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The Early Years of Albert Einstein:

When viewed through the lens of current theory and research were there signs of giftedness?

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Abstract

Underachievement is commonly seen as a discrepancy between the level at which a student performs and their academic potential. It is a learned behaviour that can be caused by factors both inside and outside the school setting including family and community dynamics, school curriculum and teaching methods, and personality traits. The identification of underachieving gifted students is closely linked to the identification of giftedness itself and talented students can be marginalised if a school's definition is conservative and its methods of identification narrow. This case study examines Albert Einstein's early life through the lens of recent theory and research in an effort to understand why he became an underachiever at school. It identifies several factors that may have contributed to his underachievement, in particular his frustration with inflexible teaching methods and the rigid curricular at that time. It also highlights the need for today's teachers to ensure that they keep abreast of current research and theory so that they can best meet the educational needs of the gifted and talented students in their classrooms.

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Introduction

Albert Einstein is one of the world's most renowned scientists, regarded by many as the greatest scientist of the 20th century. His theories changed long-held beliefs about scientific laws, including beliefs about gravity. Furthermore, Einstein's work forever changed people's understandings of the Universe and replaced questions, which had been puzzling scientists for centuries, with answers.

In 1905, at the age of 26, he published four theories (often referred to as the 'Great Works'), which focused on the structure of light, kinetic energy theory, electromagnetism and motion, and his special theory of relativity (arguably his most famous theory). Although his theories were not universally accepted at that time, they did rocket him to fame for the first time in his life – a fame that would continue to grow as each of his theories was proven beyond doubt in subsequent years.

Einstein has been called both a genius and a super-genius, yet at school he was described as being anti-social and a poor student who was disrespectful of his teachers. How could such giftedness go undetected throughout his childhood and adolescence? Why did his teachers not recognise that a genius sat amidst the students in their classrooms? Contemporary research and theory offers some possible explanations as to why Einstein remained one of the 'hidden gifted' at school, an underachiever who would eventually drop out of high school and obtain unremarkable results in his tertiary studies.

The following case study presents factors that may explain why his giftedness was not recognised. These factors include some of his personality traits, his delayed language development and how others interpreted this, his frustration with the teaching methods used at that time, inappropriate curriculum content and, finally, a widespread belief at the time that giftedness was characterised by skill in lesson-learning and test-taking (school-house giftedness).

What is underachievement?

Before exploring Einstein's life it is important to understand what underachievement is. Underachievement is commonly seen as a discrepancy between the level at which a student is performing and

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his or her academic potential (Berger, 1990; Berube, 1995; Fascilla, Hanninen & Spritzer, 1991; Johnson, Saccuzzo & Guertin, 1994; Matthews & McBee, 2007). There is no one common cause that explains underachievement (Baum, Renzulli, Hebert, 1995; Myers, 1980) but there are numerous factors, both inside and outside of the school setting that can contribute to underachievement in gifted students. These include family and community dynamics (e.g., parents' attitudes to school and the role modeling they provide, the nature of home support, sibling rivalry and the loss of a 'special' label), school curriculum and teaching methods (rote learning, rigid teaching styles and curriculum content, inexperienced and inflexible teachers) and personality traits (lack of social skills, poor study skills, trouble focusing, low self-esteem, trouble connecting effort with outcome) (Baslanti & McCoach, 2006; Berube, 1995; Rimm, 2003). It can be very difficult to identify gifted underachievers as, although they may not be achieving to their potential, they often perform at satisfactory levels (Johnson et al, 1994).

The identification of gifted underachievers is closely linked to how giftedness is conceptualised and how gifted students are identified (Baslanti & McCoach, 2006). Definitions of giftedness that are conservative and focus on a very narrow range of abilities may result in many students with exceptional abilities outside these areas being neglected. Conservative definitions often lead to approaches to identification that confine the characteristics of giftedness to a very small set of behaviours, often only focused on measured academic achievement. To better identify gifted and talented students, schools need to develop broad definitions of the term (Renzulli, 1998) and use multiple tools for identification (Croft, 2003; Myers, 1980; Renzulli, 1998). Once identified, schools need to acknowledge the specific needs of these students and develop approaches and strategies to address these. In doing this, it is important to develop effective home-school communication, modify and adapt curriculum content and delivery, provide students with opportunities to pursue topics of interest, help them to set realistic goals (Berube, 1995) and embrace their individual approaches to learning to ensure that gifted and talented students have the opportunity to develop their potential (Berube, 1995; Croft, 2003; Renzulli, 1998). Gifted and talented students also require teachers who are skilled at identifying and

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nurturing potential, have specialised knowledge of the unique characteristics that gifted and talented students, their styles of learning and a respect for each student's individuality so that giftedness is nurtured and the likelihood of underachievement minimised (Croft, 2003).

