=1.45$ ).

Gifted intuitionists and rationalists also proved significantly different in terms of creative and imitative attitudes as determined by the KANH Creative Behavior Questionnaire. Gifted rationalists were significantly more conformist than gifted intuitionists ( $M=12.93, SD=4.8$  and  $M=9.9, SD=3.72$  respectively;  $F[1,54]=6.03; p=.02, \eta^2=.1$ ). Significantly, gifted intuitionists were more frequently characterized a tendency toward heuristic behavior ( $M=19.7, SD=3.2$  and  $M=16.6, SD=3$  respectively;  $F[1.54]=10.2; p=.002; \eta^2=.16$ ). In case of algorithmic or step-by-step problem-solving behaviors, the difference was close to statistical significance ( $F[1.54]=2.98; p=.09$ ) with gifted rationalists proving more algorithmic ( $M=14.64, SD=4.2$ ) than gifted intuitionists ( $M=12.73; SD=3.35$ ).

It should be noted that while achievement in school was a distinguishing feature of intuitionists compared with rationalists in the overall population, it wasn't significantly different in groups of those considered gifted.

## Discussion

The aim of the first, exploratory research was to provide as broad a description as possible of the personality characteristics of those who, though considered gifted by their teachers, are characterized by different cognitive styles, i.e., intuitive versus rational. Results prove that despite the relatively small size of the sub-group comprised of those identified as gifted, in a number of cases both the direction and statistical significance may be considered interesting. Specifically, gifted intuitionists seem to be characterized by creative capabilities as well as personality characteristics. Their non-conformism, need-to-create, heuristic behaviors may lead one to consider them potentially creative. Gifted rationalists seem to bring a rather "typical" good student to mind, i.e., solid, systematic, guided by schemes and proven solutions.

This leads to the conclusion that creativity, inclusive of both creative ability and personality feature, i.e., attitude, and cognitive style, connects with intuitiveness. When looking at results associated with the school, it needs to be borne in mind that, for the most part, good students were described as gifted. This imposes a possible limitation with the results quite artificial being unduly influenced by teacher nominations. Even so, differences found between intuitionists and rationalists in whole sample, were not found among gifted intuitionists and gifted rationalists, implying a higher level of importance being attributed to giftedness than cognitive style to school achievements.

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## Study Two: Intuition as a Style and Level, and its Relations with Intellectual Abilities

### Method

#### *Purpose*

The aim of the second research study was to attempt an analysis of intuition treated both as a style and cognitive ability, i.e., as intuitive intelligence including all its psychology traits and component abilities. Unlike the first study, it was decided to apply test-like measurement to intuition.

#### *Sample*

Research was conducted on a group of 561 high school students. The sample comprised of 317 males and 244 females. The respondents were aged 17-19 years old, the mean age being  $M=17.70$  and standard deviation of  $SD=.96$  (men  $M=17.89$ ;  $SD=1.1$ ; women  $M=17.45$ ;  $SD=.56$ )

#### *Instruments*

To examine relationships between intuition as a style and cognitive capability; abilities and creative capabilities; emotional and academic intelligence, in addition to academic progress in school, the researchers used six instruments.

- (1) To measure creative abilities: TCT-DP test (Matczak, Jaworowska, & Stanczak, 2000; Urban 1996)
- (2) To measure creative attitudes: KANH (Popek, 2000)
- (3) To test to measure academic intelligence: Raven Progressive Matrices, advanced version (Raven, Raven & Court, 2003)
- (4) To measure emotional intelligence: INTE (Schutte, Mallouf, & Hall, 1998)
- (5) To measure preferences within the frame of intuitiveness / rationality as well as level of intuitive intelligence: LIG (Dobrolowicz, 1995)
- (6) To measure school achievements: GPA, grade point average as of the semester directly preceding the research.

A new Polish computerized tool for measuring intuitive intelligence, called LIG: Logician –

Intuitive – Guesser, Dobrolowicz, 1995) is based on Westcott's (1968) approach. Participants in this study were presented with a series of tasks they must solve in the absence of necessary information. Each respondent is allowed to demand additional hints that could help solve the problems. The problems are similar in character to those presented in the Raven Progressive Matrices test.<sup>3</sup>

There are two indicators; a) the 'indicator of demands' or "id" that determines the number of hints demanded, in conjunction with, b) the 'indicator of success' or "is" that determines the number of successfully solved tasks. Using these two indicators it is possible to divide respondents into four groups:

- a) Intuitives, i.e., those who achieve high scores on 'indicators of success' but low scores on 'indicators of demands'
- b) Logicians, i.e., those who achieve high scores on 'indicators of success' and high scores on 'indications of demands'
- c) Guessers, i.e., those who demand few hints but solve few tasks - scoring low on both 'indicator of demands' and 'indicator of success'
- d) Weak ones, i.e., those who achieve low scores on 'indicators of success' despite high scores on 'indicators of demands'

Eysenck (1995) suggests the label intuitionist is not only applicable to those who achieved high scores on 'indicators of success' with low scores on 'indicators of demands,' but also those described by Westcott (1968) as "wild guessers". According to Eysenck (1995), they are "errant intuitionists" who may not solve many tasks correctly, but do act intuitively.

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<sup>3</sup> Raven's Progressive Matrices Test, in its advanced version, (Raven, Raven & Court, 2003), is composed of five series of twelve tasks (the total of 60 assignments) where one is asked to choose one of eight drawings that would well complement the series of eight other drawings which are interrelated one to another by means of a certain principle.

## Results

In the first study an attempt was made to describe two different types of intuitively intelligent people, i.e., intuitionists and rationalists. In this second study, intuition was analyzed both as a typological and continuous variable.

In order to examine just how significantly different intuitionists are from rationalists with respect to individual abilities and creative attitudes, the data underwent a ONE-WAY ANOVA, where the dichotomous variable of 'intuitionist-rationalist' was the factor. Statistically significant differences were found in the academic progress and the emotional intelligence components ( $F[1.297]=5.56$ ;  $p=.02$  &  $F[1.297]=4.49$ ;  $p=.04$ , respectively). All other differences between rationalists and intuitionists proved statistically insignificant (i.e.,  $F<1$ ). Apparently rationalists are significantly better students than intuitionists ( $\chi^2[N=298$ ;  $df=1]=7.1$ ;  $p=.006$ ). Of all good students 2/3 were rationalists. On the other hand, both rationalists and intuitionists had their equal share of weak students.

Rationalists proved to be characterized by higher levels of academic and emotional intelligence. Generally, they were better able to cope with

tasks presented during the LIG procedure. Surprisingly, differences appeared in the context of academic intelligence and while lack of such differences appear in the context of the elements of creative attitudes ( $F<1$ ) and creative capabilities ( $F<.6$ ). Data appear to prove rationalists are better students overall and more emotionally and academically intelligent than intuitionists.

There are no differences, however, between intuitionists and rationalists when it comes to creativity in either form, i.e., creativity either understood as an attitude and personality trait or as a level of creative ability measurable psychometrically.

The question of interdependency existing between intuitive intelligence and other abilities was important. Therefore, in addition to taking a closer look at the potential differences in the structure of the abilities of intuitionists and rationalists, separate calculations were completed for the correlations between individual abilities and an indicator of success in the LIG test. In this way, e.g. in case of intuitionists, a correlation was obtained between intuitive intelligence and the remaining abilities. Correlations between intuitive intelligence and other abilities are presented in table 3.

**Table 3:** Intuitive intelligence and other abilities (only significant results).

	Efficiency of problem solving	
	Intuitionists	Rationalists
Academic intelligence (Raven Progressive Matrices)	.22***	.15**
Conformity	-.14*	-.16**
Algorithmic behavior	-.22***	-.09
Nonconformity	.15*	.02
Imitative attitude	-.26***	-.19**
Creative attitude	.13*	.04

\* $p<.05$ ; \*\* $p<.001$ ; \*\*\* $p<.0001$

**Table 4:** Differences in the intensification of academic and emotional intelligence and creative abilities that exist between the LIG types (SD in parentheses).

		Intelligence (Raven Progressive Matrices)	Creativity (TCT-DP)	Emotional intelligence (INTE)
Wild guessers	M (SD)	38.61 (6.51)	25.75 (10.92)	119.63 (17.29)
Intuitive	M (SD)	41.10 (6.84)	26.36 (11.21)	122.69 (15.99)
The Weak	M (SD)	40.23 (5.56)	25.98 (10.38)	124.29 (15.28)
Logician	M (SD)	41.14 (5.59)	26.48 (10.11)	124.96 (16.42)
		$F(3.560)=5.6^{**}$	$F(3.560)=.15$	$F(3.560)=3.2^*$
Total	M (SD)	40.22	26.14	122.81

\* $p<.05$ ; \*\* $p<.001$



**Table 5:** School results of selected types.

Category	Weak or moderate	Good	Total
Wild guessers	84%	16%	100%
Intuitive	89%	11%	100%
The Weak	75%	25%	100%
Logician	72%	28%	100%
Total	80%	20%	100%
	$\chi^2(z, N=298)=7.69^*, C=.16^*$		
Intuitive / Logician	$\chi^2(3, N=144)=5.62^{**}, C=.19^{**}$		

\* $p < .05$ ; \*\* $p < .01$ ;

**Table 6:** Predictors of school successes in intuitives and logics (logistic regression results).

Significant predictors	Intuitives	Logics
Conformity	B=-.25**, Wald=9.37	ns
Analytic intelligence (Raven)	ns	B=.15**, Wald=9.61;
Creativity (TCT-DP)	ns	B=.05*; Wald=5.75;
Sex	B=.91^, Wald=2.43;	B=.83^; Wald=3;
Model summary	$\chi^2(8)=21,98^{**}, R^2=.26$	$\chi^2(8)=31,51^{***}, R^2=.28$

^ $p < .1$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Statistically significant interrelations exist between intuitive and academic intelligence, as well as statistically significant, but negative interrelations exist between the ability to use intuition and intellectual component of imitative attitude, i.e., algorithmic behaviors. Data suggest that as intuitive intelligence increases so step-by-step or algorithmic behavior decreases. At the same an increase in the tendency towards use of heuristic behaviors, characteristic for intuition and creativity, is noted. One should point out that the interrelations are weak and moderate, perhaps denoting relatively weak connections and relative independence of intuitive intuition from other abilities.

Analyses of data connected with academic achievement or progress obtained via the LIG test were interesting. Table 5 presents the comparison between the frequency of good and weak students among intuitives, wild guessers and logicians. Statistically significant differences do occur, i.e., the largest numbers of good students are found among logicians compared with just a little fewer among the weak or ineffective rationalists. The least number of good students appear among intuitionists – especially effective intuitives, i.e., less than one in eight intuitives is a good student – a result demanding special attention.

Intuitives, in particular, effective intuitionists, appear to be no different from logicians either in respect to their academic or emotional intelligence or creative abilities and creative attitudes. Data

suggest possession of high levels of academic or emotional intelligence or creative abilities and creative attitudes is no guarantee of academic progress. This seems especially true for those guided by intuition, even if they effectively use intuition to solve problems.

Needless to say, in terms of a limitation to this study, a person's ability to arrive at an effective solution to a task presented in a test may not signify a similar effectiveness in student activity. Nevertheless, there is plenty of evidence to suggest intelligence test scores predict school success (Terman, Oden, 1959). Data gathered in this study suggest success is only the prerogative of logicians and, or weak rationalists. This success may be predicted via use of the test for academic intelligence with quite a high degree of probability.

Dependence does not apply in case of intuitionists. Intuitives, despite being no less academically or emotionally intelligent than logicians and despite not being characterized by a lower level of creativity, prove to be a good student less often.

To find and explain possible predictors of school success in groups of intuitives and logics, two separate logistic regressions were provided. School success (0-no, 1-yes) was used as a dependent variable. Analytic intelligence, creative abilities, emotional intelligence, sex, age, conformity and algorithmic behavior were applied as predictors separately for intuitives and logics. Results are presented in table 6.



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## General Discussion

This article seeks to present an analysis of intuition based on the understanding of its being a cognitive style and cognitive capability as well as its having relation with other psychological characteristics. A division has been proposed supportive of a twofold and broader understanding of intuition as a cognitive style which, in turn, can be represented by intuitionists and rationalists. Furthermore, a narrower understanding is also presented, making it possible to distinguish intuitives or effective intuitionists from wild guessers or ineffective intuitives from among intuitionists and logicians or effective rationalists from weak or ineffective rationalists among rationalists.

Given the proposed typology is rooted theoretically in the works of Jung (1923) and Westcott (1968), it seemed appropriate to coin the term intuitive intelligence to describe the ability to use intuition by intuitionists. Using the experimental tool, i.e., LIG - currently undergoing validation works, in addition to a number of known survey and psychometric tools for estimating academic and emotional intelligence along with creative abilities and attitudes, an effort was made to establish the most comprehensive set of characteristics possible which may be associated with either intuitionists and, or rationalists.

How might the higher level of academic intelligence of rationalists be explained? Referring to the famous, slightly humorous and multiply-criticized definition of intelligence by Boring, (1923) – *intelligence is what test tests*, it may be said that intelligence defined as an ability to solve abstract problems and notice connections closely resembles that possessed of rationalists. To be sure, tests of intelligence are more likely to be successfully completed by analytical people who process information sequentially and operate systematically.

Differences observed with regards to emotional intelligence seem understandable on the level of systematic analysis. Many may regard results indicating a higher emotional intelligence for rationalists as surprising. Frequently in informal discussions, even in scholarly works (e.g. Myers, 2002), intuition is connected with emotions and associated with an energetic and dynamic mind. On the other hand, the tendency toward intellectual and emotional coolness and manner is ascribed to the more rational. The dissonance is plausible if we realize that emotional intelligence signifies, among other traits, an ability to recognize and control one's own emotions. It is also implies the ability to think as the emotional processes take place. With this in mind, the

unity of emotional intelligence with rationality may be less surprising than it might first appear. A fundamental discrepancy does not seem to operate here. For intuitionists, i.e., those who tend to act quickly and receive information holistically, it is likely that management of emotions may be somewhat difficult. Therefore, the 'emotional spurts and getting lost' (Necka, 2001) experienced by intuitionists is not negated.

What is especially interesting is that when considering analyses in terms of the level of ability in using intuition, few differences are noted between agile intuitionists who are intuitives and rationalists who are logicians. It appears to support the notion that wild guessers who are ineffective intuitionists, significantly reduce statistic levels of ability and thus are responsible for differences in academic intelligence observed between intuitives and logics. There is a lack of statistically significant differences in the context of academic and emotional intelligence or any other ability.

