

Walking Up Hill: My Experiences as an International School Student with a Learning Difficulty

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A great deal of ink has been spilled attempting – with varying degrees of success - to delineate the exact nature of the “international school student experience”. One only has to google “third culture kid” to find the angsty musings of teenagers living overseas. While all third culture kids struggle with abstract notions of belonging and home, a select few of us belong to an oft-disdained minority, a group that faces its own unique set of challenges – international school students with learning difficulties. Collectively, we are confronted with uninformed and/or indifferent teachers, unbending external examining bodies and administrations at times more concerned with the school’s reputation than the success of “different” students, all in an environment that places an absolute premium on academic achievement. That being said I, and others like me, ended up succeeding, largely by virtue of our own efforts, the efforts of our parents, and the work of the handful of excellent teachers and administrators willing to act in our best interests. With school behind me I thought it might be worthwhile to recount my experiences – good and bad - in case they prove useful to students and families in a similar position as my family and I once were.

I am Dyslexic. Specifically I have always struggled with spelling, the arcane rules under which letters arrange themselves into words have always eluded me. To this day I survive on paper via a combination of rote learning and spellcheck. By extension, learning foreign languages was next to impossible, if I could barely spell in my mother tongue you can imagine how I fared when faced with a new lexicon. I am also dyspraxic, meaning that both my fine and gross motor skills are poor. Put simply, my movements, both large and small, aren’t particularly graceful. Academically this impacted my handwriting, I never mastered cursive and my printed scrawl was (and still is) hard to decipher. When I was nine I resorted to

writing in all capital letters so I wouldn't have to worry about reversing my b's and d's any longer. My dyspraxia also made physical education classes torture. As you might imagine, I never had any aptitude for sports; I am far too slow and uncoordinated. Thus, when we were made to play team sports, my awkward fumbblings would invariably jeopardize my team's chances of success. Being forced to fail in front of one's peers is never pleasant.

I attended an international school from September 1998 to June 2013, starting what was effectively preschool, just before my fourth birthday. The first two years of school weren't concerned with any substantive academic endeavor (I distinctly recall my spending an "English" lesson scribbling winding coils that were ostensibly the letter "O") but nonetheless my Mother remembers me being distraught one day after school and saying "I just can't do it like the other kids". While my being distressed could easily have been chalked up to a bad day at school, as it turned out my anxiety proved prophetic.

A few years after that fateful statement, a kindly looking man with glasses appeared outside my classroom and my teacher told me I would be spending an hour or so with him. The man introduced himself as "Mr Moseley" and walked me to his office where he informed me he would be performing some tests. My memory of those tests is fuzzy but I do recall him apologizing for the spelling portion - he was aware of my distaste for arranging letters. I assumed that Mr Moseley's visits would be a semi-regular occurrence but I never saw him again.

Learning how to spell is not an insignificant portion of everyone's early education and hence there are myriad ways of teaching spelling. One particularly cruel method my teachers conceived to teach this dark art was the "Have a Go Book". The "Have a Go Book" was a tall, thin, lined notebook with a pale yellow cover made of heavy textured paper; if I close my eyes I can still see it. The idea was simple. Whenever you needed to use a word you couldn't spell you made an attempt at spelling it in your "Have a Go Book"; if your attempt satisfied the teacher you were rewarded by being told the correct spelling. As the words in my vocabulary were far beyond my spelling ability, I was perpetually reaching for the infernal thing and scribbling down incomprehensible jumbles of letters. My attempts were always in vain, and I was made to repeat the futile exercise again. I will forever resent my Year 2 teacher for thinking if I failed spectacularly at something six times the seventh would somehow be different. I expect the whole system was designed to encourage "perseverance" or "self-reliance" or whatever educational buzzwords were in vogue at the time. However, for me and others like me, the "Have a Go Book" only served as an instrument of continual humiliation - it also improved my spelling not one iota.

Beyond the "Have a Go Book", when simply asking someone how to spell a word, I

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was confronted with the great torment of those who can’t spell – people talking slowly. Many people assume the appropriate response to a spelling query is saying the word in question slowly, emphasizing each syllable. Daily, my peers would answer me with their mouths contorted into exaggerated shapes, as they tried to “teach” me the spelling. This approach didn’t (and still doesn’t) work, all I learned from their pantomime of speech was which of my classmates flossed daily (fewer than I would have liked). As a consequence of this grand misconception someone enunciating a hard “ch” sends my blood pressure rocketing.

When someone asks you how to spell a word tell them. Tell them by listing, at a normal cadence, the letters that comprise the word they are

unsure about. All saying the word in question ridiculously slowly accomplishes is to make you look foolish.

At the same time as the worst of my spelling woes, Mr Mosely recommended that I have a “Personal Learning Support Assistant”, or PLSA. In a nutshell, a PLSA is a person who sits beside a student during every class and helps them cope with the demands of the lesson. For me, that boiled down to scribing. I would dictate whole pieces of work to my PLSA who would then transcribe my words in elegant, flowing cursive. Freed from the dual tyrannies of my glacial hand writing and my inability to spell, I was finally able to get down on paper the ideas in my head. The results were immediate; I went from being in the “bronze” ability group for English to “gold” in the space of one lesson. I only used my scribe for longer pieces of writing, for subjects like maths and the sciences I found it much easier to think on paper.

Despite the undeniable efficacy of my scribing class work, there were instances where I was deprived of this tool. I recall I was made to laboriously compose a poem by hand, the idea being that everyone’s poems would be typed up afterwards by the mothers who came in to help out each week. My poem made reference to a birthday cake, at the time I couldn’t spell birthday so I abbreviated it to “B-day”, trusting that my meaning was clear. I was wrong. Whoever was tasked with deciphering my hieroglyphs mistook “B-day” for “boney” and lo, the typed copy of my poem hanging on the wall referred to a “boney cake”. The macabre idea of a mal-adjusted eight year old writing about a cake full of bones must have chilled the parent typing up my poem, it’s a wonder that the typo didn’t get me quietly sent to the school counselor. I remember thinking that the error never would

have happened if I'd been allowed to dictate the poem. It makes no sense to grant a child an accommodation one day and arbitrarily take it away the next. Such needless inconsistency leads to unnecessary stress and hugely impacts academic performance.

At 13, in order to keep my documentation up to date, I underwent an assessment with my school's new education psychologist. She recommended that instead of the use of a scribe I be given access to a word processor (with spell check disabled) and extra time for exams, the one size fits all solution my school doles out to students with learning difficulties. To be clear, I face all of the same problems using a word processor as I do hand writing and hence it wasn't much of a solution. Suddenly, I found myself failing exams in English, History and Geography where before I had been thriving. It was as though I had been given glasses and then someone had taken them away, leaving my vision as blurry as before. Despite the abject failure of my using a word processor in exams the school refused to apply for a scribe for my GCSEs. The mother of all battles ensued between my parents and the school, which eventually resulted in the school agreeing to apply for a scribe. The external examining body that administered most of my GCSEs (Edexcel) granted me a scribe, the body that administered Geography (AQA) did not.