It is important to acknowledge the complexities and controversies associated with every aspect of underachievement, from conceptualisation to identification to remediation. For example, Reis and McCoach (2002) report that, "For each personality trait common to gifted underachievers, there are many other underachieving gifted students who do not exhibit that trait. In addition, students who are not underachievers, may exhibit one or several of these characteristics" (p. 160). As Delisle and Galbraith (2002) report, much research has been undertaken but few conclusions have been reached. However, there does appear to be a set of factors characteristic of many underachieving gifted students (Reis & McCoach, 2002). There is also general agreement that underachievement is a learned behaviour and as such can be unlearned (Berger, 1990; Berube, 1995). In many of these cases the underachievement is content and situation specific and therefore changes in one or both of these factors may have positive outcomes for underachieving students (Berger, 1990). What evidence do we have then that some of these factors may have explained Einstein's underachievement?

His Early Childhood

Albert Einstein was born into a middle class family in Ulm, southern Germany, on March 14 1879 (Miller, 1998). His parents were both descendants of Jewish tradesmen and peddlers who felt that they had assimilated into German culture over the years (Isaacson, 2007). Although his parents were Jewish by heritage, neither of them was particularly religious.

Einstein's father, Hermann, showed an aptitude for mathematics as a child. His parents however, could not afford to send him to University so he entered into trade instead. Hermann is described as a genial family man who was both a good husband and father (Folsing, 1997; Isaacson, 2007). His mother, Pauline, was a strong-willed woman who passed on her love of music to Einstein. Pauline

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and Hermann are said to have had a harmonious relationship and Einstein was blessed to have been born into an independent-minded and intelligent family that valued education (Isaacson, 2007; Miller, 1998).

The value that Einstein's family placed on education contrasts with recent research on underachievers that indicates that many underachievers become this way because of a lack of family support. Studies contrasting gifted achievers and gifted underachievers show that, in many cases, home environment plays a significant role (Rimm, 2003). Although parents from both groups show concern for their children's education, families of underachieving students often fail to model intrinsic and independent learning, a positive commitment to career and respect for school. They also tend to deny their children the opportunity to learn through exploration and fun during their early childhood years (Rimm, 2003).

It will become evident as Einstein's life story unfolds that his family did not fit into this mould. In contrast, he was loved by his immediate and extended family and they all played a role in nurturing his inquisitive mind.

Shortly after Einstein's birth the family of three moved to Munich where Hermann joined his brother Jakob in business. When Einstein was two and a half years old his sister Maria, commonly known as Maja, was born. Research suggests that the birth of a sibling can be a catalyst for underachievement in some gifted students as they suffer a loss of self-esteem if the family stops viewing them as 'special' (Rimm, 2003). However, this may not have been the case with Einstein, as it appears that his parents did not view him as gifted, just curious. Furthermore, despite the fact that Einstein thought Maja was a new toy for him to play with when his parents first introduced them, over the years she was to become Einstein's soul mate and his constant companion and confidant (Clark, 1973; Isaacson, 2007).

As a toddler, Einstein was described as being a shy quiet boy. He did not begin to speak until the age of two and when he did talk he would quietly rehearse what he wanted to say before sharing his thoughts with others, which some interpreted as a sign of idiocy (Clark, 1973; Folsing, 1997; Isaacson, 2007). His parents were

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concerned that there may be something intellectually wrong with their son, however, a visit to their doctor confirmed that there was no need for concern. What others failed to recognise was that, even though he was verbally rehearsing his utterances, he was in fact speaking in whole sentences from a young age. Einstein ceased rehearsing his speech not long after he started school and although he continued to speak slowly, he was expressing his thoughts and ideas fluently by the age of nine (Folsing, 1997). Years later his sister hypothesised that Einstein's slow speech development may have been due to an early ambition to speak in complete sentences rather than going through the experimental phase that most youngsters are happy with (Folsing, 1997). His unusual way of talking meant that, at the start of school, his teachers were already questioning his academic ability and looking for delay, rather than giftedness, as their perceptions of him were influenced by speech patterns that were outside the norm.