The only area where significant differences were noted was respect to academic achievement. Here intuitives are significantly weaker than logicians, a result somewhat difficult to explain when the lack of statistically significant differences in the strength of abilities is considered. As in the case of general differences in school results between intuitionists and rationalists, one might hypothesize that the school uses analytical, step-by-step problem-solving techniques, something much more acceptable to rationalists as a cognitive strategy. Alternatively, teachers may prefer students who either act systematically or are able to justify their answers logically. Many teachers seem to think that these are the abilities by which a good student is characterized. It is possible that the actual explanation of these differences lies in the middle, indicating the obtained results demand further research and studies.

Correlation analyses revealed that intuitive intelligence is both connected with academic intelligence and the heuristic behaviors characteristic for creative people. On the other hand, no relationship was observed between intuitive intelligence and creative ability. Similarly, no such relations were observed when comparing intuitionists and rationalists in terms of potential differences in creative abilities.

Literature in this field, (e.g. Policastro, 1995) seems to favor the existence of strong relations between creativity and intuition. Most authors

write about intuition in creativity after observing the outstanding creativity characteristic of professional creators, e.g., artists, musicians or scientists. In these studies, a different group of individuals has been studied, i.e., young people. It is only some sort of creative potential of the so-called “psychometric creativity” that can be described. From this standpoint, intuition – both understood as a style and as intuitive intelligence, is not connected with creativity understood in this way.

The aim of this article was to attempt to broadly characterize two, somewhat opposing cognitive styles as favoured by intuitionists and rationalists. Attempts were also made to analyze and describe the conditions for intuitive intelligence.

On the basis of the analyses presented here, one may consider intuitionists and rationalists as types differentiated mainly by the level of academic and emotional intelligence. Even so, these differences tend to disappear after scrutinizing the effective representatives of the two types, i.e., intuitives and logicians. This could indicate that irrespective of cognitive style, if abilities associated with a given style are well developed, it is unwise to assume that intuitionists are more gifted than rationalists, or vice versa. On the other hand, even though

the described types are not much different in terms of abilities, academic progress does differ. Intuitionists, i.e., the intuitives and wild guessers, are clearly the overall weaker students compared with rationalists, i.e. the logicians and the weak. This was found quite alarming, revealing of the need for deeper explanatory studies in this area. This fact might also be a source of interest for educators. It might indicate schools preferring rationality over intuitiveness – a preference not necessarily appropriate given the differences between their students.

Finally, the regression analyses presented here show that different characteristics influence a student’s ability to be effective in school, especially if he or she is an intuitive and logician. What is especially interesting is that analytic intelligence appears to have no influence on school results as far intuitives are concerned. This implies high intelligence, in their case, does not necessarily translate into success in school. For logicians or effective rationalists, on the other hand, school successes are significantly influenced by the level of analytic intelligence and creativity. With such results in mind, it seems appropriate that these issues, particular in terms of the two types and how they function in school, need to be studied in the future.

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# Gender, Social Behaviour and Domain of Ability – Influences on Teachers’ Diagnoses of Giftedness

Martina Endepohls-Ulpe

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## Abstract

This study examines the question why teachers seem to have more difficulties identifying giftedness in girls than boys. A total of 241 German teachers completed a questionnaire requiring them to identify and make recommendations for children portrayed with a few sentences; differing in gender, social behaviour, i.e., maladapted, socially integrated or shy; and domain of giftedness, i.e., general cognitive abilities, mathematics, literacy skills. Although results failed to show evidence of influences of gender stereotypes on teachers’ diagnoses, they did reveal significant effects with respect to social behaviour and domain of giftedness.

**Keywords:** Identification of gifted children, social behaviour, gender stereotypes, domain of high ability

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## Introduction

Among the variety of criteria applied when identifying gifted children, teacher nomination is very important. Unfortunately there is some evidence suggesting the validity of teachers’ determination concerning giftedness has to be questioned (Rost & Hanses, 1997).

One aspect often found to impact a teacher’s ability to identify gifted children is good performance at school. For many teachers this is perceived to be the central feature of giftedness. They tend to overlook children with high intellectual potential who may be performing at an average or below average level (Rost & Hanses, 1997). The issue has been broached frequently in literature while much effort has been made to improve the situation of underachieving students (Peters, Grager-Loidl, & Supplee, 2000) by sensitizing teachers to this problem.

A second problematic aspect exists with respect to the teacher’s ability when identifying gifted children. They tend to experience greater difficulty identifying gifted girls than gifted boys (Dresel & Finsterwald, 2003; Endepohls-Ulpe, 2004; Heller, 1990; Perleth & Sierwald, 1992; Sadker & Sadker, 1994).

To be sure, teachers are not the only group involved in an identification process that seems to overlook gifted girls. The fact that the ratio of gifted boys to

gifted girls taken to counselling-centres by their parents for identification of giftedness is 3:1 to 5:1 in favour of the boys (Prado und Wiczerkowski, 1990) is not a consequence of teachers’ lack of diagnostic abilities alone. Parents also appear to underestimate the cognitive capacities of their daughters, paying more attention to the indicators of giftedness in their sons.

There are several possible reasons for this general preponderance of identified gifted males and one of those reasons may actually lie in the field of scientific research itself. More than twenty years ago Benbow and Stanley (1980) initiated a major debate regarding the causes of the gender ratio among the mathematical precocious youth. They found many more boys than girls to be exceptionally gifted in the field of mathematics. They supposed the reasons were biological, however, since that time other data have contradicted the notion (Freeman, 2004). Even so, remnants of this debate may still reside in the minds of experts, teachers and parents connecting giftedness with males.

Gender stereotypes in general might also be considered as a possible reason for gifted boys being more readily identified. Considerable empirical evidence exists to suggest high



performance in males is attributed to aptitude rather more than in females. This attribution pattern is found for boys and girls with respect to their own performance as well as for teachers and, or parents concerning the performance of children (Rustemeyer & Jubel, 1996). Furthermore, in a cross cultural study, Stoeger, Ziegler and David (2004) demonstrated that for many people the prototypical successful academic person ("specialist") is male. These results could lead one to assume that in the eyes of a majority the prototypical intellectually gifted person would also be male. In addition to this general association between ability and male gender, attribution of ability in the context of certain subjects and fields of study, mainly science and mathematics, is gender specific and can be observed among teachers (Rustemeyer, 1999; Tiedemann, 1995; Ziegler, Kuhn & Heller, 1998). At the same time it has been proved repeatedly that these gender specific expectations influence the achievement behaviour of girls in a negative way, especially in mathematics and natural sciences (see: Rustemeyer, Wilde & Fischer, 2006).

Another reason why there is greater risk of gifted girls being overlooked by teachers compared with boys may lie in authentic differences between boys and girls with respect to social adaptation and social behaviour. Generally boys tend to behave socially in less adaptive ways, e.g., disrupting lessons when confronted with boredom and lack of challenge. Girls attract less attention because their social behaviour is more adaptive. Freeman (2004) quotes a report from the British school inspectorate that found girls generally more tolerant to mediocre teaching. Their interest is more constant and, compared to boys, they are less likely to disrupt class if they do not respect the teacher (Ofsted, 2000, cited in Freeman, 2004). Hence boys, especially gifted boys who are feeling bored and unchallenged in classes, are more likely to catch the teacher's eye.

It is possible that social behaviour or non-cognitive personality traits in children generally influence a teacher's identification of giftedness - irrespective of gender. Gifted pupils presenting maladapted and disturbing social behaviours are perhaps identified as gifted sooner than those who behave in ways that are socially inconspicuous. Endepohls-Ulpe (2005; 2006) demonstrated that the way certain non-cognitive personality traits are valued may indeed influence whether or not a child is identified as gifted. In one of her studies primary school teachers more often identified certain types of children with a specific

constellation of non-cognitive personality traits as gifted. There was also a different ratio of identified boys and girls for each type (Endepohls-Ulpe, 2006). The type most frequently identified among boys could be characterised as the "high performing troublemaker." Among girls it was the very positive type who was identified. She would be high performing, bright, and outstanding due to positive social behaviour.

In a recent survey study (Endepohls-Ulpe, 2007) a sample of primary school teachers were asked to describe a randomly selected student from their class. The questionnaire included items to be rated by the teachers relating to the student's social adjustment, shyness and social integration. Teachers also assessed the level of intellectual giftedness of their chosen student.

The results of this study indicated that the group of children assessed as extraordinarily gifted by their teachers were described much more negatively in terms of their social behaviour than pupils assessed as above average or moderately gifted. The highly gifted were described in a similar way to pupils assessed as below average or averagely gifted. Their teachers also perceived them as resembling children at the lower end of the aptitude scale in terms of their social integration in class. Even so, they were described as not very shy and similar to the group of children assessed as above average gifted in this respect.

The results of this study confirm the hypothesis that socially maladapted behaviour and behaviour that attracts the attention of teachers enhances a child's chances of being identified as gifted. Teachers are more likely to identify gifted children presenting disturbing behaviour as being gifted. Studies examining random samples of gifted children, i.e., those not pre-selected by teacher judgment, revealed no difference to children with average cognitive ability with respect to psychological problems, behavioural disorders or non-cognitive personality traits (Freund-Braier, 2000; Rost, 1993).

In summary, there are two major possibilities for why a greater number of boys than girls are identified as gifted by their teachers. They are:

1. Gender stereotyping attributes more features fitting the image of a gifted person, e.g., high ability or expertise, to males than females. Consequently the prototype of a gifted student in the mind of a teacher is likely to be a boy. Boys might be, therefore, more probably labelled as gifted.



2. Gifted children who draw attention to themselves by virtue of outstanding social behaviour, and particularly externalising behaviour demanding action by the teacher, are more likely to be identified by that teacher. Boys generally receive more attention from their teachers as a consequence of their less adjusted social behaviour. When it comes to boredom, boys probably react more with disturbing behaviour and hence the probability for their being identified is enhanced.

## The Purpose of the Study

The aim of this study was to test the following hypotheses:

1. On condition that achievement and social behaviour of children are equal there will be a greater probability for teachers to suspect giftedness in boys.
2. On condition that achievement of children is equal there will be a greater probability for teachers to suspect giftedness in children with disturbing behaviour.

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## Method

### Participants and instrument

A total of 241 teachers filled out a questionnaire on which they could give recommendations for children portrayed with a few sentences and differing in gender, social behaviour, i.e., maladapted and disturbing, socially integrated with leadership skills, shy, and - since the field of mathematics is connected with the male stereotype - also domain of giftedness i.e., general cognitive abilities, mathematics, literacy skills.

Here the characterisation of a shy boy with extraordinary literacy skills:

*Kilian is nine years old and in the fourth grade. He is very reserved and shy, but his classmates like him anyhow. He has problems to participate actively in classes but if he is called on by the teacher his answers demonstrate a very high level of linguistic skills and reveal a great amount*

*of general knowledge. Especially in the matter of creative writing he shows great imagination. He does his homework diligently. Solely in the matter of mathematics he tends to have slight difficulties, especially with comprehension of a new subject area.*

Every questionnaire included nine of these vignettes each story containing a different combination of social behaviour type and domain of giftedness. The children characterized in the texts alternately had male or female names. There were two parallel versions of the questionnaire, each version was identical but for the fact that the children differed in gender. For example, the parallel version of the example above began: "Marie is nine years old ...." A total of 117 teachers filled out the questionnaire starting with the portrait of a boy, a total of 124 teachers filled out the parallel form.

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## Procedure

Teachers were asked to express the strength of their agreement or rejection with respect to the following statements or recommendations for each characterised child on a five step Likert-type scale (1 = "do not agree at all" to 5 = "totally agree"):

1. *The child should be fostered by non-school-related activities.*
2. *The child seems behavioural disordered to you.*
3. *The child should be fostered systematically at school.*
4. *You would like to have this child in your class.*
5. *The child should be tested for giftedness.*
6. *The child should be tested for Attention Deficit (Hyperactivity) Disorder.*
7. *The child should be tested for Dyslexia.*
8. *Concerning this child there is need for action.*
9. *The child is unchallenged.*
10. *The child is over-challenged.*
11. *You like this child.*

---

## Analysis

To test the first hypotheses concerning the influence of gender stereotypes, Student's t-tests on each item of the two parallel questionnaire forms were conducted using a Bonferroni adjustment.

A one-way analysis of variance for repeated measurement was computed for each item. Type of child was used as the repeated measurement to analyse the influences of social behaviour and domain of giftedness.

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## Results

From the total of randomly-chosen German teachers (N=241) who answered the questionnaire, 182 were female and 59 were male. The mean age of respondents was 40 years. The ratio of male and female teachers was probably due to the fact that most of the teachers (n=179) worked in primary schools. A total of 61 teachers worked in different types of secondary schools, one teacher worked in a special school. The teachers mainly worked in Rhineland-Palatinate schools.

The t-test results showed no significant difference between the two sub-samples who filled out the parallel forms. This signified that there were no differences in teachers' identification or recommendations regardless of the characterized child's gender.

All ANOVAs for repeated measurement showed significant differences ( $p < .001$ ) with regard to teachers' recommendations or identification for nine types of children. The following legend is used to denote three different domains of giftedness systematically combined with three

differing types of social behaviour:

- GL = generally gifted, socially integrated with leadership abilities
- GS = generally gifted, shy
- GBD = generally gifted, shows externalising behavioural disorders
- LL = literacy skills, socially integrated with leadership abilities
- LS = literacy skills, shy
- LBD = literacy skills, shows externalising behavioural disorders
- ML = mathematically gifted, socially integrated with leadership abilities
- MS = mathematically gifted, shy
- MBD = mathematically gifted, shows externalising behavioural disorders

In the following figures only the results of items described in conjunction with the identification of giftedness are reported.