The experience left me entirely mistrustful of school administrators. I feel that for people in my position it is a safe assumption that administrators will, wittingly or unwittingly, act in a manner that is not in our best interests. Hence, parents of students with learning difficulties must advocate tirelessly for their children and never assume that the school knows best. In my experience, most of the people in charge of exam accommodations are as incompetent as they are indifferent and wish you would just go away.

By and large, my Edexcel GCSEs went well, bar art, which I flunked because of an abject lack of talent, along with a propensity for earnestly applying my ineptitude to "drawings" of tanks, superheroes, and robots. Despite my not being granted a scribe for Geography, I still managed to scrape a good grade, largely by virtue of pre-exam coursework. Still, I didn't do nearly as well as I would have with a scribe.

After my GCSEs, I initially choose a raft of technical A Levels, (maths, physics, and chemistry) out of a supreme overestimation of my abilities and a misguided desire to build my own Iron Man suit. I reluctantly took history because my mother insisted. However, I quickly discovered that I needed to take my shoes off to do advance arithmetic, a less than ideal approach. By contrast, history was effortless. After realizing where my strengths lay, I salvaged my academic career by switching to essay-based subjects, where I thrived, without removing any footwear. My success in the humanities came in no small part due to my having access to a scribe for every exam – practice or otherwise – that I took.

During both my first ham fisted attempt at choosing subjects, and subsequent damage control, I had to ensure I picked subjects administered by examining bodies that would grant me a scribe. In practice this meant that I couldn't take English, one of my best subjects, as it was administered by AQA. Although a disappointing compromise, being realistic, there was no way I was going to be able to successfully write several essays in one sitting without a scribe. While campaigning for accommodations, it is important to keep in mind that schools are often only the lesser of two evils, and that unbending external bureaucracies that administer exams often simply refuse valid requests. With this in mind, where possible, it is often better to compromise and simply take a similar subject administered by a different examining body.

A major obstacle for those going through school with a learning difficulty is accommodations being perceived by some teachers as an indulgence, a result of education somehow gone soft. Students are regularly confronted with the unspoken notion that they should just "get on with it", sans accommodations, as, "there are no accommodations in the real world". A teacher of mine managed to voice this viewpoint, with singular clarity, during a sermon she delivered one afternoon. This teacher was overseeing my school's annual trip to UK universities – a trip I was going on. In order to create the most useful itinerary, students were asked to compile a list of the universities they would most like to see. I handed in my list, with the proviso that it was not final, as I had not investigated the accommodations offered by those universities. This addendum triggered an unlettered tirade. I was told, in no uncertain terms, that while the school may provide accommodations, universities would have no interest in doing so. I would have to "learn to get by without them", as, according to her, there are no accommodations in the "real world". Having arrived at university, I can say with some satisfaction that she was wrong. In my experience at university, professors are more concerned with what is in your head, not how it gets down on the page. Perhaps things are different in the UK, although I have it on good authority that they aren't. I find it is important to simply laugh at these situations, the people who hold these views are ignorant and wrong, and you'll probably be successful and write about it later.

Perhaps the strongest rebuttal I have to her empty claims are the actions of my history professor one night last fall. Our midterm exam began at 7pm and had no time limit, most students finish the paper in about two to four hours. I proceeded to work on the exam for eight hours, till 3 o'clock the next morning. Given that I was using voice recognition software in lieu of a scribe, I was sitting the exam alone in an isolated basement room lest I disturb anyone. The basement locked

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automatically past a certain hour, and there was no way for my professor to let me know he was going home for the night. To get my attention, he climbed down the six foot shaft to the basement window and signaled me to let him in. It is not every day that one sees a man in a flamboyant three piece suit and Cuban heels lowering himself down a sheer wall. After he had clambered back out and came inside, he first reminded me to take as much time as I needed, then he asked me to slip my exam under his door when I was done. The whole episode was refreshing after the often begrudging attitude of staff in secondary school.

Ultimately, the point that I'm trying to make with this essay is that having a learning difficulty is hard, no matter what kind of school you are in. However, by campaigning strenuously for the accommodations necessary to level the playing field, opportunities for success abound. Furthermore, the "words of wisdom" my teacher imparted ring hollow, at least in my experience. Universities are in the business of recruiting and training fine minds, most couldn't care less if a student has a learning difficulty. As far as they're concerned, if those minds needs extra time and a scribe to really shine, so be it.



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“Amazing Shortcomings, Amazing Strengths”: Beginning to Understand the Hidden Talents of Dyslexics

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Editor's note. This concept of giftedness in dyslexia is one that has not yet been widely addressed within the Asia Pacific context. This is despite the recognition given to the mild dyslexia of former prime minister of Singapore, Lee Kuan Yew, a seminal force in government for over 30 years. A search for eminent dyslexics in these areas reveals only the Indian actor, Abhishek Bachchan, and the young dyslexic Malaysian pilot, Captain James Antony Tan, the youngest pilot to fly around the world, with two entries in the Guinness Book of records, who is still only 21. There are undoubtedly many more famous dyslexics who have not yet revealed their difficulties in learning, because of the potential stigma attached. This recognition of the extraordinary strengths of some dyslexics, if they are not too daunted by the difficulties they experience in school, should begin to redress the balance. Above all, identifying and supporting the problem early can reduce the potential impact on self-esteem, allowing dyslexic people to fulfill their potential and make a full contribution to their environment

OVERVIEW OF A NEW AWAKENING

In recent years, developmental dyslexia is coming to be seen, remarkably, as a significant advantage in an increasing number of fields – often linked to substantial success in design innovation, entrepreneurial business and scientific discovery. As hard as it is for many to believe, it is becoming more and more clear that some dyslexics are capable of envisioning possibilities, seeing patterns and making discoveries that are missed by even the smartest non-dyslexics.

It is also becoming increasingly clear that all of this is because of the dyslexia, not

in spite of it. Currently, during a period of new awakening, a small number of researchers are finding more evidence that dyslexia does not result from damaged “wiring” in the brain, as many have long believed. Rather, they see an alternative (a different but valuable) “wiring” pattern – one that involves early educational difficulties – but one that provides alternative strengths and capabilities generally not available to non-dyslexic brain structures.

An example of these new perspectives on dyslexia research and practice is found in the recent book *Dyslexic Advantage* by Drs. Brock and Fernette Eide, which asserts: “the brains of individuals with dyslexia aren’t defective; they’re simply different. These wiring differences often lead to special strengths in processing certain kinds of information, and these strengths typically more than make up for the better-known dyslexic challenges.”

“We don’t see the reading, spelling, or other academic challenges associated with dyslexia as the result of a ‘disorder’ or a ‘disease.’ Instead, we see these challenges as arising from a different pattern of brain organisation – [which predisposes] dyslexic individuals to the development of valuable skills” (Eide & Eide, 2011, xvii).