Another factor that may have blocked the early identification of his giftedness was Einstein's perceived lack of social skills. He was not a rough and tumble boy, preferring instead to spend his time doing quieter more thoughtful activities (Gardner, 1993; Miller, 1998). He was happy with his own company and would spend hours making constructions, puzzling over jigsaws and playing with a steam engine that his Uncle Caesar had given him, demonstrating both persistence and tenacity when engaged in activities which interested him (Folsing, 1997; Gardner, 1993; Hayden, 2002; Isaacson, 2007). He also marveled at mysteries (Isaacson, 2007) and asked deep questions about experiences that seemed to conflict with his conceptual world (Folsing, 1997). A much quoted example is the fascination he displayed with a compass that his father showed him at four or five years of age. Einstein was struck by the tenacity of the needle to point north and wanted to know why (Gardner, 1993).

When he was made to join in games with his sister and cousins he was invariably given the role of referee as he had a highly developed sense of justice (evident throughout his life), which made him the ideal choice for the role (Folsing, 1997). Although seen by others as being anti-social, it may in fact have been that even at a young age Einstein was happy to 'march to the beat of his own drummer' (Gardner, 1993).

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At the age of five Einstein's parents employed a tutor whose job it was to prepare him for the rigors of school and therefore his tutoring sessions replicated the way he would be taught at school (mechanical rote learning). However, the tutor left soon after starting when confronted with the temper tantrums Einstein would throw when things were not to his liking. These temper tantrums may have resulted in people perceiving him as difficult and further contributed to their negative perceptions of him. Could it have been instead that, even as a pre-schooler, he was trying to get people to understand that mechanical learning was not for him?

When Einstein arrived at school he presented with speech and language problems, anti-social tendencies and behavioral problems, and it is not hard to see why his teachers at that time were not looking for signs of giftedness. One has to wonder whether it would have been any different today. Would contemporary teachers have seen early indicators of giftedness in Einstein's questioning of accepted wisdoms, his persistence when working in an area of passion and the quality of his speech rather than its delivery?

The Elementary School Years

At six years of age Einstein entered Peterschule, a Catholic elementary school near his home. Although the school had students from all socio-economic groups, Einstein was the only Jew. His teachers were considered to have had liberal views regarding denominational affiliation and were happy to include Einstein in religious education classes. It is possible, however, that there was still an element of anti-Semitism as many biographers mention teachers who negatively portrayed the role of the Jews in Jesus' life (e.g., Clark, 1973; Folsing, 1997; Isaacson, 2007).

What is not clear in accounts of his life is whether this prejudice may have been another factor in Einstein's giftedness remaining hidden. Cultural groups differ in how giftedness is conceptualised, which are shaped by their beliefs, attitudes, habits, values and practices. They in turn create an innate filter through which a person views the characteristics of others (Ford, 2003). It therefore follows that Einstein's teachers may not have recognised his giftedness as their

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cultural filters influenced what they expected to find in someone from Einstein's religious background.

Einstein was generally a well-behaved student at elementary school and was often placed at the top of his class, which made his parents very proud (Folsing, 1997; Isaacson, 2007). His school reports also commented that he tired easily during some activities at school (Folsing, 1997), which contrasts with the persistence and tenacity he showed at home, but it appears that Einstein's parents chose not to discuss this disparity with his teachers.

As his elementary years progressed cracks began to appear in Einstein's ability to remain a model student. During his third year at school he was moved Form IIIA to Form IIIB following a temper tantrum. Although at the age of eight he was not ready to directly question his teachers (Folsing, 1997), his behaviour was an outward sign of the frustration he was feeling. Einstein has stated that, in retrospect, he saw his teachers at the elementary school as drill sergeants and his teachers at the Gymnasium (German High School) as lieutenants (Folsing, 1997).

The focus on rote learning and memorisation (Isaacson, 2007; Miller, 1998) was stifling his creative thought processes and denying him opportunities to explore the subject areas that fascinated him. It would appear that this would become a key factor in his becoming a gifted underachiever.