1 = "do not agree at all" to 5 = "totally agree"

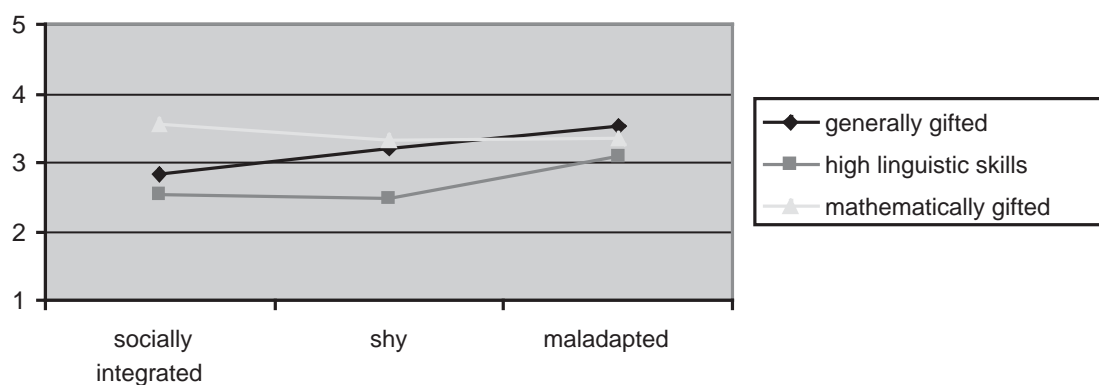


Figure 1: Mean scores on Item 1: "The child should be fostered by non-school-related activities."

From the teachers' point of view all children portrayed as mathematically gifted and, or presenting externalising and disturbing behaviour should be fostered by non-school related activities (see figure 1). This also applied to the child characterised as generally gifted and shy. It was considered unnecessary to foster generally gifted

children portrayed as socially well integrated or children with linguistic skills characterised as either shy or socially integrated. (Post hoc paired tests showed significant differences between GBD, LBD, MBD, ML, MS and GL, LL, LS ( $p < .001$ ), adjustment: Bonferroni.)

1 = "do not agree at all" to 5 = "totally agree"

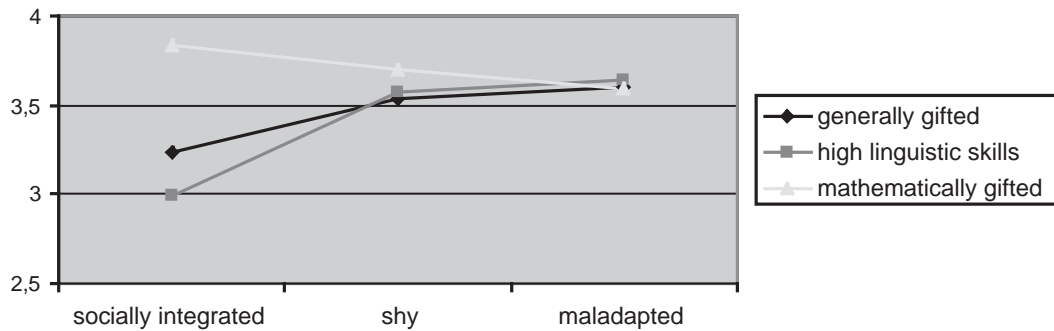


Figure 2: Mean scores on Item 3: "The child should be fostered systematically at school."

Teachers recommended fostering at school for all types of children with the exception of those characterised as gifted in the field of literacy and socially well integrated ( $p < .001$ ) (see figure 2). The degree of agreement with this recommendation

for the child portrayed as generally gifted and socially integrated was also significantly lower than for both the two other types of generally gifted children and those with mathematical abilities ( $p < .001$ ).

1 = "do not agree at all" to 5 = "totally agree"

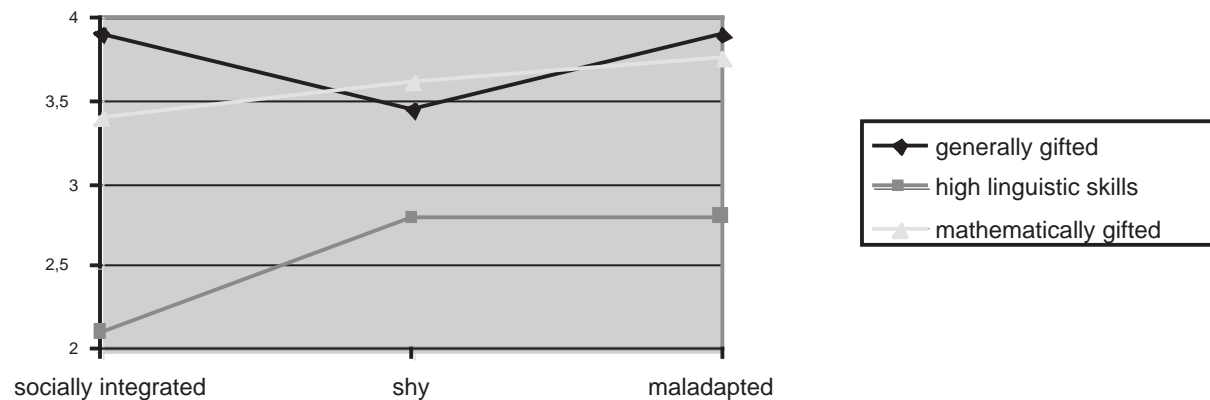


Figure 3: Mean scores on Item 5: "The child should be tested for giftedness."

Teachers clearly recommended testing for giftedness for all types of children portrayed as mathematically gifted and, or characterised as generally gifted, but not for children with high literacy skills ( $p < .001$ ) (see figure 3). Children

characterised as generally gifted with leadership abilities or behaviour disorders and those characterised as mathematically gifted with externalising behaviour disorders received the strongest recommendation for being tested.

1 = "do not agree at all" to 5 = "totally agree"

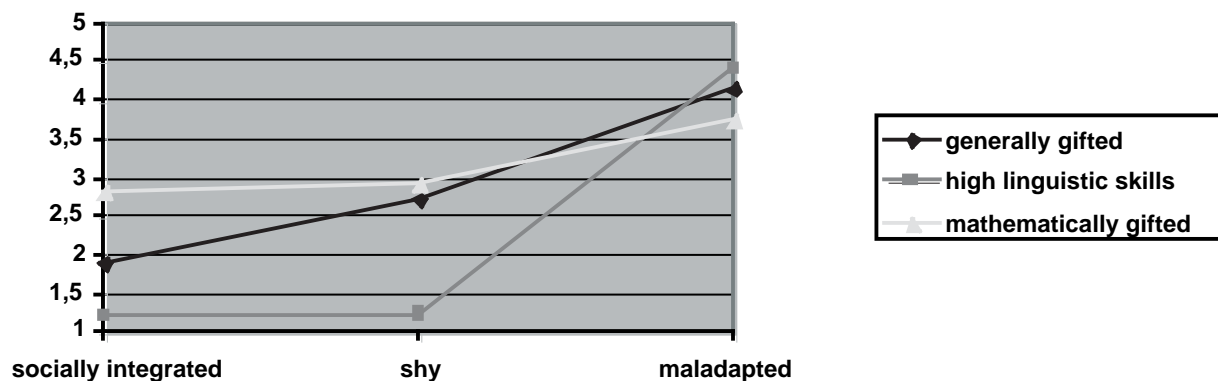


Figure 4: Mean scores on Item 8: "Concerning this child there is need for action".

Teachers considered the need for action as urgent only in the case of children showing externalising behaviour disorders, regardless of their domain of giftedness (see figure 4) (paired tests between values of GBD, LBD, MBD and all other types were significant ( $p < .001$ )). Interestingly, they considered the need for action least important

for children with literacy skills who behaved in a socially inconspicuous way, i.e., socially well integrated or shy, and the generally gifted child portrayed as socially well integrated (paired tests between GS, ML, MS and GL, LL, LS were also significant ( $p < .001$ )).

1 = "do not agree at all" to 5 = "totally agree"

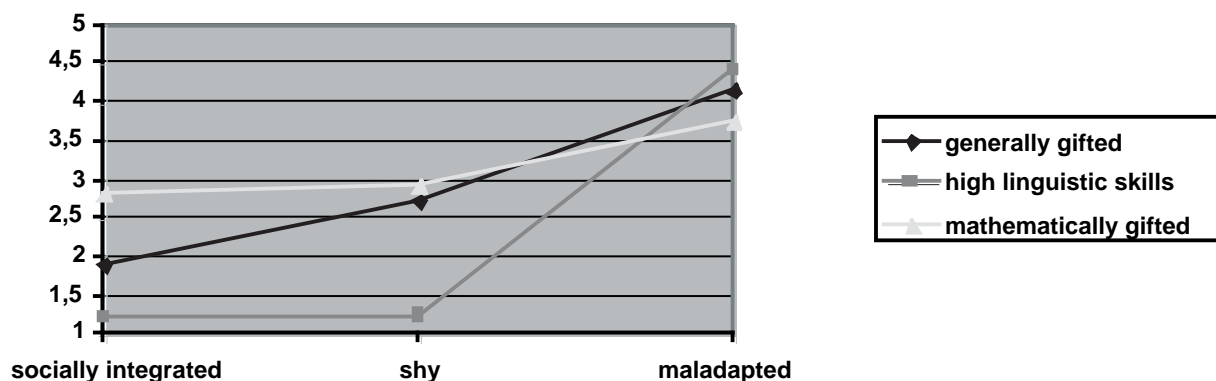
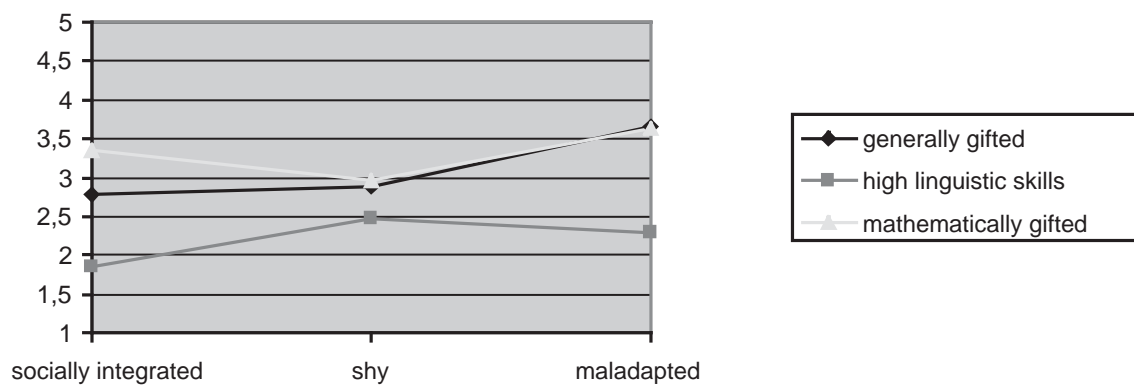


Figure 5: Mean scores on Item 9: "The child is unchallenged."

Children characterized as generally gifted but presenting behavioural disorders, mathematically gifted children with behavioural disorders or portrayed as socially well integrated were mostly judged as "unchallenged" (see figure 5). Values on

this item were significantly higher for these three types than for all other types ( $p < .001$ ). Values on this item were lowest for the child portrayed as socially well integrated and showing literacy skills ( $p < .001$ ).

1 = "do not agree at all" to 5 = "totally agree"



**Figure 6:** Mean scores on Item 4 and item 11: "You would like to have this child in your class"; "You like this child."

Results for Items 4 and 11 were nearly identical (see figure 6). Teachers neither liked children with behavioural problems - even though they might show exceptional achievement, nor did they want them in their classes (all paired tests between types portrayed as showing behavioural disorders and other types were significant ( $p < .001$ )).

The results of the remaining items are somewhat redundant. They simply indicate teachers judged the portrayed children in ways reflecting the

impression intended by the author. Teachers failed to identify any type of child as over-challenged (they were all portrayed as showing extraordinary ability in at least one area) and they assessed children portrayed as showing behavioural disorders or disturbing social behaviour in the way intended. Teachers saw no need for testing for Dyslexia, but did consider testing for ADHD necessary for behaviourally disordered children with general high ability or literacy skills but not for children with mathematical skills.

## Discussion

First of all, the results provide no support for the first hypothesis. In other words, teachers show no bias on the basis of gender in their identification or recommendations with respect to the portrayed children. Apparently stereotypical views, e.g., giftedness may be biologically connected with the male gender, do not influence teachers' identification process.

There is some support, however, for the second hypotheses. Children portrayed as showing disordered or disturbed behaviour, regardless of the domain of giftedness, were consistently considered in need of nurturing activities. Teachers saw more need for action for these children overall, but specifically they recommended fostering by non-school-related activities and fostering at school. They strongly recommended testing almost all these children for giftedness – the only exception being those with high linguistic skills. Teachers assumed children with high levels of ability but who were disturbing to others were unchallenged – at least to a greater degree than their socially inconspicuous peers. So despite

teachers not liking children who present disturbing or antisocial behaviour and preferring not to have them in their classes, they nevertheless felt called to action by these children. Interestingly the probability of these particular children being identified as gifted is enhanced, as is the likelihood of their being provided with a challenging and adequate learning environment. Being socially well integrated is almost more of an impediment than shyness for gifted children with respect to getting support from their teachers. Teachers see little need for promotion for these children compared to children with disturbing behaviour.

The domain of giftedness also has significant effects on teachers' identification processes and recommendations. Children portrayed as mathematically gifted receive even stronger recommendations for promotion at school and in non-school activities than children portrayed as generally gifted. Teachers recommend testing for these children to a similar extent as for children with generally high abilities. Unlike children with general high ability, teachers even judge



the mathematically gifted as unchallenged. The notable exception here being children with general high ability showing behavioural problems.

In contrast, from the teachers' perspective, children with literacy skills need no promotion in or out of school. They consider it unnecessary to test these children for giftedness and see absolutely no need for action, again with the notable exception of children with behavioural problems. According to these results, having literacy skills and being socially well integrated appears to be the very worst combination of features a child can have with regard to experiencing an individualised and challenging learning environment. Similarly, being generally gifted and socially well integrated does not necessarily guarantee access to an individualised programme. Teachers most strongly recommend testing for generally gifted children, but they see little need for non-school-related activities, absolutely no need for action and - astonishingly - they do not judge these children to be unchallenged.

All this information begs the question: What might be the reasons for the different judgements for children with different domains of high abilities? Is it that teachers predominantly value mathematical abilities higher than literacy skills? Or is it perhaps their image of a gifted child is more closely connected to mathematical abilities than to literacy skills? Perhaps the reason may lie in the fact that the sample of teachers, for the most part, consisted of female German primary school teachers. These women are required to teach mathematics despite feeling very inadequate for the task. Maybe primary school teachers find mathematical abilities more impressive or admirable than literacy skills.