There are many cases of this paradoxical mix of weaknesses and substantial strengths. It is becoming increasingly apparent that these are not really unusual – and appear to be representative of an important subgroup that needs to be studied in a systematic and rigorous fashion. A good example (to be dealt with at greater length below), is one of the founders of the modern study of molecular biology. He was a classic dyslexic, with the usual reading and writing problems throughout his early education. Yet, as he as he eventually struggled through college and graduate school and progressed into laboratory work, he found that he could predict the results of many experiments. He found that he could use his powerful dyslexic imagination to see interactions at the molecular level – seeing new patterns and developing fundamental insights and new theories (in one instance, twelve years ahead of all others in the field) about the links between the human genetic code and the development of the immune system. Later, a different scientist proved experimentally that he was right and received a Nobel Prize (Tauber & Podolsky, 1997).

The US National Science Foundation has been funding a Harvard-Smithsonian study of when and where dyslexia may be an advantage in

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doing science, especially within astrophysics (Schneps, 2013). In the UK, the dyslexic head of the Virgin Group explained long ago that his dyslexia had been a motivator in building his group of more than 250 companies as well as giving him a “business edge” (Branson, 1999). In the field of computer graphics and simulation, dyslexic artists, scientists and technologists are often leading innovators (West, 2004; 2009).¹

A dyslexic professor at Columbia University has written the book, *The Great Ocean Conveyor*, about how he was able to integrate complex information (in a manner similar to many other dyslexics) from extremely diverse sources to understand the way historic changes in ocean currents have led to abrupt climate change in the past. In the preface, he explains, “As a dyslexic, I receive my most valuable information and ideas from what I hear and diagrams I see rather than what I read on the printed page” (Broecker, 2010, ix-x).

A world famous professor of paleontology, dyslexic himself, says that he tries to teach his graduate students how to “think like a dyslexic” so they can see patterns invisible to others, making discoveries long thought impossible. The rest is “just memorisation,” he says, without significant discovery or true innovation (Horner, 2007).²

Very recently, in an especially striking example, the British electronic intelligence agency GCHQ announced publically, “Dyslexia is Britain’s secret weapon in the spy war: Top code breakers can crack complex problems because they suffer from the condition. GCHQ bosses say those with the disorder see things in codes others do not. The Cheltenham-based agency has set up a dyslexia support group.” One agency official noted that “dyslexia may in other circumstances be regarded as negative – but most people only get to see the full jigsaw picture when it’s nearly finished while the dyslexic cryptographers can see what the jigsaw looks like with just two pieces” (Mail Online, July 13, 2013). Long aware of the important contribution of distinctive dyslexic talents (along with other forms of “different thinking”), GCHQ had held its first “Diversity Day” as early as June 2006. However, the agency had rarely been so public about these considerations until they were raised by recent comments from MPs on the Commons Intelligence and Security Committee.

While many are still skeptical, an increasing number of researchers believe that learning from the lives of highly successful dyslexics and visual thinkers can lead to new insights and approaches that will help dyslexics and non-dyslexics alike – profoundly transforming fundamental ideas about education and work in a time

¹ Note: Some sections from this edition, with other writings, have been modified for inclusion in this paper.

² Filmed by NHK cameraman (Tokyo, Japan) on site of dinosaur dig, far northern central Montana on Canadian border, about 9 minutes, July 5, 2007.

when computer technologies are rapidly turning the world upside down and the established professionals seem to have lost their way. Accordingly, they say it is high time for us to begin to recognise and understand and learn how to deal with these puzzling extremes in talent – the unexpected academic weaknesses that seem often to be associated with special capabilities and success in both life and work. Low level weaknesses should not be allowed to prevent high level accomplishment. Schools, they say, almost never teach or test what dyslexics are good at – but life does.

EARLY PUZZLE

From the time of the earliest researchers (in the 1890s) until Samuel Torrey Orton (in the 1920s) and Norman Geschwind (in the 1980s), the central puzzle of dyslexia has always been the linkage of high ability in some areas with remarkable and unexpected difficulties and disabilities in other areas. For more than a century we have recognised this pattern, but have generally focused on only one aspect. With the best of intentions, we have learned much about how to fix the problems that dyslexics experience but we have done almost nothing to develop a deeper understanding of the varied and hard-to-measure talents that many dyslexics possess (Geschwind & Galaburda, 1987).

As we have noted, highly successful dyslexics nearly always say that their accomplishments and special ways of seeing come directly from their dyslexia – not in spite of their dyslexia. More researchers are now saying that we should take them at their word and give credence to what they say. Most professionals in the field have long agreed that talents are important, but eventually they almost always come to focus exclusively on the serious business of reading and academic remediation alone.

In contrast, more and more researchers are feeling a sense of personal responsibility to dyslexics as a group. They feel the need to substantially change the course of what is being done within the field. They believe there is a need to seriously embrace a radical change soon or there will be no change at all – allowing additional generations of dyslexics to suffer needlessly – as well as wasting the distinctive talents that are sorely needed by the larger society and economy as we enter an age of great uncertainty on many fronts. They recognise that we badly need the big picture thinking and original insights that seem to be the signature contributions of the most successful dyslexics. (It is a paradox, among many paradoxes, but it may be that those who would appear, initially, to need the most help are, in time, may be those most likely to be able to help the most.)

Much has changed in recent years that would suggest that these fundamental

changes in perspective may be much closer to taking place: a small conference of foundations, researchers and highly successful dyslexic individuals and their families took place in April 2013 – which has built considerable momentum in this direction; the increasing influence of the “positive psychology” movement (Seligman, 1990); efforts to integrate dyslexia research with work psychology research (in the UK and elsewhere); books, articles, blogs and websites devoted to “the dyslexic advantage.” (Eide & Eide, 2011)

WILLIAM J. DREYER – CASE STUDY OF A DYSLEXIC DISCOVERER AND HIS GRANDSON

Sometimes, a longer look at a particular case can indicate the potential of these major reversals in perspective. The passage below is excerpted from the oral history project at the California Institute of Technology in Pasadena. The speaker is the late William J. Dreyer, Ph.D., who is increasingly recognised as one of the major innovators in the early days of the biotech revolution that is now washing over all of us. In September 2007, one of his inventions was placed in the National Museum of Health and Medicine in Washington, D.C. – the first gas-phase automated protein sequencer, which he patented in 1977. The sign over the machine on exhibit reads: “The Automated Gas-Phase Protein Sequencer: William J. Dreyer and the Creation of a New Technology.”