The Gymnasium Years

Einstein's elementary years were relatively uneventful and there was little distinguishable difference between Einstein and his peers upon entry to high school (Clark, 1973). The situation would change, however, during his years at the Luitpold Gymnasium, which he entered at nine and a half years of age. Although the school was seen as being 'enlightened' at that time (as it included three to four hours a week spent on mathematics and science instruction), the majority of time was still spent on the traditional subjects of Latin and Greek (14 hours per week) (Folsing, 1997; Isaacson, 2007). Furthermore, giftedness at that time was associated with skill in lesson learning and

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test taking in these subjects and ignorance of mathematics was seen as a virtue (Folsing, 1997).

Einstein's talents were in the logical-mathematical and visual-spatial areas and included the ability to visualise problems and solutions (Gardner, 1993). However, although he maintained passing grades he found processing and memorising texts difficult. Therefore, the emphasis placed on languages may have masked his giftedness (Folsing, 1997). The curriculum provided few opportunities for his abilities to be demonstrated, as physics did not even appear in the curriculum until Year 7.

It is now recognised that the intellectual capacity of students with learning difficulties may be underestimated if they are not given opportunities to express their knowledge in a variety of ways (Sturgess, 2004). Although they may perform at an equivalent level to their peers they do not reach their personal academic potential without opportunities to exhibit their abilities (Sturgess, 2004). To achieve this requires educators to modify and adjust their teaching styles to accommodate the ways in which some students learn best.

Research indicates that one of the key factors of underachievement may be the on-going exposure to inappropriate school environments (Berger, 1990; Matthews & McBee, 2007; Myers, 1980; Reid & McGuire, 1995; Rimm, 2003) where programming and instruction is rigid (Baslanti & McCoach, 2006; Fascilla et al, 1991; Howell, 1979), and teachers require all students to cover the same content at the same pace (Howell, 1979). The risk of gifted students underachieving is significantly increased in schools where the curriculum is unchallenging and unmotivating and where students have already mastered what is being taught (Stamps, 2004). Furthermore, teachers often do not understand that gifted and talented students learn in qualitatively different ways.

To lessen the risk of underachievement, teachers need to understand that gifted children are different from their other students and from each other (Renzulli & Park, 2002). These students need to learn in the style that best suits them (for Einstein this was through visualisation) and to have content material delivered at a pace commensurate with their abilities (Baslanti & McCoach, 2006). The

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gifted and talented student's drive to "... discover and create within a personal framework of independence, self-direction and self-sufficiency must be valued, encouraged and provided for within a school setting" (Bagley, Frazee, Hosey, Kononen, Siewert, Speciale & Woodfield, 1979, p23) if we wish to stimulate the desire to acquire and create new knowledge (Renzulli & Park, 2002) and foster the 'Einstein's' that sit in our classrooms today.

Teachers play a critical role in identifying and nurturing the potential of gifted and talented students. They need to be skilled at recognising this potential in all students, regardless of gender, socio economic status and cultural heritage, and not allow their conscious or sub-conscious prejudices or biases to cloud their judgment (Powell & Siegle, 2000). They also need to be both a resource and a catalyst for learning (Bagley et al, 1979), accepting that their gifted and talented students may well ask difficult questions that challenge knowledge that has long been accepted by others, just as Einstein did at school (Miller, 1998). Professional development [PD] is essential to ensure that inexperienced teachers learn to see potential in inquisitive students, rather than viewing them as disruptive and annoying (Berube, 1995). Furthermore, PD is crucial as incompetent and/or insecure teachers can be a contributing factor to underachievement in some gifted and talented students (Myers, 1980).

In hindsight, it is possible to see that Einstein's originality of thought, flexibility in thinking, inquisitiveness, imagination and complexity of thought were all characteristics of giftedness in the area of creative thinking (Bagley et al, 1979). Had his teachers recognised his skill and passion for mathematics and science, and been willing to embrace his style of learning, they may not have tried to make him into a lesson learner, or consumer of knowledge, but rather allowed him to become a producer of new knowledge at a much younger age. It is possible, that had Einstein been exposed to flexible teaching and learning styles (Gubbins, 2002; Matthews & McBee, 2007; Renzulli & Park, 2002) and a modified curriculum, he may not have become an underachiever at school.