Of course there are limitations to the study in general: The stimulus material for the teachers

was highly artificial. Only a very small amount of information about each child was available in this study. In normal circumstances, teachers may have known and worked with children for months, even years, in real life classroom situations and therefore are more able to base judgments on a highly differentiated pool of data. Nevertheless, results from this study suggest gender, social behaviour and domain of giftedness effect judgment. The results lead to an educated guess that these variables influence teacher nomination in the field of giftedness in different ways.

Finally, the results of this study are not supportive of the hypothesis that teachers' identification processes with respect to giftedness are influenced by gender stereotypes or notions about biological differences between the sexes. Children behaving in a conspicuous and disturbing way, most probably boys, catch the teacher's eye. It therefore appears that real differences between girls and boys in terms of their social behaviour and not their ability, lead to the higher rate of boys being nominated as gifted. The fact teachers see more need to support children with mathematical skills than those with literacy skills may also lead to a higher rate of identification and higher incidents of promotion for boys. During primary school years interest in mathematical matters develops differently in boys and girls. In spite of equal ability, girls' interest decreases in mathematics along with their feelings of competence and achievement in the subject. Hence it is more likely to find a boy rather than a girl, full of enthusiasm and interest for mathematics working eagerly in this domain. It appears gender stereotypes are entering this field through the back door because of their impact on the behaviour of girls and boys. Something which, in turn, influences the way teachers identify giftedness.

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# Developmental Potential Among Creative Scientists

Rita R. Culross

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## Abstract

This article uses Dabrowski's theory to frame research about creativity among contemporary research scientists. Creative scientists are described in terms of Dabrowski's concepts of "overexcitabilities" and "developmental potential."

**Keywords:** Developmental potential, overexcitabilities, creativity, scientists.

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## Introduction

The world of creative scientists is dramatically different in the 21st century than it was during previous centuries (Culross, 2004). Whether biologists, chemists, physicists, engineers, mathematicians, or computer scientists, the livelihood of research scientists is dependent on their abilities of creative expression. The view of a solitary researcher who functions independently and is somewhat asocial is outdated when one considers scientists today are likely to work for large corporations, universities, or research organizations within teams or research groups (MacGrath, 2002). The reality that scientific research requires large amounts of funding also affects the research agendas of scientists today. The support of external funding agencies or corporate research and development groups has created a situation in which individual research goals are subordinated to the will of corporate managers or peer-review panels (Sinderman, 2001). Scientific research today is often a group effort, combining the work of multiple members of research teams, some at different sites or with different institutions (Biagoli & Galison, 2002).

We know creative scientists tend to be highly motivated and emotionally stable, and many continue to produce throughout a long and focused career. Many studies have focused on the personalities of such individuals (Piiro, 2004), using both psychological tests and biography as research tools. However, much of this research has examined the lives of scientists working in the "solitary scientist" era. Few of these individuals fit the pattern of more modern team leaders whose social skills and savvy funding skills determine the ultimate success of their research and, moreover, the psychological development of these individuals over time has rarely been studied.

Certain questions are raised. Two specifically are:

- Given the current state of scientific research, what might be the internal experience of the creative scientist?

- What are the implications of Dabrowski's theory for this selected group of individuals?

## Dabrowski's Theory of Positive Disintegration

Dabrowski (1970) characterized the gifted and creative as undergoing a process of "positive disintegration" in which inner conflict leads to the breakdown of psychological structures and a reintegration marked by a heightened sense of developmental potential especially in terms of their creativity. In Dabrowski's theory individual development progresses from the most basic level, or Primary Integration, where egotism prevails, through a level where actions reflect concern with others' values, to higher levels where inner conflict develops, until the individual can attain a sense of self-mastery through authentic transformation of self, or Secondary Integration. The result of this dynamic process is not only higher levels of intellectual functioning, but also a strengthening of one's value system, a deepening of the personality, and the development of broader avenues for expressing compassion.

Dabrowski also postulated the concept of "overexcitabilities" (OE). According to Silverman (1993), "Overexcitabilities ... represent expanded awareness and a heightened capacity to respond to stimuli of various types" (p. 13). Van Deur (n.d.) sought to profile high achieving adults featured in news accounts or documentaries and to link their behavior to Dabrowski's overexcitabilities. While she succeeded in profiling high achieving adults in a number of the areas of the arts, mathematicians or scientists were not included in her study. The purpose of this paper, therefore, is to chronicle how today's highly creative scientists, in particular, exhibit Dabrowski's overexcitabilities and how they move through the developmental levels of positive disintegration.

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## Overexcitabilities in Scientists

Scientists seem particularly strong in four of Dabrowski's overexcitabilities, i.e., intellectual, imaginal, psychomotor, and emotional. Root-Bernstein, Root-Bernstein & Garnier (1993) found that creative scientists exhibited superior intelligence, were very much in touch with sensory experiences, and exhibited elaborate fantasies. Sensual OE appeared less important, although present in some examples of creative adult scientists.

### Intellectual OE

When one thinks of the creative physicist, chemist, or computer scientist, one invariably focuses on the intellectual skills of that individual. Individuals high in Intellectual OE are introspective, ask probing questions, do extensive reading and thinking, and focus on problem solving. Nobel Prize winner James Watson, who with Francis Crick discovered the structure of DNA, was rejected for inclusion in the Terman studies (e.g. Terman et al., 1925) because his score was not high enough on the IQ tests given to prospective subjects in the study. When asked as an adult why he thought he was bright, he replied that adults told him as a child he asked interesting questions (Bass & Simon, 1968). According to Joseph Bates, well-known computer scientist at Carnegie Mellon University, creative scientists need the ability to generate "crazy random ideas" if they are to be successful (Subotnik, 1993). Even aging scientists place themselves in a learning mode. They "purposely place themselves in the position of becoming novices again every five or ten years [and] become mentally young by starting over again [with] the courage to be ignorant again" (Root-Bernstein, Root-Bernstein, & Garnier, 1993, p. 341).

### Imaginational OE

Visualization, dreaming, and an active fantasy life are also characteristic of successful scientists. The classic example of such a scientist is Friedrich Kekule, the chemist who discovered the structure of the benzene ring. While dreaming of atoms spinning in his head, he visualized the larger chains of atoms in the form of a snake. One of the snakes eventually grabbed its own tail, and Kekule awoke with new insight (Koestler, 1967).

More recent research has revealed that Nobel laureates in sciences are likely to have an avocation in the visual arts (Lindauer, 2003) in

addition to being enamored of science fiction (Piirto, 2004). Borer (Subotnik, 1994) alluded to the beauty of science as the creation of order and form for information useful to a field through discovery.

### Psychomotor OE

Often overlooked in scientific studies about creative scientists is the role of psychomotor OE. Scientific work is characterized by a high level of energy, marked enthusiasm for a problem, and the capacity to work hard. Indeed, some (e.g., Reis, 1998) have argued that we do not stress enough to gifted young people that creative scientific work is hard work. Walberg & Stariha (1992) suggest that 70 hours of work per week for a decade may be needed to achieve distinction. Lederberg (Subotnik, 1995) commented that a career as a scientific researcher is one of intense involvement, which is both fun and a consuming commitment. Ajzenberg-Selove (1994) wrote in her memoir, "Science is not a dead cathedral; it is live and it is fun, and it is full of passion" (p. 224). Although Dabrowski said that productivity, as a measure of genius, was an American concept (Piirto, 2004), Simonton (1988) found huge productivity generally to be characteristic of creative scientists. Edison, for example, held over 1000 patents.

### Emotional OE

Emotional OE is defined as having intense feelings, whether they are of inferiority, fear, guilt, depression, or loneliness (Silverman, 1993). Cattell & Drevdahl (Piirto, 2004) found creative scientists very similar to creative artists the exception being the former were more emotionally stable. Nevertheless, intense feelings can affect the research experience. As Joseph Bates explained:

It was very frightening to feel truth dissolve. I remember sitting in a car in Ithaca at Cornell and starting to let go of Einstein and determinism and reality. I was disoriented, I was really disturbed. It was as if safety or security or stability were being dissolved. It really was a difficult time for me. It's exciting to think about it now, but back then it was scary. (Subotnik, 1993, pp. 319-320)

Other scientists seek not fame but truth. Maria Goeppart-Mayer (Dash, 1988) delayed publishing her Nobel Prize winning discovery several months, out of modesty.



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## Developmental Potential

Overexcitability plays a major role in the developmental potential of the creative scientist across the life span. Henderson (2004) considered technical ability, interpersonal ability, and hardiness central to the achievement of scientific productivity. In terms of Dabrowski's (1970) ideal, dynamic interaction between innate tendencies and the external environment result in the growth of an individual's personality from one that is basically self-interested to one more self-assured and comfortable with its responsibility toward others. As researchers, successful scientists draw upon their strengths and life traumas in order to shift from the ordinary to a fuller realization of their developmental potential. Follow up studies (Piirto, 2004) of Terman's subjects, or "Termites", found that as adults they sought to make their lives whole, not only achieving success but also balance and peace. Jeffrey Borer, an internationally known research cardiologist, has said:

I like to think that the ultimate goal for every child is to grow up to be a happy adult, and that the components of happiness for most people include far more than success in a single field of endeavor. (Subotnik, 1994, p. 208)

As described earlier, Dabrowski conceived of development as being composed of multiple levels, beginning with an integrated but egocentric level, followed by three levels characterized by various types of disintegration, and a final fully-integrated level (Mendaglio, 2008).

### Level I: Primary Integration

At this basic stage there is early evidence of superior intellectual abilities, imaginal thinking, and a surplus of energy characteristic of psychomotor OE. The future scientist makes bottle rockets, reads Isaac Asimov novels voraciously, and builds a space ship of sheets and chairs in the living room. As is the case for many bright young individuals, early learning experiences come easily and fill the child with excitement. Normal psychological development predicts a growing awareness of others' perspectives, however, for the budding young gifted scientist, early realization of some level of different-ness with regards the self, propels him or her into the first developmental conflict (Pyryt, 2008).

### Level II: Unilevel Disintegration

In school the young gifted scientist finds a less supportive environment; courses often cover material he has already mastered, and peers find him weird and bookish. Joshua Lederberg (Subotnik, 1995), Nobel prize-winning physiologist, spoke of the loneliness he experienced in elementary school. Joseph Bates (Subotnik, 1993), considered himself different from other students but found companionship through mentors and older students. This loneliness is common to extremely bright scientists and undergirds their ability to push beyond the group values and ideas particular to Dabrowski's second level. Because self-concept is less dependent on the approval of others, they are more willing to take risks and to push on in their quest for truth. As Piirto (2004) put it, such a scientist can "cut one's own jugular in order to tell the truth" (p. 48).

As mature scientists their behavior often challenges mainstream theories and practices within the field. Jeffrey Borer describes what transpired when presenting his revolutionary idea of using imaging technology to study the heart during exercise to others at his institution.

That is extraordinary! We'll apply this method during exercise and revolutionize the way cardiology is practiced." One of the two physicists turned around, looked at me strangely, and said, "That's ridiculous. It's technically impossible." There followed two weeks of discussion and disagreement about the applicability of the imaging program. At the end of this period, I finally said, "You know, you can tell me that this won't work from today until eternity but I'm never going to believe you because I know that I'm right. Rather than argue about it, why don't you just let me try it? If it doesn't work, then I won't talk about it anymore. (Subotnik, 1994, p. 202)

Feelings of emptiness and lack of a social group drive the scientist's thinking forward, allowing old structures to give away to new conceptualizations. In moving from the lowest levels through transformative growth, creative scientists have the courage to let go not only because of the confidence in their ideas but also because earlier trauma has prepared them to take

high risks. Lederberg (Subotnik, 1995) feels the only worthwhile projects are those that focus on high risk, high stakes problems.

### **Level III: Spontaneous Multilevel Disintegration**

Within the creative process of the research scientist there is often an early disillusionment with current ways of conceptualizing the problem. Whitmore (1980) has argued that the gifted and talented have a super sensitivity that makes them acutely perceptive and sensitive, more analytical and critical, and more discriminating of the details of a problem. New theories originate when scientists begin to question the tenets of a particular theory, develop conceptual arguments against it, and perform experiments to disprove it.

For the individual scientist this process requires risk-taking, specifically in going against the established practice or theory in a field. One risks criticism from one's colleagues and rejection of one's ideas. Advancing one's own theory requires not just the soundness of the intellectual idea but also the emotional stamina to hold fast against the tide of current thinking. For a scientist highly dependent on others for research funding and who often works in a research team, going against the grain of current thought can be a painful process. To do so, one must have what James (1902/1936) called "a temper of peace." One must wrestle with the anxiety of insecurity, both in one's own ideas and status within the intellectual, research community.

### **Level IV: Organized Multilevel Disintegration**

The individual scientist must learn the social skills of group process and collaboration but also have the ability to function with compassion and without prejudice. When one's ideas or experiments are attacked, perhaps unfairly, it is tempting to strike back. Yet, if development is to occur, both in the individual and in the field, an absence of the ruthlessness found at Level I is paramount. As

Jeffrey Borer is recorded as saying:

A delicate balance must be achieved among the involved personalities if a scientific group is to function. In my own situation as a group leader, I must be constantly aware of the emotions as well as the ideas, of group members, adding a level of complexity beyond that resulting from the work itself. A leader must be sensitive and responsive to nuances of feeling, capacities, and talents to elicit maximal performance from coworkers while producing maximally him or herself in achieving jointly held goals. Of course, the tension to assert oneself and the need to be responsive to others will always exist. (Subotnik, 1994, pp. 207-208)

### **Level V: Secondary Integration**

Creative scientists who are able to follow this path exhibit a heightened sense of creativity. Free and at peace, their ideas flow from the unconscious to form new understanding. As Csikszentmihalyi (1997) has written, "Once we realize what our demons are, we need not fear them any longer. Instead of taking them seriously, we can smile with compassion at the arrogance of these fruits of our imagination" (p. 135).

There are those (Henderson, 2003, 2004) who would say that scientists are, in part, able to be freer of outside opinion because their careers give them an ample income and financial security lacking in many other fields. But Henderson also found that modern scientists exhibited "hardiness" in equal measure with their intellectual and interpersonal strengths. They no longer need the validation provided by publication in journals or participation in professional meetings. For example, Gene Glass, a social science researcher, simply publishes his most recent work on his web site for others to read (Glass, 2004).

In the final analysis scientists are "human beings, not human doers" (Source unknown). In Dabrowski's own words, their "life is the creative product" (Dabrowski, 1970).