“I knew I was different in the way that I thought, but I didn’t realise why I was so dumb at spelling ... and rote memory and arithmetic. The first time I realised how different ... brains could be ... was when I bumped into Jim Olds at a dinner party back in the late sixties. Jim ... was a professor here [at the California Institute of Technology] ... famous for his pleasure center work. A speaker talked about the way we think and compared it to holography. Jim was across the table from me. I said, ‘Oh, yes. When I’m inventing an instrument or whatever, I see it in my head and I rotate it and try it out and move the gears. If it doesn’t work, I rebuild it in my head.’ And he looked at me and said, ‘I don’t see a thing in my head with my eyes closed. ‘We spent the rest of the evening trying to figure out how two professors – both obviously gifted people at Caltech in the Biology Division – could possibly think at all, because we were so different. So then I took this up with Roger Sperry [Nobel Laureate and near lab neighbor] and I realised that I had some amazing shortcomings as well as some amazing gifts” (Caltech, 1999).³

A strong visual thinker and in many ways a classic dyslexic, Dreyer developed new ways of thinking about molecular biology. With his powerful dyslexic visual imagination, he could somehow see the molecules interacting with each other.

³ PDF at <http://oralhistories.library.caltech.edu/108/>. Roger Sperry, mentioned in this quotation, was Caltech Hixon Professor of Psychobiology 1954–1984. Sperry was awarded the Nobel Prize in Physiology or Medicine in 1981.

Sometimes he was almost entirely alone. He (with his colleague J. Claude Bennett) advanced new ideas based on new data about how genes recombine themselves to create the immune system. These ideas turned out to be many years ahead of their time.

Most did not like this new theory because it conflicted with the conventional beliefs held by most experts in the field in those years. "It was so counter to the dogma of the time that nobody believed it," his widow, Janet Dreyer, explained (Dreyer, J., 2005). Dreyer's approach also used a form of scientific investigation ("peptide mapping") with which most immunologists were then entirely unfamiliar. "Knowing what we know now pretty much any biologist would look at Bill's data and say that is what it has to mean. But few could understand it then," she noted. However, gradually, they all learned to think the way Dreyer thought. Then, it was obvious that Dreyer (and Bennett) had to be right.

TO SEE WHAT OTHERS CANNOT SEE

In his earlier school days, Dreyer had the usual reading, writing, memory and other academic difficulties experienced by most dyslexics. Throughout his career, he avoided reading and writing whenever possible. But in time, he was able to make it to college and even graduate school – where he developed his own ways of learning and began to find roles that made use of his strengths while he learned to get help in his areas of weakness.

He joined a study group. The others in the group all took careful notes in the lectures. He took no notes. He just sat there while he listened and observed carefully. Then after the lecture, they provided him with the detailed data, and he told them what it all meant. "He was giving the big picture and all the major concepts, ..." explained Janet Dreyer. Eventually, surviving a major life-threatening illness made him realise it was time to refocus his life – and then his fascination with laboratory work began to draw him in.

Soon, with his remarkable ability to visualise the molecular interactions (using his dyslexic imagination), the young Bill Dreyer became a star in the laboratory. While in graduate school in Seattle, Washington state, and while working at the National Institutes of Health (NIH) in Bethesda, Maryland, he could tell his professors and colleagues which were the best experiments to do. Somehow he knew how to proceed and where to go in this brand new field of study that came to be known as protein chemistry. He was seeing patterns and connections the others were not seeing. Like many highly successful dyslexics, Dreyer could thrive in the leading edge of a new field. Like so many dyslexics, Dreyer seemed far better suited to creating new knowledge than he was in memorising old knowledge.

At this time, his professors and section heads would write the grants, get the funding and write the research papers with him and for him based on his ideas and observations. "The money just came. Because he was doing good work, grants would just be there for him," observed Janet Dreyer. He was happy at NIH but eventually (after a previous Caltech offer had been refused) in 1963, Caltech persuaded Dreyer to come to Pasadena as a full professor at the age of 33. Clearly, the value of his pioneering work had been recognised.

However, later, because of the further development of his new and increasingly heretical ideas, William Dreyer could not get funding from academic or foundation sources for inventing his new instruments. His department head would get irate phone calls from professors from other institutions complaining about Dreyer's publications and talks. He gave many talks at the time, making some attendees angry, although others could see the importance of his innovative observations. "He was on the lecture circuit then and he [gave these talks] a lot." Of course, these were not really unproven theories, explained his widow Janet. She pointed out that Dreyer was sure of his ground because he had the data to prove the veracity of his ideas. "It was not merely a hypothesis in that paper, it was real data." However, it was data in a form so new and so alien that almost everyone in the field could not understand what he was talking about. In time, these professors, and all their students, came to see, much later, that William Dreyer had been right all along.

Because he could not get funding from the usual sources, Dreyer went to private companies to manufacture the innovative instruments he had designed and built himself – something quite unusual and discouraged at the time but now wildly popular among universities hoping for a share of large royalty payments. Seeing the potential for his inventions (and their scientific impact) but having a hatred of administration and corporate politics, Dreyer came to be the "idea man" for seven new biotech companies (including Applied Biosystems).

Years later, when Susumu Tonegawa was awarded a Nobel Prize (Physiology or Medicine, 1987) for work he had done in Switzerland, his innovative sequencing work proved (through experiments that were illegal in the US at the time) that Dreyer and his colleague had been correct in their predictions many years earlier. In

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the words of two scientific historians of this period: "This experiment marked the point of no return for the domination of the antibody diversity question by nucleotide studies: it was Susumu Tonegawa's final proof of the Dreyer-Bennett V-C translocation hypothesis through the use of restriction enzymes" (Tauber & Podolsky, 1997, 207).

FAMILY WEAKNESSES, FAMILY STRENGTHS

Later in his life, Dreyer taught molecular biology to his grandson who was clever with computers but had been having a very hard time in high school because of his own dyslexia. The grandson went to live with his grandfather. Employing the grandson as a kind of apprentice, Dreyer would start each work day (using a form of applied just-in-time learning) saying something like: "I want you to write this little search program for me today but first let me explain the biology you need to know to do this task." In time, working with Dreyer, the grandson skipped the latter part of high school, most of college, all of graduate school and was doing advanced "post-doc" level work writing computer programs, doing advanced programming developing databases, graphic user interfaces (GUIs), and other tools.

The grandson also used sophisticated scientific information visualisation techniques to help link various human traits to sections of the genetic code. In doing this work, he noted that he used his "visual thinking ability to design the architecture of the programs ... visualising the components in his head, trying it out and fixing what doesn't work, before I write the code – much like my grandfather..." He is not only doing high level work; as Dreyer and others pointed out, the grandson was in fact working at the leading edge – co-authoring peer-reviewed journal articles (King, in Roden, 2005, Hart, 2006). Indeed, one of the grandson's work colleagues only got his own Ph.D. degree (and a required publication) because the grandson was able to write a tutorial and GUI that helped a member of the colleague's required publication review committee better understand the significance of the advanced work done by the colleague (Dreyer, Dreyer & King, 2001-2004).⁴

Much later, after years of post-doc level work without even a high school diploma, the grandson decided it was time to go to college. He chose a university with very challenging standards but also an extremely good system for supporting his dyslexia—which presented continuing problems throughout his four years of study. This happened to be the University of California at Berkeley. In May of 2013, the grandson, Brandon King, graduated in Cognitive Science with honors and distinction.