Although there were some teachers at the Gymnasium that satisfied his intellectual hunger they were few and far between (Clark, 1973; Folsing, 1997). During these years Einstein also began to question

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some of the ideas that were being taught. Instead of embracing his curiosity, his teachers viewed his questions with skepticism and resistance, seeing them as a challenge to authority and as a lack of respect (Folsing, 1997; Isaacson, 2007; Miller, 1998). Einstein could not understand their blind faith in what had been handed down from generation to generation and in return was losing respect for his teachers. Nor was he coping with the mechanical nature of their teaching (rote drills, lower order questioning, and memorisation) and the military tone of the school (Reid & McGuire, 1995; Isaacson, 2007).

Einstein's saving grace during this period of time was the mentors he had outside of school. The first of these was his Uncle Jakob (an engineer) who introduced Einstein to the wonders of algebra and Pythagoras' theorem. Einstein was so fascinated by this mathematical concept he spent three solid weeks developing a proof for the theory by himself. Although Einstein's proof was not original, it was unique to him (Clark, 1973; Folsing, 1997; Isaacson, 2007).

His second mentor was Max Talmud, a Russian-German medical student whom the family befriended (Clark, 1973; Gardner, 1993; Isaacson, 2007). Talmud's mentorship was pivotal in providing the mathematics challenge and stimulus that Einstein was lacking at school. He gave Einstein a series of mathematics text books that he would spend hours working through independently, sharing his solutions with his mentor once a week. Einstein enjoyed the purity and certainty of Euclidean geometry and mastered the material with astounding speed. Talmud is quoted as saying that "... soon the flight of his mathematical genius was so high that I could no longer follow" (no date, cited in Folsing, 1997). In order to keep challenging his young prodigy Talmud turned to discussion on philosophy to broaden Einstein's horizons (Folsing, 1997; Isaacson, 2007).

Since ancient times mentors have nurtured potential (Clasen & Clasen, 2003) and they can be a crucial factor in the development of giftedness and talent. Mentors can provide the guidance needed to develop skills and abilities far beyond the scope of usual school resources (Clasen & Clasen, 2003). However, mentors need to be well-matched to the current capacity of their students and to understand that they may need to hand their mentee over to someone else as their abilities develop beyond their own (Simonton, 2003). In

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Einstein's case, his uncles began the mentoring process and then handed over the reins to Max Talmud. He in turn, recognised that Einstein's mathematics skills had surpassed his own and he then sought new areas in which to challenge him. Mentors can serve as teachers, advisors and role models. They provide academic challenges as well as developing a better understanding of life's possibilities through enhanced self-understanding, self-confidence and self-esteem (Clasen & Clasen, 2003). Einstein's mentors played a critical role in nurturing his passions for mathematics and science at a time when the education system was failing to meet his educational needs.

Einstein's parents also fostered his academic development and they would buy their son textbooks to study during the summer vacation. Once again, the problems in these books fascinated Einstein and he would spend days on end developing his own proofs (Isaacson, 2007). In effect, both his parents and his mentors compacted the mathematics and science curriculum for Einstein (albeit outside of school). By the time physics was introduced in Year 7 it was of no interest to him, as he had already taught himself the concepts that were being introduced (Folsing, 1997).

Today, curriculum compacting is seen as an effective instructional strategy as it eliminates time spent on drills and the practicing of content and skills within a curriculum that has already been mastered. As a result, gifted and talented students have more time to spend on enrichment activities that provide academic challenge (Stamps, 2004). Curriculum compacting offers differentiated and extended instruction, varied pace and levels of development, accelerated instruction through the use of high-interest content and hands-on activities that foster high levels of engagement and creativity (Reis & Renzulli, 2004).

One can only wonder what may have happened had Einstein been enrolled at a school, for example, that used Reis & Renzulli's (2004) *School Wide Enrichment Model* [SEM]. This programme provides more opportunities for the hidden gifted (Riley, Bevan-Brown, Bicknall, Carroll-Lind & Kearney, 2004) and those previously marginalised by traditional assessment measures to be identified (Renzulli, 2001). SEM offers three levels of enrichment, however it is the final tier,

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Type III enrichment, which offers students who demonstrate ability, commitment and creativity, opportunities to pursue activities in their self-selected area of performance. Type III enrichment also facilitates self-differentiation in learning (Haensley, 1999) and recognises that gifted behaviours within an individual are both temporal and specific to certain areas of study and not pervasive to time and situation (Delisle & Renzulli, 1982). It allows students to act gifted during activities of maximum interest.