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## **Conclusion**

To summarize, today's scientists work in a world of collaboration, dependent not only on their intellectual, imaginal, psychomotor, and emotional sensitivities, but also on their abilities to move beyond an egocentric perspective, accepting the traditional norms of the field, and re-imagining a new conceptualization of problems grounded in a clear sense of moral values.

Dabrowski's Theory of Positive Disintegration (1970) provides a means of piercing the veil of creativity as it pertains to today's creative scientists. The struggle with data that fails to fit the existing model has its corollary in the provocative events in a scientist's life that jolt that individual into a re-examination of one's own thinking and then bring the other team members

along with what may seem a counterintuitive way of thinking and acting.

According to Rovner (2006), a team leader who, despite admitting to being a novice in the field, believed amazing things could be accomplished together as a team, had more success than one who characterized himself as an expert in the field. The second leader's group "felt stupid by comparison" and "were not comfortable sharing their ideas" (p.41).

As Neumann (2006) has written, just as people take stock at mid-life to examine the meaning in their lives, scholars examine their creative efforts from time to time, reflecting on the developmental path of their work. Such self-reflection sometimes

triggers risk-taking, a time when old paradigms or former collaborators are abandoned to pursue new avenues of interest.

What these two examples reflect is the ongoing disintegration and re-integration necessary for scientific progress. Today's creative scientists must be willing to step away from their status as experts to allow the perspectives of others to influence the creative process. In pursuing new directions the loss of familiar funding sources or long-standing relationships with collaborators may plunge the individual into a crisis of conflict. But it is through this process of disintegration and growth that new knowledge emerges and the truly creative scientist is transformed into a self-actualized individual.

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# Assessing the Effect of Explicit Teaching on High Reasoning Primary Students' Knowledge of Self-Directed Learning

Penny Van Deur

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## Abstract

This paper reports on an assessment of knowledge of SDL in primary (elementary) South Australian school students, fifty-six of whom were assessed to be high reasoning. The goals of the study were to identify the effectiveness of teaching and assessing knowledge of Self-Directed Learning (SDL) in high reasoning students, investigate whether there were differences in students' knowledge of SDL related to reasoning, and to identify the influence of engagement on high reasoning students' knowledge of SDL. The students were taught about SDL in four class lessons. Partial Least Squares path analysis showed that there were significant (negative) differences in high reasoning students' development of knowledge of SDL. This indicates that high reasoning students were more engaged and had an indirect gain of knowledge of SDL as a result of the teaching intervention suggesting that high reasoning students could become more self-directing if they are highly engaged in classroom activities about SDL.

**Keywords:** Self-Directed Learning, process knowledge, high reasoning, engagement, assessment.

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## Introduction

It is assumed that students with high ability are self-directed or autonomous learners (Braggett, 1997; DECS, 1996), and, given their high reasoning level, self-directed learning has long been advocated for those assessed as gifted (Treffinger, 1975). Indeed, Treffinger developed a model of Self-Directed Learning (SDL) and argued teachers could develop self-direction in their gifted students by involving them in experiences requiring "increasing degrees and kinds of self-management" (1975, p. 53). Central to Treffinger's SDL model is the creation, by teachers, of supportive learning environments designed to motivate self-directed learners to engage in learning while at the same time teaching the skills needed for SDL. Treffinger called for research on his instructional model by researchers and classroom teachers involved in the education of gifted and talented students.

Treffinger (1975) advocated for elementary students' learning to be scaffolded by teachers who would teach them skills to be able to work with other people and evaluate their own work. He argued that teachers can guide and help students learn via planned instructional experiences by developing instructional materials and providing opportunities for them to formulate new problems and questions. Treffinger also posited

that successful independent study involves organisation and thoughtful planning by both student and teacher – something he considers highly teachable. He discussed misunderstandings associated with SDL which imply it is unstructured or random and disorganised. On the contrary, he argues that it involves planning and organisation and that gifted students need guidance in the process of self-directed learning.

It has been shown that teachers' views of particular students differ according to the students' reasoning ability. Typically gifted students are perceived as having a more functional and adaptive orientation toward school tasks than non-gifted peers, with gifted students having greater control over their own success and failure on learning activities (Hmelo & Ferrari, 1997). These perceptions suggest gifted students' reasoning ability influences their engagement in classroom activities.

## Self-Directed Learning, engagement and reasoning

Self-Directed Learning has been recommended as a goal of gifted education (Braggett, 1996; Treffinger, 1975). Research suggests gifted students are critical, independent in thought



and judgement, motivated and persistent in terms of learning. Treffinger (1993) described the 'Individualised Programming Planning Model' (IPPM) as an approach to gifted programming based on recognition of the need for effective instruction to respond to the unique characteristics, strengths and talents of individual students. He argued that classroom practices, such as independent learning, can be developed by teachers helping all students to "learn how to set goals, identify resources, develop learning activities, make decisions and evaluate ideas and create and share products" (Treffinger, 1993, p. 438).

High levels of engagement on classroom tasks are important for effective SDL because there is a need for students to make an effort, feel competent and have a positive view of their ability to learn at school. Student engagement in learning

contributes to motivation, an important dimension of SDL in primary students. With perceived control contributing to school performance by promoting or undermining students' engagement in learning, student engagement is the mediator between it, i.e., perceived control, and actual accomplishments (Skinner, Wellborn & Connell, 1990). Students with high levels of engagement hold self-efficacy beliefs valuing effort, recognition of competence, and the perception of an ability to carry out learning in the classroom (Skinner, Wellborn & Connell, 1990). In contrast, students with low levels of engagement have self-efficacy beliefs which attribute more value to luck or ability, lack competence and, or the ability to learn successfully in the classroom. These descriptions reflect Hmelo and Ferrari's (1997) discussion regarding the orientation of students to school tasks suggesting reasoning levels influence engagement in classroom activities.

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## The Purpose of this Study

Teachers' views with respect to the SDL capacity of gifted students have been based on observations of their classroom behaviour. It appears gifted students are typically regarded as naturally self-directed in terms of their learning. This could signify teachers fail to recognise the need to teach these students about self-directed learning, assuming they know about it already.

No previous studies have been conducted where gifted students' knowledge about self-directed learning has been assessed. This paper addresses these issues by analysing, by reasoning groupings, assessments of students' knowledge of SDL, their engagement in class lessons about SDL and teachers' ratings of students as self-directed learners at school.

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## Goals and Hypotheses of the Study

The goals of the study were three-fold:

- (1) Identify the effectiveness of teaching and assessing knowledge of SDL in high reasoning primary students;
- (2) Investigate whether there are differences in primary students' knowledge of SDL related to reasoning; and

- (3) Identify the influence of engagement on high reasoning students' knowledge of SDL.

The study explores the hypotheses that relationships exist between student reasoning and levels of engagement during lessons on SDL; engagement and student reasoning; teacher's rating of students as self-directed learners at school and knowledge of SDL.

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## Method

### Participants, Instruments and Procedures

The reported study was conducted with 150 students from six intact Year 5 classes in six schools. Whole classes participated in a teaching intervention where students were taught explicitly about SDL in a series of five class lessons. Students were assessed on their knowledge of SDL before and immediately after the intervention and at three and six month intervals following the intervention.

Participants completed a reasoning test (*Raven's Standard Progressive Matrices*) and were grouped for analysis purposes as 'Low', 'Regular' and 'High' reasoners. In South Australian schools, students are described as gifted if they are assessed as scoring above the ninetieth percentile on a standardised test. No similar distinction is commonly made for students of other ability levels. Thus, in this study the reasoning level of all students was assessed using the Australian norms of '*Raven's Standard Progressive Matrices*' (Raven, Court & Raven, 2000).

Typically, the normal range of intelligence is shown on the bell-shaped curve (Gottfredson, 2003 p.28-29) where IQ 70 is regarded as the threshold for mental retardation and 130 is regarded as the threshold for intellectual giftedness. However, Gross (2000) described levels of giftedness beginning at IQ 115. In South Australia, the support document for the policy statement on gifted children, *Understanding giftedness* (1996), classifies gifted students as scoring from 125 on a standardised intelligence test. It was decided

to include in the average or regular group, scores within 1.25 standard deviations from the mean of 100. On this calculation, there were 15 students in the Low (SS, <88) reasoning group, 68 students in the Regular (SS, 89-111) reasoning group and 56 students in the High (SS, >112) reasoning group. Eleven students did not complete the Raven's assessment as they were absent on the day of the testing. The results of these students are not discussed in the analysis of knowledge of SDL.

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## Instruments

### 'Raven's Standard Progressive Matrices'

An assessment of students' reasoning ability was made with 'Raven's Standard Progressive Matrices' (Raven, 1956) - a test of non-verbal general reasoning ability. It was used to assess the reasoning level of the students in each school. Raw scores were computed and standard scores calculated according to the Australian manual (Raven, Court & Raven, 2000). Mean scores were calculated using SPSS (2001, Version 11.0 for Windows) for students grouped by reasoning (Low, Regular and High) based on the theoretical distribution of IQ scores along the normal curve (Gottfredson, 2003 p.29).

### Learning At School Questionnaire (LASQ)

The *Learning At School Questionnaire (LASQ)* was developed to assess primary students' knowledge of SDL. It was developed through a process of constructing statements, pre-testing and trying them out them with primary students and adjusting the questionnaire accordingly. Two versions of the questionnaire preceded the one used in the intervention study. Items in this final version of *LASQ* were re-numbered and re-grouped into three sub-scales in order to improve the flow of the questionnaire and to keep together statements about each sub-scale. The *LASQ* was comprised of 46 items grouped in sub-scales of:

- Motivation (items 1-19, Cronbach alpha= 0.71), i.e., statements about attitudes to SDL contributing to dispositional orientation, and which, in turn, influence behaviour. Statements about self-efficacy, causal attributions, and persistence were also included in this sub-scale.
- Strategy (items 20-36, Cronbach alpha =0.84), i.e., statements about learning strategies that can be employed in SDL.
- Context (items 37-46, Cronbach alpha 0.76),

i.e., statements about support available in the school environment for SDL.

Students completed the *LASQ* assessment on four occasions over six months (pre-test, immediate post-test following four lessons on SDL, delayed post-test at three months and delayed post-test at six months). Students responded to 46 statements in *LASQ* by circling one of three response categories (Disagree scored 0, Unsure scored 1, Agree scored 2). This scoring is consistent with the Rasch model of ordered categories where three categories are used to gain an indication of the respondent's ideal point (Andrich & Luo, 2003). High scores in any of the three sub-scales are interpreted to mean a high level of knowledge, while low scores mean a low level of knowledge. The scores were analysed by reasoning groupings.

The process of learning was examined in terms of the mean frequency of responses in each category of Bloom's taxonomy of cognitive objects. The taxonomy is two dimensional (Anderson & Krathwohl, 2001) including both the knowledge dimension (factual, conceptual, procedural and meta-cognitive) and cognitive process dimension, however only the latter was used in the study because it is commonly used in South Australian schools. Activities were developed, classified in terms of the major categories of Bloom's taxonomy of cognitive objectives (Anderson & Krathwohl, 2001), and written as sentence stems on lesson work-sheets. These activities required students to:

- (1) Remember, (cognitive) i.e., recognise and recall, e.g., participate in activities where they needed to pay attention to class discussion and listen to or read a problem based learning scenario;
- (2) Understand (cognitive) i.e., interpret and explain, e.g., evaluate their own knowledge and skills and explain how they could be used for tasks;

- (3) Apply (cognitive) i.e., execute and implement ideas, e.g., recognise knowledge, sort it out and decide how to use it;
- (4) Analyze (metacognitive) i.e., differentiate, organise, and attribute, e.g., sort out the main ideas in a problem and choose the best actions to take;
- (5) Evaluate (metacognitive) i.e., check, and critique, e.g., evaluate their own skill and judge how adequate it is for a task; and
- (6) Create (metacognitive) requiring students to generate and plan, e.g., work out how and what to find out and devise new solutions and ideas to use on a problem.

### Student engagement in each category of Bloom's taxonomy

Students' levels of engagement were assessed by inspecting written responses that were completed as part of each of the lesson activities. These were transcribed by the researcher, and frequency of responses for each activity (in each category of the taxonomy) was tabulated, totalled and mean scores were calculated. The process of learning was examined in terms of the mean frequency of responses in each category of Bloom's Taxonomy of cognitive objectives, by students grouped by reasoning. Table 1 shows examples of the items in each LASQ sub-scale. Table 2 shows the total number of lesson work-sheet activities classified in each category of Bloom's taxonomy.

**Table 1:** Examples of statements in each sub-scale of the LASQ.

No.	LASQ item	Sub-scale
1	I know how to learn about topics that I am interested in	Motivation
8	When I get stuck on something I cannot do, I encourage myself to keep going	Motivation
20	When I start to learn about a new topic I always ask myself what it is all about	Strategy
28	I keep track of the time I am spending as I am finding out about my topic	Strategy
37	The teacher helps me to be clear about the topic I am trying to find out about	Context
41	At school there are different resources that I can use to find out about topics	Context

**Table 2:** Lesson work-sheet activities classified in each category of Bloom's taxonomy of cognitive objectives (levels of engagement).

Bloom's category	No. of activities	Example of lesson work sheet activity
Remember	9	What do you know about a dolphin sanctuary?
Understand	8	What is your opinion about a dolphin sanctuary?
Apply	9	How could you help a friend to find information about this topic?
Analyze	10	A different strategy I will try is...
Evaluate	15	One good SDL skill I have is...
Create	6	An idea no-one else has thought of is...

### Teacher's Rating of Student Self-Directed Learning (TRoSSDL)

The TRoSSDL was developed through a process of pre-testing and piloting and is a ratings form using a Likert-type scale. This type of scale has been used often in attitude scales and is regarded as leading to highly reliable and meaningful scores

(Vogt, 1999). The Likert-type rating scale has a low rating where '1' = never; a medium rating where '3' = sometimes; and a high rating of '5' = always. It was used by class teachers to rate students as self-directed learners at school by attributing a rating to the statement "(child's name) is a self-directed learner at school". The teachers' ratings were analysed by student reasoning groupings.

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## Procedure

All 150 students participating in the study completed the *Learning At School Questionnaire (LASQ)* as a pre-test before engaging in a series of four class lessons on SDL. At the end of the series of lessons they again completed the *LASQ* as an immediate post-test. Two delayed post-tests were carried out three months and six months later. The four *LASQ* assessments were analysed according to reasoning groups. Students were taught as a whole group in intact classrooms that represented their regular learning environment. Six class teachers participated in the study by completing the rating of all 150 students as self-

directed learners at school on *TRoSSDL*.