⁴ Additional clarifications and further details were provided by Brandon King via email, March 23, 2009, available from Thomas G West.

Brandon's grandfather, William Dreyer, died of cancer in the spring of 2004. One of the enduring passions of his later work had been to try to understand the relationship between his dyslexia, his visual thinking and the high levels of creativity he had experienced in his own life and work. Dreyer's interest led to his participation in a small conference on visualisation technologies, creativity and dyslexia held at the National Library of Medicine in Bethesda, Maryland. This author's second book, *Thinking Like Einstein*, is dedicated to: "William J. Dreyer, 1928-2004, molecular biologist, strong visual thinker, prescient inventor, instrument maker, who loved to fly high to see what others could not see, frequently alone."

MAGNIFICENTLY ILL-ADAPTED ENGINES OF DISCOVERY

The story of the life of William Dreyer and his grandson, Brandon King, brings into sharp focus the considerable advantages, in the right setting, of the dyslexic kind of brain – at least of certain variations within the great diversity of dyslexic brains. (Of course, this story also strongly suggests what sometimes might be possible employing nontraditional educational approaches such as apprenticeship or home schooling.) We can see that this kind of brain – seemingly so magnificently ill-adapted to conventional education – can (sometimes) be a powerful engine of insight, innovation and discovery.

This kind of brain may cause many problems in early schooling but it may also, sometimes, raise some individuals rapidly to the top of a new field of knowledge – pushing forward way beyond the many who are conventionally successful students but who find it hard to conceive of anything really new or really important. Perhaps they cannot see through to the novel, unexpected solution because they have learned too well exactly what the teacher wanted them to learn, what was expected on the conventional test. Perhaps they cannot easily unlearn what they have been taught.

In another example, one high-achieving researcher at NIH, with three professional degrees, in law, medicine and pharmacology, once admitted that he was aware of his own limitations, constrained beneath a kind of glass ceiling. He was aware that in spite of all his success and academic accomplishments, he "was not dyslexic enough" to do really original, creative and important work – as he had seen in his dyslexic colleagues. (Personal communication, R.S., March 2000.)

With stories such as these, we can begin to understand that these visual-thinking dyslexics do indeed see the world differently. They think differently. They are not like non-dyslexics. They are not like each other. Often, they seem to "see things that others do not see." (This same phrase – with almost exactly the same words – reoccurs with striking frequency in many different and unconnected settings.) Yet

these same individuals have great difficulty with things that are easy for almost everyone else – especially at the lower levels of education. In schools, they are constantly tested on what they are not good at – almost by definition.

Why are they never tested, we should ask, in the areas where (some and perhaps many) have enormous talent and can make major contributions in their later life and work? Can teachers and school psychologists believe that this is possible? It is hoped that some of the stories offered here will have created a new vision of what is possible. But this new vision may also require the development of new tests and measures – ones quite different from conventional academically-oriented measures - - but perhaps ones that are better suited to the new realities of life and work, suited for the visual-thinking dyslexics but also suited for many non-dyslexics as well.

To succeed with such extremely mixed abilities, as these individuals often do, one needs to have a deep reservoir of confidence and fortitude to carry on in spite of the judgments of others that you are, in fact, really slow and lazy and stupid. To maintain the required drive, determination and sense of mission in the face of almost constant early failure and humiliation is often nothing short of miraculous. It would appear that only a comparatively small number survive these early days with enough confidence and drive to press on, against all odds, to find success in some area of special knowledge, deep understanding and passionate interest. We need to better understand the nature of this kind of success and the remarkable individuals who seem able to find their way around so many obstacles, seeking an area where they are at home with their work, often performing at very high levels of proficiency and productivity.

Those of us who are trying to understand and to help dyslexics (along with others more or less like them) must come to see that conventional academic remediation is only part of the job – and not the most interesting or important part. We need to seek ways to help dyslexics find and develop their own talents, large or small, so that they cannot be beaten down – hiding their distinctive talents along with their disabilities. One of the best ways – perhaps the only really effective way – to do this is to study the lives and work of highly successful dyslexics (in some detail and in all their great diversity) – to allow other dyslexics to see what can be done as well as showing how it can be done.

“To succeed with such extremely mixed abilities, as these individuals often do, one needs to have a deep reservoir of confidence and fortitude to carry on in spite of the judgments of others that you are, in fact, really slow and lazy and stupid.”

The story of Bill Dreyer and his grandson shows clearly the mixed problems and great potential of dyslexic individuals and dyslexic families in a most modern, scientifically-sophisticated and technologically-advanced context. The talents that many dyslexics exhibit are powerful and valuable assets (frequently hidden and misunderstood) in a rapidly changing world. These individuals may appear to be slow and backward, but in many cases they are way ahead of nearly everyone around them, those who are mostly blind to what visual thinking dyslexics can do and what they can contribute.

Over the years, more and more dyslexic individuals have become aware of their own special talents as they confront their long-hidden weaknesses and humiliations. Many are finally coming to understand the positive aspects of their own mixed abilities well enough to give themselves permission to talk about and think about things they no longer need to see as only failures and weaknesses to be hidden and denied. They have discovered that it does not go away just because you pretend it is not there.

Fathers are realising that they cannot drive it out of their sons by ever more rigid discipline. Rather, they are learning that it is best to confront it, face on, with the new realisation that there are hidden talents to be acknowledged (and used) as well as fears that will increasingly fade away in the clear light of day.

Learning to see the positive side can be powerful indeed. Of course, there is still a great deal of work to be done, but it can be focused on increasing strengths rather than decreasing weaknesses. It is urgent at this time to outline the kinds of things that need to be done – to take seriously, at long last, the varied talents and considerable strengths of dyslexics. The time is right. The time is late. The time is long overdue. Those on the front lines – the teachers, tutors, parents, advocates and school psychologists—those who have cared the most, those who have been able to understand when no one else did—unfortunately, they have often done less than they could have done because they have attended to only half of the job. They have too often focused on fixing the problems – and have totally ignored the development of talents. This should change – and we hope that it will change soon.

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ABOUT THOMAS G. WEST

Thomas G. West is the author of *In the Mind's Eye: Creative Visual Thinkers, Gifted Dyslexics and the Rise of Visual Technologies* (Prometheus Books), selected as one of the "best of the best" for the year by the American Library Association (one of only 13 books in their broad psychology, psychiatry and neuroscience category).



In the Mind's Eye was published in Japanese translation in as *Geniuses Who Hated School*. A Chinese translation was published in 2004 and a Korean translation was released in 2011. West's second book is *Thinking Like Einstein: Returning to Our Visual Roots with the Emerging Revolution in Computer Information Visualization*. Dyslexic himself, Mr. West has been invited to provide presentations for scientific, medical, art, design, computer and business groups in the U.S. and overseas, including groups in Australia, Canada, New Zealand, Hong Kong, Taiwan, Dubai and twelve European countries. Mr. West is associated, as board advisor or board member, with several organisations, including the Krasnow Institute for Advanced Study at George Mason University, the Dyslexic Advantage organisation, the Siena School and the Wye River Upper School, among others.