In Einstein's case the education system at that time failed to provide him with opportunities to explore his 'wonders' and 'wonderings', which is essential for the development of productive thought (Folsing, 1997). Instead the focus was on mastering prescribed material through mechanical learning. Einstein himself is quoted as saying '...it is almost a miracle that modern teaching methods have not yet entirely strangled the holy curiosity for inquiry; for what this delicate little plant needs more than anything, besides stimulation, is freedom' (American Institute of Physics, accessed September, 2, 2008).

Eventually the spirit of the Gymnasium would cause him to leave (Folsing, 1997). What is unclear is whether Einstein chose to drop out of High School or if he was in fact asked to leave. What is not in any doubt is the fact that, despite his accelerated learning outside of school, no one within the school environment had recognised his giftedness and one can only speculate how different his education may have been had educators recognised and nurtured his potential (Reid & McGuire, 1995).

One also wonders what may have happened had Einstein's parents approached the school to discuss their son's education and his deteriorating relationship with his teachers. His passion for mathematics and science was clearly evident at home yet his parents chose not get involved in his formal education. Parents can be one of the best advocates for a gifted child as they are a rich source of information (Assouline, 2003). When schools develop open lines of communication between home and school, ones that foster the open sharing of information and which value what everyone has to contribute, the needs of gifted and talented students are better met (Colangelo, 2003). Parents need to feel comfortable in approaching the school to discuss their child's giftedness and share the events

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which happen outside of the school setting that indicate this. Teachers should not be the sole identifiers of giftedness as not all teachers receive the training needed to recognise the signs of giftedness in their students (Baldwin, 2002; Gubbins, 2002; Myers, 1980; Renzulli & Park, 2000).

Teachers, however, remain the main source of nomination to gifted and talented programmes (Powell & Siegle, 2000) despite concerns over whether they are able to do this effectively. Research has demonstrated that teacher nominations can be affected by stereotypical beliefs related to factors such as gender, mathematics solving capabilities and esoteric notions of student knowledge (Powell & Siegle, 2000). Powell and Siegle (2000) found that teachers tended to refer students because they 'didn't fit the mould' rather than for the gifted behaviours they exhibited. Furthermore, students who did not complete assignments and appeared disruptive in class were rarely nominated as gifted and talented. These researchers found that teachers' innate beliefs, either consciously or sub-consciously, also formed barriers to the accurate identification of gifted and talented students, which resulted in some students continuing to underachieve.

In retrospect, one can see that Einstein's teachers may not have identified him as gifted and talented as his questioning of accepted wisdom was seen as disrespectful, not as inquisitiveness. His areas of strength were not a major component of the curriculum at the time and his average ability in languages probably precluded him from ever being considered exceptional. As a result he became a frustrated gifted underachiever.

How then can elementary and high schools ensure that they are accurately identifying gifted and talented students so that the 'Einstein's' of today are not sitting in our classrooms undetected? One of the problems in addressing this question is the lack of agreement over what constitutes giftedness and talent. However, most contemporary definitions acknowledge that giftedness can be found across a broad range of human endeavours and that this requires the use of diverse methods of identification to recognise these.

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One such definition can be found in Renzulli's *Three Ringed Conception of Giftedness* (1978; 1998). Renzulli wanted to shift the focus from identifying only 'the gifted' to also identifying the 'potentially gifted' (Baum et al, 2005). He argued that all students should be exposed to a variety of learning experiences so that multiple opportunities existed for their giftedness to shine through. He contended that gifted behaviours become evident in "... certain students (not all students), at certain times (not all times), and under certain circumstances" (Renzulli, 1998, p.6). His definition required educators to broaden their definition of giftedness to include not only the view of giftedness as being skilled in lesson learning and test-taking (school house giftedness) but also to recognise creative-productive giftedness. Students, such as Einstein, fall into this category. They are the producers of knowledge and the reconstructivists of thought in all areas of human endeavor (Renzulli, 1998).

Teachers need to be aware of the characteristics indicative of giftedness across a wider dimension and to view their students through a broader, more open-minded lens to ensure that all students' gifts are both recognised and nurtured. When the behaviours evident in Einstein's early years are compared to the Renzulli & Smith *Scales for Rating Behavioral Characteristics of Superior Students* (Renzulli & Smith, 1977, cited in Rogers, 2002), it is possible to identify several characteristics of giftedness. These include his need to discover the 'why' of things, his keen observational abilities and willingness to reason things out for himself, his task orientation and persistence, his boredom with routine tasks and rote learning, his self direction and independence, his interest in topics beyond his age level, his concern with ethics, his curiosity, his willingness to take risks, and his critical thinking. Other characteristics include his rapid learning, his divergent thinking and ability to make flexible leaps of insight and the capacity for original thought, and the development of new ideas (Alberta Learning, 2000; Webb, 1994).