The activities undertaken in the lessons were classified using Bloom's taxonomy of cognitive objectives. The mean frequencies were regarded as an index of the level of student engagement (higher frequency indicated students had a higher level of cognitive engagement). Students completed written responses on the lesson work-sheets, which were tabulated and classified for students grouped by reasoning level as Low, Regular and High reasoning. Descriptive statistics were calculated at the group level for reasoning.

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## Data Analysis

Each sub-scale of the *LASQ* was Rasch scaled (Sheridan, Andrich & Luo, 1997) in order to convert the raw scores to an interval scale on which the scores could be compared. This facilitated use of Rasch interval scale logits to study changes in the students' knowledge of SDL. Descriptive statistics were calculated for the Rasch scale scores (using SPSS, version 11.0 for Windows) on each *LASQ* sub-scale and are shown in Table 3. Effect sizes were calculated (Coe, 2000) to indicate the size of the effect in each sub-scale between each assessment in students' knowledge of SDL. The mean scaled scores in logits for each *LASQ* sub-scale depict changes over time in the mean knowledge of SDL for student reasoning groupings. Mean scores were calculated for class teachers' ratings of students as self-directed learners at school.

The levels of engagement of students were determined by the mean frequencies of responses on the lesson work-sheets. MANOVA was conducted to examine if students' levels of engagement were related to student reasoning.

Descriptive statistics were calculated in each category classified in the cognitive domain of Bloom's taxonomy of educational objectives in order to summarise, organise, graph and, in general, describe the quantitative information collected (Vogt, 1999). MANOVA was used to compare mean response levels for each Bloom's category for students grouped by reasoning because it provides a test of significance that indicates whether there are significant differences between reasoning groups.

A further analysis of the influence of student reasoning on students' knowledge of SDL was carried out using Partial Least Squares (PLS) path analysis. This analysis was carried out to test the model of factors hypothesised to influence students' knowledge of SDL. The criterion variable was students' Knowledge of SDL that was comprised of three sub-scales of Motivation, Strategy and Context. The antecedent variables were Gender and Reasoning while Engagement, School Context and Teacher operated as mediating variables.

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## Results

### *Differences between reasoning groups on LASQ assessments (descriptive statistics)*

This descriptive analysis focuses on considering how influential the students' reasoning group is in the development of knowledge of SDL. As expected, the mean reasoning scores were

significantly different (T-test) on '*Raven's Standard Progressive Matrices*' for 139 students grouped in reasoning groups (Low 81.73; Regular 101.23; High 120.62). MANOVA was used to calculate whether there were significant differences between the means of students grouped by reasoning on each assessment time for each *LASQ* sub-scale.

**Table 3:** Rasch scale means, standard deviations (SD), effect sizes (ES) and F-scores for Motivation, Strategy, and Context shown for reasoning groups.

LASQ	Low Reasoning			Regular Reasoning			High Reasoning			
<b>Motivation</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>F</b>
LASQ 1	1.14	0.61		1.64	1.21		1.80	0.99		2.02
LASQ 2	1.51	0.94	.42	1.85	1.35	.17	1.80	1.42	.00	0.30
LASQ 3	1.68	1.01	.19	1.57	1.45	-.20	1.63	1.29	-.12	0.55
LASQ 4	1.54	1.09	-.17	1.50	1.18	-.05	1.81	0.98	.38	0.86
<b>Strategy</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>F</b>
LASQ 1	1.10	0.78		1.37	1.17		1.25	0.95		0.36
LASQ 2	1.35	1.17	.22	1.82	1.37	.35	1.42	1.41	.14	0.42
LASQ 3	1.48	1.46	.10	1.58	1.39	-.18	1.34	1.34	-.06	0.63
LASQ 4	1.28	1.28	-.17	1.45	1.33	-.08	1.49	1.19	.22	0.49
<b>Context</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>Mean</b>	<b>SD</b>	<b>ES</b>	<b>F</b>
LASQ 1	1.25	0.96		1.21	1.03		1.09	0.93		0.03
LASQ 2	0.96	1.08	-.30	1.24	1.19	.03	0.93	1.47	-.13	0.53
LASQ 3	1.19	1.15	.20	1.09	1.16	-.13	0.92	1.10	.01	0.25
LASQ 4	1.00	1.61	-.20	0.92	1.35	-.12	0.97	1.17	.04	0.04

Note: There were no significant differences ( $p < 0.05$ ) between reasoning groups on each LASQ sub-scale

The results of the analysis are shown in Table 3.

It is important to note mean scores for Low, Regular and High reasoning groups did not differ significantly on the first LASQ assessment in each sub-scale. Further, MANOVA identified no significant differences between Low, Regular and High reasoning groups on each LASQ sub-scale or over the four testings. The mean scores for the high reasoning group increased from the first to the fourth assessment for the subscales of Motivation and Strategy (these were covered in class lessons while context was not) indicating some change in knowledge of SDL over time.

#### *The relationship between students' reasoning and engagement*

The mean frequency of responses to the activities on lesson work-sheets was regarded as an indication of the level of engagement of students (grouped by reasoning) in each category of Bloom's taxonomy. The General Linear Model (SPSS Version 11.0, 2001) was used to conduct a between-subjects MANOVA on differences between Low, Regular, and High reasoning groups for mean scores in each level of Bloom's taxonomy of thinking, and is shown in Table 4.

**Table 4:** Engagement of Low, Regular, and High reasoning groups.

Reasoning group	Low N = 15 students		Regular N = 68 students		High N = 56 students		F
	Mean	SD	Mean	SD	Mean	SD	
Bloom's category							
Remember	8.07	4.06	10.53	4.09	11.09	4.49	13.70***
Understand	12.40	2.29	12.24	2.90	12.63	2.39	88.57***
Apply	10.13	3.62	10.78	2.87	11.36	3.08	39.30***
<b>Analyse</b>	<b>10.47</b>	2.36	<b>11.54</b>	3.20	<b>11.50</b>	2.90	46.89***
<b>Evaluate</b>	<b>12.27</b>	2.43	<b>13.18</b>	2.95	<b>13.38</b>	2.35	37.45***
<b>Create</b>	<b>5.07</b>	1.91	<b>6.50</b>	2.24	<b>6.48</b>	1.87	36.37***

Note: \*\*\*indicates  $p < 0.001$  between Low, Regular and High reasoning groups



The mean frequency of responses analysed by reasoning groupings shows higher mean scores for the high reasoning group in four categories of Bloom's taxonomy. MANOVA was conducted to examine if level of engagement of students was significantly influenced by reasoning. The output indicated the main effects for Low, Regular and High reasoning students were highly significant ( $p < 0.001$ ) for each Bloom's category (Remember ( $F[13.7]$ ), Understand ( $F[88.57]$ ), Apply ( $F[39.30]$ ), Analyze ( $F[46.89]$ ), Evaluate ( $F[37.45]$ ), Create ( $F[36.37]$ ). This indicates at least one group was significantly different from the other reasoning groups for engagement in Bloom's Taxonomy, suggesting reasoning is related to students' levels of engagement in classroom activities.

Classification of Higher Order Thinking Skills (HOTS) showed the High reasoning group had a higher mean frequency of responses in one HOTS activity (evaluate), and the Low reasoning group had the lowest means for each of the three HOTS. The high mean scores for 'analyze', 'evaluate' and 'create' for High and Regular reasoning groups compared to the Low group suggests students in these two higher reasoning groups engaged in significantly higher levels of relating information, making judgements based on criteria, and re-organising elements to form new patterns or structures (Anderson & Krathwohl, 2001). This finding suggests there was an understanding of higher order thinking in the work done by Regular and High reasoners, but less understanding of higher order thinking in the work done by Low reasoners.

#### ***Class teachers' assessment of SDL by students' reasoning group***

The ratings by class teachers of students as self-directed learners at school showed class teachers rated students in the Regular reasoning group (mean score 3.40) as more self-directed than those in the Low reasoning group (mean score 2.53) while those in the High reasoning group (mean score 3.80) were rated more self-directed than students in both the Low and Regular reasoning groups. These ratings indicate a consistency in the classification of students as Low, Regular and High reasoners with the class teacher's rating of the students as self-directed

learners at school. The teacher ratings on *TROSSDL* suggest that in the classroom, teachers had a more positive view of High reasoning students as self-directed learners than Regular and Low reasoning students.

#### **Further exploration of the relationship of student reasoning to knowledge of SDL**

##### ***Partial Least Squares path analysis***

A path model of hypothesised relationships influencing knowledge of SDL was tested using a latent variable partial least squares path analysis (PLSPATH) procedure (Keeves & Sellin, 1997). Partial Least Squares path analysis combines multiple informants to explore the data in terms of examining the strength of effects of student and school factors on the variable of Knowledge of SDL. This analysis was employed to test the hypothesis that knowledge of SDL is related to students' reasoning, teachers' views of students as self-directed learners at school and students' engagement in classroom learning.

Central to the PLS path analysis procedure is the development of a well-specified model of hypothesised relationships shown in a path diagram. This is tested in order to estimate the magnitude of relationships (Keeves, 1988). The PLS path model gives causal-predictive information that is conveyed by inner model relations between latent variables and outer relations between the latent variables and their manifest variates (Noonan & Wold, 1988).

A path model was constructed to explore relationships between latent variables including Gender, Reasoning, School Context, Teacher, Engagement, and SDL knowledge. The path model was designed to be fully recursive. Each variable was positioned according to its predicted influence on succeeding variables in the model. The student factors were hypothesised to influence school factors which, in turn, were hypothesised to influence students' knowledge of SDL. The school factors were thus depicted as mediating variables and placed between the antecedent student variables and the criterion variable knowledge of SDL. The correlations between manifest and latent variables are shown in Table 5.

**Table 5:** Manifest Variates and Latent Variable Correlations.

	Gender	Reason	Context	Teacher	Engage	SDL
gender	1.00		-.024			.231
reasonm	.031	1.00	.045			-.058
type curriculum	-.002	.044	.867			.077
inquiry	-.041	.038	.958			.173
trate	.187	.334	.125	1.00		.211
engagement	.203	.487	.323	.421	1.00	.177
motiv	.229	-.002	.122	.224	.151	.858
Strat	.235	-.031	.110	.170	.169	.875
contex	.122	-.114	.149	.142	.130	.804

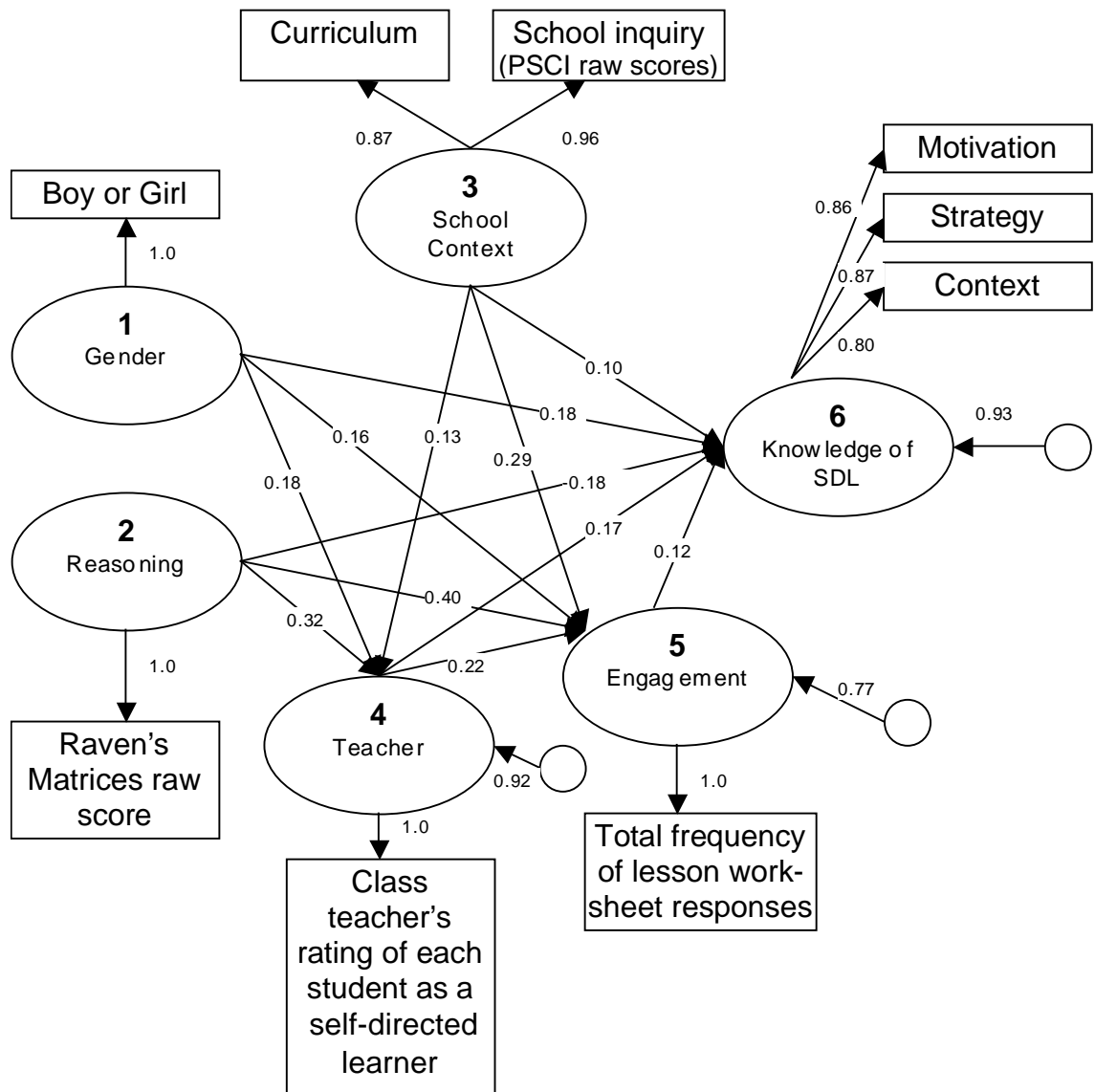
Table 5 shows that there are correlations of moderate strength between engagement and reasoning, and engagement with teacher. There are small correlations between reasoning and teacher's rating. There are small negative correlations for reasoning (reasoning and motivation, reasoning and strategy, reasoning and context (*LASQ*), reasoning and SDL) indicating that students with high reasoning scores do better than those with low reasoning scores.