Recent invited conference lectures or keynotes have included: Magdalen College Oxford, Harvard and MIT, University of California at Berkeley, University of Malta, University of Trieste, the Arts Dyslexia Trust in London and an education conference in Dubai, United Arab Emirates. Early in 2013, West gave a talk on creative visual thinking, computer graphic information visualisation and dyslexia at Pixar Animation Studios in Emeryville, California - and presented a Director's Colloquium on a similar topic for scientists and staff of NASA Ames Research Center (at Moffett Field in California's Silicon Valley).

POSTSCRIPT

Important alternative research trends and perspectives have been becoming more apparent recently. The Dyslexic Advantage organisation (with which this writer is associated) has recently formulated a strategy for research progress built around the following series of observations:

It is increasingly clear that dyslexic individuals do not only differ from non-dyslexics in the ways they process written language. Rather, they differ in the ways they process almost all kinds of information. Consequently, researchers now see that they will need to study more than reading and writing.

In addition, dyslexic individuals are seen to share common strengths as well as areas of difficulty – and these strengths usually involve brain functions unrelated to reading. Indeed, the strengths of dyslexics provide the reason that there are so many dyslexic individuals in the human population – that is, the dyslexic wiring pattern in the brain has been selected over long periods of time as a favorable trait and this provides the basis for achieving such high prevalence.

Increasingly, researchers are becoming more aware that dyslexia is a late-blooming profile. The strengths of dyslexics are often more apparent later in development than the strengths of many non-dyslexics. Consequently, because these strengths are more apparent in adults than children – when the nervous system is fully matured – it is now seen as important to study dyslexic adults, including those who are excelling in their lives and work as well as those who continue to have difficulties.

Another important observation within the Dyslexic Advantage perspective is that it may be inherently difficult to measure the things that many dyslexics are good at. Dyslexic individuals often excel in complex high-level cognitive tasks. Consequently, researchers believe they need to develop more creative research approaches and testing methods capable of measuring these high-level skills and talents. These researchers are learning to re-examine dyslexic children in light of what they have learned about the mature adult dyslexic brain. This way, they hope to be able to better understand the true nature and significance of what they observe in the earlier stages of development.

To emphasise this last point, the Dyslexic Advantage organisation has chosen to adopt the image of the butterfly as the institutional logo and symbol – believing that one can only see what the dyslexic brain is “trying to become” by considering its mature form. If one were to study caterpillars only, one would never guess that this fat, ugly worm with so many legs is ultimately destined to fly high and far on wings of iridescent beauty. (Personal communications, Dyslexic Advantage, October 2013.)

Thomas West
1 November 2013

“Left Behind at the Beginning of the Race: The Paradoxes of Dyslexia”

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I am sometimes asked to write about the positive aspects of dyslexia and the way these positive traits have been reflected in my own life story.

In my own story, the beginning is familiar. The story of a little boy who could hardly read at all for the first three or four years of primary school – and then struggled for many years to keep up with his classmates. For a long time, his greatest ambition was to not be at the bottom of the class.

Gradually, however, as the curriculum changed from rote memorisation to larger concepts and logical thinking, the little boy began to see that he could easily do things that his classmates had trouble with – and that he could quickly see things that they did not easily see.

Over time, amazingly, this little boy became an author of books about dyslexia, visual talents and emerging computer graphic technologies. His writing led to invitations to give many talks, including presentations in 18 foreign countries.

His first book has been translated into three languages – Japanese, Chinese and, most recently, Korean. To his surprise (and to the delight of his publisher), over time, his first book became a classic – an “evergreen,” as they say in the trade, a book that never stops selling.

“I was happy as a child... I have been happier every year since I became a man. But this interlude of school [made] a somber grey patch upon the chart of my journey... All my contemporaries and even younger boys seemed in every way better adapted to the conditions of our little world. They were far better both at the games and the lessons. It is not pleasant to feel oneself so completely outclassed

and left behind at the beginning of the race.”

These are not my words. However, these words perfectly reflect my own feelings through most of my own early education. They are the words of Sir Winston Churchill writing in 1930 of his own early life. When he wrote these words, Churchill was a well known public figure – indeed, one who many thought was well past his prime – although his greatest test and his chief accomplishments were not to unfold until nine years later with the beginning of World War II. (Churchill, *My Early Life*, 1930, pp. 38-39.)

PARADOXES OF DYSLEXIA

The field of dyslexia is full of puzzles and paradoxes. One of the greatest of these is that sometimes – perhaps one can say many times – the student who appears most dumb in the early years of schooling can be among the most capable and successful later on in the world of work – especially when the work is creative and innovative – involving the ability to ponder, think deeply, envision possibilities and to see patterns that others do not see.

As one highly successful dyslexic pointed out, it is not hard for a dyslexic to think “out of the box” because, as he says, “they have never been in the box.” In contrast, those who always could do quickly exactly what the teacher wanted (getting top grades) can sometimes find it very hard – if not impossible – to have a really new thought or to deal successfully with a really new problem or novel situation. They find it easy to retain old knowledge, but they may find it nearly impossible to create new knowledge.

PERSONAL DISCOVERIES

In my early school years, mostly in a rural state school system, I had learned to read very poorly and very late and had great difficulties with most primary school subjects. This was a puzzle to my teachers and a worry to my otherwise supportive parents.

Even in this comparatively undemanding rural school system, I could barely keep up. I could learn almost nothing by rote. I could not memorise. I could not retain exact texts or numbers. I had to have time to ponder and

“As one highly successful dyslexic pointed out, it is not hard for a dyslexic to think “out of the box” because, as he says, “they have never been in the box.”

think. I had to understand. I needed to see the connections between things. I needed to know the story. I had to find a way to visualise the information. Then, I would never forget.

I knew nothing of my own dyslexia at the time. I was not diagnosed until decades later – at the age of 41. But I did know that there were many things that I could not do – that were quite easy for my classmates. Gradually, in the last years before college, at another school, the increasingly high-level content began to change what was wanted – and what I could produce. Gradually, everything was transformed. The higher-level curriculum began to play to my strengths and my weaknesses became less important.

Before, I had trouble with arithmetic and “math facts,” but in time I came to love geometry, log tables, and even the slide rule. I eventually got good grades in a course on the philosophy, basic concepts and history of mathematics and logic that I was required to take in college. I had trouble with foreign languages, but loved linguistics and the history of language. I still had lots of trouble with spelling and my slow, faltering reading – but I began to see that I seemed to have a special knack for following logical arguments, complex story lines and higher level conceptual thinking in science, engineering and technology.

Gradually, strangely, by my final school year before college, I felt that I was getting more out of the readings than many of my classmates. I can still recall, in some detail, almost all of the readings we did during that year.