Later Years of Education

After leaving the Gymnasium, Einstein joined his family in Milan, Italy. He spent a few months living with his family and at the age of

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16 wrote his first essay relating the theoretical physics that he sent to his Uncle Caesar. Although it lacked sophistication, it did show his potential in this area (Isaacson, 2007). At the same time he applied to the Zurich Polytechnic even though he was two years younger than most applicants. He passed the science and mathematics sections with ease but failed the general section (Isaacson, 2007), which meant that he was ineligible to enter.

One of the physics professors was so impressed by his scores that he encouraged him to attend his classes anyway but Einstein chose instead to attend a Cantonal School in Aarau (Miller, 1998). For the first time in his educational history Einstein flourished in school, as educators at the school believed in nurturing inner dignity and the individuality of each student (Isaacson, 2007). He was encouraged to utilise his skills in visual imaging and to learn through hands-on activities and conceptual thinking. Furthermore, rote drills, memorisation and force-fed facts were avoided (Gardner, 1993; Isaacson, 2007). He was finally in a school that fostered his creative-productive giftedness and one can only wonder whether he would have achieved greatness at a younger age had he completed all of his education at such a school.

After finishing at Aarau, Einstein once again applied to Zurich Polytechnic and was accepted. However, he was once again plunged into an academic system that focused on the mechanical learning of prescribed content which led to more conflict with his professors (Isaacson, 2007). His professors found him difficult to teach as his divergent thinking meant that, even though his solutions were always right, his methods of inquiry contrasted with the norm (Clark, 1973). Einstein also took risks in his learning that his professors found difficult to accept and understand (Clark, 1973) and he again began to question conventional wisdom, which put him at odds with his teachers (Isaacson, 2007).

As a result of the conflict and boredom he felt at the Polytechnic, Einstein began to cut classes to spend time with friends who had similar interests. He attributes his passing of final exams to his good friend Marcel Grossman, who lent Einstein his notes to study from – another indication of his ability to quickly learn prescribed content.

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Clark (1973) states that the difficulties Einstein faced during his school years taught him the virtue of self-discipline and concentration. It is also suggested that being pushed into a stance of opposition hastened Einstein's willingness to question (Burnham, 2005). Both of these characteristics were however, evident from an early age and it seems that he was better served by teachers who were willing to embrace his alternative learning style and to nurture his passions and interests.

Conclusion

Albert Einstein remained one of the 'hidden gifted' throughout his years at school as the characteristics which defined giftedness at this time encompassed neither his style of learning nor his areas of giftedness. Had his educators recognised his propensity for 'wondering' and his questioning of accepted wisdoms as signs of his inquisitiveness and embraced his unique learning style, his education may have taken a different path. Instead he attended school at a time when giftedness was defined by an individual's skill in lesson learning and test taking in Greek and Latin and not, as would have benefited Einstein, an ability to produce new ideas in an area of passion.

Likewise, had his family and mentors advocated for him with the school, encouraging them to see and nurture the potential that was seen outside of school, he may have found school a more stimulating and nurturing environment. It is important for all educators to remember that underachievement is a learned behaviour that can be unlearned in the right school environment.

The teacher must keep alive
That spark of wonder
To prevent it from becoming
Blasé from over-excitement
Wooden from routine
Fossilized through dogmatic
Instruction, or dissipated
Through random exercise
Upon trivial

(John Dewey, 1938, cited in Renzulli, 1982)

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To some, Einstein's early childhood years did not suggest genius. However, when considered in the light of modern research there are clear indicators of giftedness present: his ability to focus for extended periods of time on activities of personal interest; his deep questioning and the quality of his early speech (despite its unusual delivery); his questioning of accepted wisdom; his impatience with rote learning and his ability to learn rapidly in his areas of interest; his divergent thinking, which enabled him to make intuitive and flexible leaps of insight and; his capacity for original thought that would eventually lead him to develop new and significant scientific theories.

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