#### ***The final PLS path model***

The final path model showing the strength of student and school influences on knowledge of SDL is shown in Figure 1 where lines from latent variables (Gender, Reasoning, Teacher, School Context, and Engagement) indicate significant paths with the standardised coefficients shown. The temporal sequence of the data was taken into

account in the specification and numbering of the latent variables according to their placement in the model for the analysis. Predictive relationships are shown in the model by single headed arrows. Latent variables 3, 5 and 6 are shown with arrow heads indicating that as endogenous variables they were influenced by one or more other variables in the model. The latent variables of School Context, Gender and Reasoning were exogenous variables with their lack of incoming arrow heads indicating their function as antecedent variables and not effects. Exogenous variables have values possibly influenced by variables not shown in the model (Vogt, 1999). The path coefficient is considered significant when more than twice its jackknife standard error as it can be said to be replicable or repeatable.

In the final path model there is a significant negative path to Knowledge of SDL from Reasoning (-0.18).



<sup>1</sup> R<sup>2</sup>= 0.127, Q<sup>2</sup>=0.109  
<sup>2</sup> R<sup>2</sup>=0.415, Q<sup>2</sup>=0.402  
<sup>3</sup> R<sup>2</sup>=0.159, Q<sup>2</sup>=0.148

**Figure 1:** PLSPATH model of knowledge of SDL for all times.

There are significant paths to Engagement from Teacher (0.22) and a significant path to Teacher from Reasoning (0.32). The combined effects of variables in this model explained only 13% (R<sup>2</sup> =.127) of the variation in the outcome between school and student influences. This amount of explained variance is small. It is not, however, trivial. It still provides an indication of the factors influencing Knowledge of SDL. The stability of the outcome measure reflected by the difference between R<sup>2</sup> and Q<sup>2</sup> (0.018) indicates that since R<sup>2</sup> is 0.127, the model has satisfactory predictive relevance.

**Discussion of the PLS analysis**

The final PLS path model show Reasoning (negative) and Teacher as strong influences on Knowledge of SDL. It indicates the students' reasoning score and the teachers' rating of students as self-directed learners had direct influences on students' knowledge of SDL for Motivation, Strategy and Context. Students rated highly by teachers had high levels of knowledge of SDL and students rated lower had less knowledge of SDL. The significant paths from teacher's rating (Teacher) to Engagement, indicates that this variable had a direct influence

on students' Knowledge of SDL after the effects of School Context, Teacher's rating, and Student Engagement is taken into account. If teachers rated students highly as self-directed learners at school they were highly engaged, but if rated at a low level students had a low level of knowledge associated with SDL.

Knowledge of SDL is influenced significantly by student reasoning, although the loading is negative ( $p = -0.18$ ) indicating students with low reasoning gained directly from the teaching intervention and the relationship carries through to increased knowledge of SDL. On the other hand, there was an indirect effect for high reasoning students who were more engaged in class lessons, gaining knowledge of SDL as a result.

The literature suggests there may be other influences on knowledge of SDL that are not

included in the path model, e.g., students' experience and initiative (Brockett & Hiemstra, 1991) and reflection (Hmelo & Lin, 2000) from which comes self-feedback. Such exogenous variables could be influencing the variables in the model and contributing to the high percentage of unexplained variance.

The significant influence of reasoning on engagement in classroom activities suggests high reasoning students engage more than low reasoning students. The significant influence on student engagement of teachers' ratings of students as self-directed learners at school suggests teachers influence students' classroom work. This indicates that there would be low engagement of students with low teacher ratings of students as self-directed learners, and high engagement of students with high teacher ratings (high reasoners in this study).

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## Discussion

Students were taught explicitly about, and assessed on their knowledge of SDL over time. Their responses were analysed in reasoning groups of Low, Regular, and High reasoners. Results from descriptive statistics indicate no significant relationship between reasoning level and knowledge of SDL. However, further exploration of the data by PLS path analysis showed significant influences are exerted by student reasoning (negative influence) and the school factor of teachers' ratings of students as self-directed learners on students' knowledge of SDL. PLS path analysis results showing significant influences on Knowledge of SDL indicate that when SDL is being implemented in schools consideration should be given to reasoning and teacher's views of students as self-directed learners at school. These results also suggest that when trying to develop knowledge of SDL in students, teachers should pay attention to students' reasoning levels. The results of this analysis indicate that high reasoning students increase their knowledge through classroom engagement in activities which required them to reflect, rather than directly from teaching carried out by the researcher.

Investigation of the consistency of reasoning level with each class teachers' rating of students' SDL at school showed that class teachers perceived High reasoners to be more self-directed than Low reasoners. Frequency of responses to lesson activities was calculated to provide an indication of student engagement in lessons on SDL. The mean frequency of lesson work sheet responses in each category of Bloom's taxonomy showed students were more engaged in the Regular

and High reasoning groups and less engaged in the Low reasoning group. The highly significant differences between the groups of students indicate that reasoning was related to students' levels of engagement when participating in classroom activities about SDL.

Finding all students, including high reasoning students, increased their knowledge of SDL after a teaching intervention indicates students benefit from instruction in SDL processes, as identified by Treffinger (1975, 1993). Descriptive analysis showed reasoning was associated with level of engagement in classroom activities about SDL. High reasoning students had higher levels of engagement than low reasoning students and this had a significant influence on their knowledge of SDL. The negative influence of reasoning on knowledge of SDL (as shown by PLS path analysis) indicates low reasoning students gained directly from the teaching intervention while high reasoning students gained indirectly by being more engaged and reflecting on classroom activities and increasing their knowledge of SDL through this engagement.

Descriptive analysis showed teachers had accurate views of students as self-directed learners at school, so that if teachers rated students highly they were more engaged in classroom activities and expressed high knowledge of SDL on the LASQ. These findings indicate classroom (teacher) and student (reasoning) factors influence students' knowledge of SDL. Partial Least Squares path analysis supported this finding by showing that there were both school context and student influences on students' knowledge of SDL.

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## Conclusion

This paper addressed the issue of assessing whether explicit teaching has an effect on high reasoning students' knowledge of SDL. It is significant because it identifies the need for teachers to be aware of their expectations of students' capability as self-directed learners. It shows that there are differences in knowledge of SDL following a teaching intervention related to reasoning, and that for high reasoning students, in particular, engagement is important for developing this process knowledge. It suggests a need to integrate assessment of knowledge of SDL into inquiry activities requiring SDL. Such action is considered particularly important for high reasoning or gifted students to facilitate their development as effective managers and directors of their own learning (Treffinger, 1975).

Assessing knowledge of SDL could assist high reasoning students acquire the habit of learning how to learn by guiding their reflections on the 'self' aspects of their learning. Rather than assuming gifted students know how to be self-directed, data

suggest knowledge of SDL can be developed when teachers promote students' engagement in activities as part of explicit teaching about SDL. This supports Treffinger's (1975) view that gifted elementary (primary) students' learning should be scaffolded by their teachers who teach them skills to manage their learning and work with others. However, it also suggests high reasoning students learn indirectly what they need to know via engagement and reflection on classroom activities about SDL rather than from teacher explanations. This finding indicates that explicit teaching is less important for high reasoning students. It is better to encourage engagement in classroom activities designed to help learn about SDL. Finally, knowing how to become self-directed learners seems to help high reasoning students actually adopt self-learning skills. There appears to be a snow-ball effect in that high reasoning students may become even more self-directing when highly engaged in classroom activities, especially with respect to those associated with the process of SDL.

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# From the Activation of Hidden Talents to Promoting Highly Gifted Students

## “Von der Aktivierung der Begabungsreserven zur Hochbegabtenförderung”

Kurt A. Heller (2008).

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### Book Review by Heinz Neber and Taisir Subhi-Yamin

This volume provides an overview of Kurt Heller's contributions to the domain of giftedness and talent development. Writing in German, the author presents 20 texts he has offered over the past 40 years and which cover a broad spectrum of themes.

From the very beginning in the 1960s with *Finding hidden talents*, to his latest work - *Test batteries for identifying highly gifted students*, Kurt Heller's concern has been the identification and diagnosis of giftedness. Driven by a desire to contribute and effectively secure “Chancengleichheit” or *equal opportunity* for highly gifted students in the educational system, he realized the development of sound instruments and procedures for identifying such students was essential.

As a prerequisite, the author conceived models of giftedness and talent that specify the variables necessary when the measurement of giftedness is considered. Already the first Munich Model of Giftedness (MMG) integrated cognitive variables, i.e., intelligence, creativity, as predictors, and diverse motivational and contextual variables as moderators of extraordinary (learning) performances of highly gifted students. In addition, more recent versions of the model consider findings of studies on expertise, in particular, for example as mentioned in Chapter 4, the role of expert level knowledge for explaining achievements in various fields. As a consequence, Heller's models cover a wide range of different types of giftedness, and may be used to specify causal factors of general and of domain-specific giftedness.

Whatever the case, giftedness is conceived as a competence in terms of a variety or multiple cognitive factors not much influenced by contexts and environments. These factors may be measured

by intelligence, creativity, and psychomotor scales of the latest test batteries developed by Heller and Perleth (Munich High Gifted Test Battery for Elementary- and for Secondary School Students, 2002). From this perspective, identification and diagnosis of giftedness should help highlight strongly genetically determined potentials whose transformation into domain-specific performances requires adaptive programming founded upon adequate family, school, and college environments.

In part IV, several chapters are dedicated to such topics. According to the author, immediately after the fourth grade differentiated education should be offered for highly gifted students. He argues in Chapter 14 that giftedness, i.e., in terms of cognitive factors, is already reliably measurable at this rather early level, and the results of such measurements allow a quite good prediction of later learning performances.

In Chapter 17 Heller looks at issues concerning co-education and mixed gender classrooms in math, science, and technology. He concludes further investigation is necessary in this context because current evidence does not support straightforward empirically-based decisions. He believes it may be more important to change and optimize gifted girls' motivational determinants of science learning via re-attribution procedures. A practical approach that has been implemented in existing mixed-gender classrooms is offered in Chapter 18.

In Part V and Chapter 19, counselling is presented as an important intervention for individually promoting highly gifted students. The author, after establishing a counselling centre for such students at the University of Munich, is able to provide an

overview on the needs of the students and their parents. Although he found highly gifted male students, in particular, require *psychological* help with cases of underachievement and problematic social behaviour, many students need *pedagogical* information, e.g., about special courses and institutions for the gifted, irrespective of gender. Apparently, schools and teachers are not really prepared to offer such information.

Kurt Heller applied his Munich Model of Giftedness model and testing procedures in the range of empirical studies presented in the empirical section of the volume - Part III. The Munich Longitudinal Study is described in Chapter 10. This study covered the development of highly gifted students over nine years of their school career at the Gymnasium - the German version of a college-preparatory high school. Students identified in 1985 have been repeatedly investigated using MMG-variables related to giftedness, personality, and social environment. Data revealed high prognostic validity of school achievement based on the Cognitive Achievement Test - an intelligence test adapted by the author himself. Further findings indicate the necessity of early identification in order to provide optimal social environments to highly gifted students; the scarcity of real multiple talents, i.e., extraordinary high values in intelligence, creativity, social competence, musical, and artistic abilities; and the rather high risks of girls for a decline in giftedness-related personality factors throughout their school career.

Other chapters in part III present a selection of program evaluations that exemplify Heller's

empirical contributions to the field. A case in point is the long-term evaluation of an important high-school acceleration program described in Chapter 11. Data from that particular study showed it may be possible for highly gifted students to graduate from high school a year ago without negative cognitive or motivational consequences. Chapter 12 provides details of an on-going longitudinal evaluation of the same program that has revealed further multiple positive effects. It also showed students clearly profit from an interdisciplinary math and science enrichment program. Compared to a non-enriched group, students attending the enrichment programme acquire higher levels of expertise; develop stronger leadership skills; gain better access to universities; and are more successful in earning prizes and grants in math and science competitions.

Finally, a study is presented in Chapter 13 that was a part of an international project evaluating the science-related Student Olympics. A characteristic observed in, and shared by students from different nations, e.g., South Korea, Finland, and the USA, is that most successful students come from families with high educational backgrounds. It was also found that repeated participation in such competitions had no negative social and motivational effects on the students.

In general, this text makes it clear that progress in gifted education depends upon a strong theoretical framework, requires evidence-based development, and benefits from continued research efforts. Kurt Heller's contributions in this regard and his efforts in our field of study and interest are well reflected in this book.

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# A Parent's Guide to Gifted Children

James T. Webb; Janet L. Gore; Edward R. Amend; Arlene R. DeVries (2007)

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## Book Review by Mihyeon Kim

Being the parent of a gifted child is both an enjoyable and challenging experience, but it requires an understanding of various complex aspects of the child and it raises many questions. What is giftedness and is my child gifted? Do problems experienced by my child spring from giftedness? What are the needs of my child? How may we, as parents, offer the best support for our child in productive ways?

Most parents of gifted children don't recognize these issues until they have to deal with their children's difficulties when mainstreamed in regular classrooms. When parents are faced with these uncomfortable issues, they try gathering information to help them understand their gifted children and learn how to provide pertinent support for them. However, it is then parents often face another difficulty, i.e., *finding* comprehensive information that answers their specific questions.

As the mother of a potentially gifted child and an educator in the gifted education field, I was pleased to read, *A Parent's Guide to Gifted Children* by Webb, Gore, Amend and DeVries. It provided me with thoughtful insight on issues gifted children may have and an excellent opportunity to deepen my understanding of giftedness and its various aspects, including the intellectual, social, and emotional needs of the child. Furthermore, this book suggests practical ways to overcome the problems and issues raised and provides helpful recommendations for optimal parental support for gifted children.

This book is comprised of fifteen chapters. In the introduction, the authors state that the purpose of this book is:

To provide advice and guidance that is practical rather than theoretical that will help you nurture your relationship with your gifted child, avoid frequent power struggles, and help young gifted children find understanding and satisfaction for themselves and others as they strive to reach their potential. (p. xxi)

They honour their intentions by providing parents of the gifted child comprehensive and easy-to-read guidance.

The introduction addresses how gifted children are perceived and the importance of developing a better understanding of their emotional and interpersonal needs. It is hard to comprehend giftedness in all its complexity because each gifted child has unique characteristics. Depending on the students' types and levels of giftedness, diverse approaches are necessary in order to accommodate their individuality.