I went to a small liberal arts college that proved to be the right place, on the whole, for the further growth of these new-found strengths and abilities. Remarkably, my major studies were English Literature and Philosophy (so many books to be read and understood) and later earned a Masters degree. I found that I was well suited to do high level work – but I had to be careful because I could easily be overwhelmed by large volumes of work.

I had begun to see that, for some people, the easy things in primary school could be quite hard – but the hard things in college, graduate school and work could be quite easy.

SCHOOL WEAKNESSES, WORK STRENGTHS

After graduate school and military service, I was employed by several consulting and engineering companies where I worked in early computer information systems, studies of the effectiveness of certain new medical services, developing national energy policy and international trade (participating in one trade mission to four

Asian countries and then leading a second Asian trade mission).

Eventually, I was the number two manager for a five-year renewable energy development and training program for engineers in Egypt, funded by the US Agency for International Development.

Throughout these work experiences, I found ways around my weaknesses and ways to exploit my talents. I could easily see the big picture of our projects and how to deal with co-workers and clients. However, I learned to never mention a number unless I had it printed in front of me. My memory for certain details was too unreliable. I had little technical training, but – coming from a family of engineers and usually working with engineers, economists or computer programmers – I found I could easily understand the technical concepts and technical projects at an appropriate level. Others could be relied on for the data and details. I could write reports about the projects, explain them, plan them and, eventually, manage them.

FAMILY PATTERNS

However, I didn't really begin to understand the common difficulties and the common patterns of talent among dyslexics until our own two sons started having problems in their early years of primary school.

The idea that they were going to go through what I had gone through – this was a great emotional shock for me. Suddenly, I realised that I had to understand this thing that had been running my life – and, in part, the life of my dyslexic artist father as well as other family members, more or less.

So I had myself tested for dyslexia. I attended dyslexia conferences and started the library research that eventually became the book, *In The Mind's Eye*. I had learned that almost all the professionals in the field wanted mainly to fix reading problems. But that they mostly ignored the special talents that many dyslexics have. Coming from a family of visual-thinking artists and engineers – many with dyslexia or related problems and talents – I realised that there was more to the story than just reading problems.

My research and book focused on these talents as no other book had done before – the neurological foundations, the case studies and the profiles of famous people and the growing role of new computer graphic information visualisation technologies. I found that several important earlier neurologists had emphasised the talent side – but they had been largely ignored. Also, as I did my research, I could see the world of technology was changing in fundamental ways – almost all in favor of the dyslexics and their distinctive talents – while, of course, most

conventional educators and institutions were then – and still are – blind to these changes.

I was shocked to suddenly realise that, in most cases, the major technological changes unfolding today required skills and talents that seem to come easily to most dyslexics (information visualisation, for example) – while the things dyslexics had most difficulty with (rapid reading, fact memorisation and spelling) were becoming less and less important in life and in the workplace. Few experts understand the inevitable consequences of this major trend.

I suspect that the strong focus on the talents of dyslexics is the reason that the book is still very much alive today – and still, amazingly, regarded as radical new thinking – over twenty years since it was first published in 1991. (However, I have often pointed out that most of the basic ideas were not really new. They were set forth earlier by neurologists like Samuel Torrey Orton and Norman Geschwind. But, as noted, these ideas were largely ignored by later researchers and practitioners who mostly focused on pathology alone.) Even the university research librarians liked the book. It was selected out of some 6,000 books as one of the “best of the best” for the year by the American Library Association (one of only 13 books in their broad psychology, psychiatry and neuroscience category).

Over time, the book has come to be highly regarded in many quarters. To my great delight, Dr Oliver Sacks (the famous author of *Awakenings* and *The Man Who Mistook His Wife for a Hat*) came to write in the foreword to the second edition: “In the *Mind's Eye* brings out the special problems of people with dyslexia, but also their strengths, which are so often overlooked... It stands alongside Howard Gardner's *Frames of Mind* as a testament to the range of human talent and possibility.”

VISUAL THINKERS, VISUAL TECHNOLOGIES

Over the years, I have been invited to give talks and workshops for scientific, medical, art, design, computer and business groups in the U.S. and overseas, including groups in Australia, New Zealand, Canada, Hong Kong, Taiwan, Dubai and twelve European countries.

In addition, I came to be asked to write a regular series of articles and columns on the broad effects of visualisation technologies for a quarterly publication of the international professional association for computer graphics artists and technologists (ACM-SIGGRAPH) – a truly international organisation with many creative dyslexics (with conferences as large as 60,000 attendees, often in Los Angeles, California).

These columns have been collected into a second book with the title: Thinking Like Einstein – Returning to Our Visual Roots with the Emerging Revolution in Computer Information Visualisation.

Attitudes toward the special talents of dyslexics have been changing, but very, very slowly. Gradually, non-dyslexics are beginning to see why it is important to have dyslexics involved in their start up businesses – or their scientific research.

However, no one could be more surprised that I am with the wide and continuing interest in my books and articles and the ideas they contain. As I started my book research long ago, it was more than a small comfort to me to know that Winston Churchill, for all his major achievements as a leader in time of great crisis, had also once been at the bottom of the class – feeling “completely outclassed and left behind at the beginning of the race.”

ABOUT THE AUTHOR

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What Factors are Important to Ensure that Students with Dyslexia have a Positive Learning Experience?*

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** International Baccalaureate Extended Essay in Psychology—submitted for Assessment May 2011*

ABSTRACT

This research review investigates the factors that are important to ensure that students with dyslexia have a positive learning experience. Dyslexia is a learning disability that makes it very difficult for children to read, write and/or spell. Dyslexia is life-long, but the difficulties caused by dyslexia can be overcome with successful specialist teaching and the use of compensatory strategies (DAS, 2011). This research review has shown that dyslexic students can have positive and negative learning experiences. Some of the factors that promote a positive learning experience are effective support by teachers in the education system, appropriate learning accommodations, professional support from an Educational Psychologist providing a diagnosis and recommendations of strategies for learning, specialist teaching to assist in areas of weakness, parents and peers support to ensure that the dyslexic student feels good about themselves. This research review investigated Psychological studies and research into dyslexic self-esteem, academic self-concept, and depression as well as teaching methods, teacher training and learning strategies. A metaphor study was used to investigate how dyslexic students thought about their learning difficulties. Other texts and professional books on the subject of dyslexia, study strategies, counselling dyslexics and learning strategies were also reviewed. It was determined that when positive factors such as multisensory learning strategies, teaching support and teacher recognition and understanding of dyslexia, technology assistance in the form of computers, laptops, software and touch typing, and emotional support from parents and peers were the best way a student with dyslexia could be supported to ensure a positive learning experience. When these factors were not in place research showed that this could lead to low self-esteem, inferior and poor views of themselves which could lead to depression, increased frustration and anxiety and where social support was not present this could lead to bullying and rejection by peers.