In Chapters One and Two, the authors provide various definitions for giftedness as well as the characteristics and challenges of gifted children. Most parents consider IQ testing as the main critical measurement for identification of their children's abilities. However, in truth, an IQ score represents only one aspect. Giftedness can be revealed in different ways. For example, the authors, highlighting the complexity of giftedness, introduce Howard Gardner's Multiple Intelligence Theory to demonstrate how giftedness can be determined differently.

In addition to defining giftedness, the authors present detailed characteristics typical of gifted children as well as their different thinking and learning styles. They describe difficulties that may arise in identifying giftedness that are related to differences between auditory-sequential and visual-spatial learning styles. They also provide helpful information about achieving an optimum educational environment in school for such children.

The authors introduce Dabrowski's overexcitability (OE) theory which refers to the five psychic abilities which influence the way we receive and respond to stimuli, and which are expressed in increased or enhanced sensitivity, awareness, and intensity. Dabrowski proposed that overexcitability is more evident in the gifted population than in the general population. The authors deal with the strengths and possible behavioral difficulties or problems caused by this particular characteristic in gifted children, especially highly gifted children.

The difference between "smart" and "gifted" is clarified by the authors. Parents as well as many teachers easily confuse these two terms. They examine the differences in terms of questioning

style, learning speed and application of concepts, emotional outlook, level of interest, language ability, and concern with fairness.

In Chapter Three, the authors consider issues that involve communication with gifted children. As psychologists or counsellors of gifted children, the authors present practical recommendations for creating effective communication. They present specific examples of conversation and offer various approaches to help develop effective communication skills and build positive relationships. The book helps parents guide their children as they form good relationships with others through positive communication experiences within the family. Since gifted children have different affective needs caused by their unique characteristics, e.g., perfectionism, idealism, sensitivity, and intensity, good communication is integral to the development of children's self-esteem and confidence. Parents who model good communication skills can lead their gifted children to have successful adult lives.

Chapters Four and Five consider the most proper and best ways to establish motivation and enthusiasm as well as discipline and self-management. A question is raised: Even though one of the characteristics of giftedness is excitement about learning, why are there so many underachieving children in schools? In part the answer is, since emotion and motivation are strongly related, problems with family or other relationships may cause behavioral issues of gifted students. Parents are easily confused with respect to discipline-related problems and behavioral issues caused by decreased motivation toward learning. The authors clarify types of discipline and support the importance of setting a proper level of discipline for gifted children. A step-by-step process is offered that goes from making a diagnosis of their children to ways of meeting their needs in order that they may be motivated. In addition to making suggestions for the provision of an optimum environment to motivate their children, parents are also given examples of responses to their children that ought to be *avoided*. Parents as well as teachers may use these avoidable response examples to check their attitude toward gifted children, and utilize the specific techniques and strategies to motivate their children. The authors describe how parents can develop suitable home environments that support self-management in their children.

Psychological, social and emotional aspects of gifted children are introduced in Chapters Six, Seven, Eight, and Nine. Most parents and teachers of gifted children probably notice their special social and emotional traits such as heightened

sensitivity, emotional intensity, perfectionism, idealism, and asynchronous development of intellectual and emotional maturity. To help their understanding about what they may face with their gifted children, parents will find detailed, comprehensive information about social and emotional issues and traits and the potential problems they may cause. For example, gifted students may feel unhappy because of their uniqueness. Some of these unhappy situations are caused by intrinsic emotional aspects, and others can be caused by extrinsic social issues such as finding an appropriate peer group. Even though having an appropriate peer group is important for good psychological development, gifted children often have a hard time finding a fitting peer group. This book discusses when peer group problems can begin, what kinds of peer group issues exist, and how parents can help their children to overcome those problems. Practical suggestions for parents are beneficial in their efforts to ensure appropriate and healthy psychological development in their children.

In addition to peer group issues and emotional traits of gifted students, family relationship issues are discussed that relate to another influencing factor for children's development, i.e., siblings and only children. Parenting style and interaction can differ depending on whether they have an only child or a child with siblings. This book presents various roles, depending on birth order, and possible emotional stress caused by different interactions within the family. The authors explain in detail how siblings interact with each other, the consequences of sibling rivalry, how parents can deal with different abilities among siblings. It is hard to keep balance when sibling rivalry and competition occur, and this book provides practical suggestions to overcome sibling related issues. Also, the authors warn that an only child may have a problem with sharing others' attention and having too much power within the family. Wide-ranging recommendations are provided that are designed to help overcome and prevent problems such as stress, depression and unhappiness caused by the unique social and emotional traits of gifted children.

Sometimes young gifted children can embarrass adults because they try to correct wrong information or just behave in non-traditional ways. The authors identify the reasons for this situation in Chapter Ten. Young gifted children have an imbalance between academic knowledge and experience related to social behavioral norms. Gifted children are bothered by incorrect information, and their moral sense and need for truth are stronger than their social



development. The chapter is devoted to dealing with social norms for gifted children. Although traditional rules and current social norms are neither unbreakable nor always appropriate, for a child to challenge existing values sometimes requires cost. However, the authors suggest that a challenge to tradition may be a way of leading society. Parents sometimes need to sustain a balance between traditional social norms but also recognize courage as a necessary aspect of creativity and leadership, as well as its playing an essential role in fitting into the current social system. This book discusses the stages of moral development and makes recommendations for how parents can help their children to be creative members and leaders in society.

In this fast-paced modern society, parenting becomes more complex. The authors consider current conditions and influences that impact parenting, e.g., small family structures, divorce and remarriage, distressing role models in TV and movies, widespread consumerism, technology offering uncontrolled access to information, and mobility affecting children's education. Chapter Eleven makes thoughtful and accommodating suggestions for good parenting techniques, especially, the importance of parents taking care of themselves in order to contribute to the better education of their children. The authors agreed that parenting is hard work, but this book suggests that parents should find ways to limit the pressure and sacrifice they make. The authors stress the necessity for balance in each of the family members' lives. This is one of the most valuable recommendations of this book.

One of the more trying aspects of parenting gifted children is dealing with twice-exceptional children. Information suggested in this book is valuable for parents who have twice-exceptional children as well as gifted children who also have learning disabilities. In Chapter Twelve the authors explain each of the learning disabilities sometimes associated with gifted children. They deal with issues regarding how gifted students are misdiagnosed with disorders, what kinds of disorders may be associated with giftedness, how learning disabilities are diagnosed, and what kinds of interventions can be made for

learning disabilities. At times it is hard to differentiate between typical asynchronies and a true learning disability. The distinction is not always clear and consequently, a gifted child with a learning disability may continuously struggle with other weak areas in school without identification or accommodation for their strengths because a learning disability obscures their giftedness. It is important for parents to familiarize themselves with the definition and characteristics of various kinds of disabilities and giftedness as well as the strategies available to help their children optimize their ability.

For parents of gifted children, it is helpful to have information about how gifted children are identified, what kinds of educational options they have, what kinds of instructional techniques and strategies can help these children, how parents can get involved in supporting their gifted children and advocate for their children's rights, and where parents can get help if they have issues and problems. In Chapters Thirteen, Fourteen, and Fifteen, the authors provide useful information about the various procedures available for the identification of gifted children in schools, ways of getting professional help for gifted children and how a psychological approach is appropriate when faced with a broad range of concerns regarding gifted children. Furthermore, the comprehensive and practical suggestions for each issue help parents to develop an improved environment for their gifted children.

I enjoyed reading this book. I know, as a parent of a gifted child, the issues this book raised are very real for parents. It gave me the opportunity to think over many issues about parenting gifted children, such as balancing discipline and supporting the uniqueness of gifted children. It is a readable and practical book. It clarifies the confusion over gifted-related definitions. Since the authors are professional in the field, this book explains gifted students' emotions and behaviors while relying heavily on psychological principles to guide parents towards a happier and more positive interaction with their children. I would not hesitate to recommend this book to anyone – not just parents but also teachers, interested in the exceptional needs of gifted children and how they may best be provided.

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Webb, J. T., Gore, J. L., Amend, E. R. & DeVries, A. R. (2007). *A parent's guide to gifted children*. Scottsdale, Arizona: Great Potential Press, Inc (323 pp., ISBN: 0-910707-79-0)

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# Intelligent Life in the Classroom: Smart Kids and their Teachers

Karen Isaacson and Tamara Fischer (2007)

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## Book Review by Sandra Linke

This is a very interesting and reader-friendly book (which means it is written in a lively writing style). Indeed, a rarely found page-turner among academic books! In it you will find 13 main chapters, 12 of which concern the characteristics of gifted children. The last chapter gives voice to the gifted themselves, what they think about themselves, what their wishes are and what they want others to know about them. Teachers, in particular, will find excellent information on how to address the needs of these conspicuously different kids which can't and should not be ignored. Parents and other educators or people working and living with them will benefit from consulting this book. At the end of the book there are many resources for gifted education organized in categories, namely: 1. Websites, 2. Books for teachers of gifted students, 3. Catalogs/companies with gifted education materials and 4. Gifted education conferences and competitions for kids, e.g., through National Programs/ Foundations.

The first part of the book looks at subjects frequently addressed in the field of giftedness. For example, curiosity (Chapter 2.), asynchrony (Chapter 4.), attention to detail (Chapter 5.) and other interesting topics such as, potential (Chapter 1.), intensity (Chapter 3.), persistence (in Chapter 8.) and so forth. However, to get a deeper insight into the wonderfully chosen examples and the authors' writing style, I will quote and describe parts of the text from Chapters 9 through to 12.

Chapter 9 concerns itself with sensitivity. It is rare this important issue is addressed in such a depth and with so many examples. We learn gifted children experience high levels of sensitivity in many different areas, something that often sets them apart from those around them. "They can smell things that others can't smell. They see and notice things others can't see. They can feel things others can't feel" (p. 113). For that reason we, as parents or educators, should be aware of the fact that they need to know and feel that "their sensitivity is real and valid. They don't need adults to discount or minimize their feelings" (p. 119).

Other parts of the text are written in a refreshing and encouraging way. They sometimes even make

the reader smile. Here is an example:

A fourth-grade student approached the teacher and said, 'My feet can't breathe.' Fortunately, her teacher took her seriously and told the little girl that she was allowed to sit in class without wearing her shoes. The teacher figured it was a small price to pay to allow the girl to be comfortable enough to focus her attention elsewhere – maybe even on her work. (p. 115)

Another example shows how considerate and less self-centered gifted children can be once they sense their feelings and special needs are respected. Here is the third grader who is told that he will no longer be able to meet with his friend on a regular basis. He responds:

If he is happy and doesn't have to listen to his parents fighting anymore, then I am happy for him. I will miss him, but I can call and write him.' This is pretty insightful and sensitive for a third grader (p. 116).

More examples follow that highlight such characteristics as a strong sense of justice or deep empathy or the ability to appreciate beauty, especially in nature. The concluding words of this chapter could be an orientation statement for all teachers and worthy of remembering in many daily situations. "Each child is unique, just like each snowflake.... Take a closer look at each child, and tune into the unique talents, style, and potential of each one" (p. 129).

Idealism is the subject of chapter 10. The chapter talks about big dreams and how to realize them in practice. It addresses how children, assisted by their teachers, may fulfill their individual needs and accomplish their goals. The authors write: "Big dreams come in all shapes and sizes. They come from all parts of the world and from every background. Odds are, there are probably a few big dreamers in your classroom. Hopefully, you are one of them" (p. 124). The authors also recognize that sometimes, "Whether we realize it or not, we put limits on our students.... We forget that all brain capacities and interest levels are not created equal" (p. 124).

As in all chapters, you find more impressive examples demonstrating how teachers can (and do!) challenge students and how surprised a teacher of children in a higher grade-level can be when getting to know what second and third graders can do. It is not unusual to hear this comment: “Now what am I going to do with them when I get them?” (p. 126). It is a question asked in situations where a teacher in an earlier grade has allowed a young student to perform at advanced levels and without the normal class level restrictions. A receiving teacher in a higher grade who is not used to such a situation may be initially perplexed, not knowing how to deal with the child in an appropriate way.

Presented with all these motivating examples, the reader may feel encouraged to depart from tradition, perhaps break some rules and show flexibility in order to allow children “the chance to taste of their own potential [which] requires certain sacrifices and attitude changes from teachers and parents” (p. 128). Knowing that teachers have been successful and that to make changes sometimes takes little effort, the authors raise two questions: “Why, then, do we in this great country [USA] often discourage the young big dreamers among us from following a similar [successful] path? Do we not understand the importance of idealism’s potential outcomes?” (p. 136). The authors raise hope at the end of this chapter, perhaps a little bit *too* optimistically:

It’s not only the right thing to do, but who knows – some day they may tell the world in their Nobel Peace Prize acceptance speech that they owe it all to a teacher who let them dream big – and that teacher might be you!” (p. 136).

The next chapter is about humility which “may seem paradoxical” (p. 139) at the first glance. But when we take a closer look, the examples make

it clear that respect, confidence and trust in what people are telling each other provides the context. The authors remind us, “Every child in every class has something of value to offer” (p. 142), and “Every child deserves recognition for the things s[he] is particularly good at” (p. 142). According to the authors, we have to take into consideration that no single ability, gift or talent is intrinsically more valuable than another. Ultimately its value always depends on the situation. “Humility can be an important key to unlocking the door of empathy” (p. 144) is a worthy thought as it allows a person “to see beyond himself, his ego, and his concerns” (p. 145). The most important message here again is to encourage teachers and their students to break the mold. In that way, we allow children a better education overall and help educators resist falling “into a power-struggle trap” (p. 148).

Question: Why it is necessary to honor gifted children in a special way? The answer is revealed in the shortest chapter, Chapter 12. It consists of only 9 but very important pages. “While everyone in the world has something they’re good at, gifted kids generally have many *some things* they’re good at” (p. 160). Their talents, all of which require nurturing and development, impose special challenges as the children sift through all the possibilities and determine the right and, or most convenient choice for themselves. This is, without any doubt, a most demanding task they have to manage and “You, oh readers, you are the brain motivators, the creativity inspirers, and the seed planters. You are the oil in the gear, the bearers of the light” (p. 163).

I can highly recommend this book! But don’t just read it – examine the possibilities and supply some of your own examples of best practice. I am sure you can and will enjoy doing so!

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## Reference

Isaacson, K. L. J., & Fischer, T. J. (2007). *Intelligent life in the classroom: Smart kids and their teachers*. Scottsdale, AZ: Great Potential Press, Inc.

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## Notes

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## Notes