1. INTRODUCTION

Dyslexia is a learning disability that affects approximately 10% of the population (DAS, 2011). It's not a disease or illness that can be cured it is something that stays with you for your whole life. The World Federation of Neurology (1968, cited by Riddick, 2010) says that "Dyslexia is a disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence and socio-cultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin" (Riddick, 2010. p4). This shows that dyslexics do have the potential to work as well, or even better, than their peers but they have a disability that means they need to understand. As dyslexics, they will never reach their potential if they don't understand about their own disability and how they learn.

For dyslexics to be able to reach their own potential they need help and support through their learning journey. Cogan and Flecker (2004) identify that teaching methods should reflect different learning styles to suit individual cognitive strengths and that teachers need to take the responsibility to ensure that dyslexic students flourish at school. They also identify the learning strategies necessary for the success of dyslexic students which overall are good strategies for all learners (Cogan and Flecker, 2004).

The factors that affect a dyslexic learning journey and have a direct affect on them having success in their life are, positive interaction with educators and education systems, emotional support from their friends, peers, and their Parents as well as professional help such as assessments by Educational Psychologists and additional tuition from specialist teachers (Scott, 2004).

The education system affects a dyslexic child's development dramatically because students need to have a positive learning experience and also need to have good teachers that understand their disability to be able to support them (Scott, 2004).

Peers play a big role because they are always interacting with the dyslexic children in school and the way they treat them can affect them dramatically from either being a bully to them or someone who's there to make sure they can keep up with the rest of the class (Riddick, 2010).

Parents play a major role in the learning experience of a dyslexic child; they need to nurture their development in school and make sure they are getting support for their disability (Burden, 2005).

Finally, students with dyslexia are supported by professionals and having a diagnosis that identifies strengths and weaknesses as well as an assessment that

makes recommendations to those who work with the child with dyslexia on how to support them (DAS-a, 2011). Humphrey and Mullins (2002) states that children usually associate people that can read well and fast as being intelligent and for people that can't read well they see them as usually unintelligent. Therefore, children with dyslexia usually see themselves as being "dumb and stupid" which has a negative effect on their self-esteem.

This review of research on dyslexia is important because it will explore the different factors that affect a dyslexic's learning experience and will highlight the main factors to ensure that their educational development is a positive and enjoyable learning experience.

"Parents play a major role in the learning experience of a dyslexic child; they need to nurture their development in school and make sure they are getting support for their disability."

2. DEFINITION OF DYSLEXIA

The Singapore Dyslexia Association defines dyslexia as a "condition that makes it very difficult for children to read, write and/or spell. It has nothing to do with the person's intelligence. Often weaknesses may be seen in areas such as language development, memory and sequencing. Dyslexia is a specific learning difference that is neurological in origin and can go undetected in early years of schooling. Dyslexia is life-long, but the difficulties caused by dyslexia can be overcome with successful specialist teaching and the use of compensatory strategies." (DAS-b, 2011). Riddick (2010) further identifies that the British Dyslexia Association definition specifies that dyslexia is "resistant to conventional teaching methods" and that "appropriately specific intervention, including the application of information technology and supporting counselling" will mitigate the effects of dyslexia (Riddick, 2010, p5).

3. LEARNING DIFFERENCES - A PERSONAL VIEW OF DYSLEXIA

This research review was inspired by the fact that the writer and both his older sisters have dyslexia. All three have had different learning experiences. The writer's learning experience has been a very positive one with many supporting and understanding teachers. His parents have been very helpful, especially his mother who has been very active in learning all about dyslexia and how to support all three of her children's education. However, the writer's sisters have had learning

experiences that have had more negative effects. Many of the negative factors that are described in this research review have been experienced by them.

The writer suspects that his positive learning experience is as a result of the learning curve that his parents have had with the issues they faced with their daughters education. The writer feels lucky to have had a positive learning journey and therefore feels that he is in a position to review effectively the factors that are necessary for individuals with dyslexia to have a positive learning journey.

4. NEGATIVE FACTORS OF DYSLEXIA AND THE RESULTING BEHAVIOR

Ryan (1992), identifies that the emotional effects and problems with dyslexia usually appear in early reading when they see their classmates surge ahead while they fall behind. Frustration is built up because they are not able to meet expectations of parents and teachers. Teachers usually highlight that the student is smart and that they just need to work harder, not realising that they are working at their hardest (Ryan, 1992). The dyslexic's inability to reach academic goals usually plays a significant role in how they see themselves as learners, the difficulties they have in learning often mask the fact that they have a competency in different learning areas (Cogan and Flecker, 2004).

In the classroom, students are required to do many things at once listen, learn, remember, write, spell and read all of which happens at a very fast pace and when some of the skills are weak it lets down in the whole process of learning (Cogan and Flecker, 2004). Through this experience dyslexic students believe that it is terrible to make mistakes and therefore failure is associated with negative effects rather than the positive effects of learning (Ryan, 1992). With dyslexia, strengths and weaknesses are usually exaggerated. Students experience anxiety and are more frequently frustrated at their abilities which can lead to anger and stress, by the age of 10 students can develop feeling of inferiority and negative images of themselves which can place them at higher risk of depression (Alexander-Passe, 2006, Ryan, 1992).

Burden and Burdett (2007) studied 50 boys who have dyslexia to identify their attitudes and feelings about the difficulties they had with learning. The study explored the idea of how dyslexia was representative of their difficulties by using metaphors as images. The results showed a trend towards descriptions of barriers to learning which were either surmountable or insurmountable depending on the emotional stress the individual associated with their condition. One student described his dyslexia as "it's a big blob of something sticky – it, like, sticks to you. You can't get rid of it really, but you can get rid of little bits." (Burden and Burdett, 2007, p79)

Ingesson (2007), interviewed teenagers and young adults where he gathered that the early grades of school was full of distress and failure for the majority. Many experienced bullying and as they grew older the problems became more limited to their school work. Teasing was found to be one of the issues dyslexic children faced in Riddick's (2010) research where one child reported that peers said "I was thick because I was always last" (Riddick, 2010, p142), and that many children lived in fear of being teased about their difficulties.

Alexander-Passe (2010), in his research on depression in people with dyslexia, identified that the most significant factor that led to their depression was the stigma of being different and how others perceived and treated them because of their learning differences. Most felt that they were misunderstood by their peers and teachers and felt alienated, rejected and abnormal.

5. PARENTAL SUPPORT

The first major positive factor that children with dyslexia have is parental guidance during their learning journey. Parents, especially mothers, are probably the most important person to make sure that their child is developing in school and they really have the responsibility to make sure that their children are developing well (Scott, 2004). This is supported by a qualitative study by Roll-Peterson (2007), where he highlights that the mothers in the study were active in developing strategies to support their dyslexic children. Parents are instrumental in their children seeing an educational psychologist because this is one of the only ways that their problem will be attended to but also making sure that they get adequate support inside and outside of their school (DAS-a, 2011). Parents should also be there to support their child with their studies and give them help with homework or ensure they are staying on top of their school work. Mothers are acutely aware of the issues their children face and will attempt to improve their child's self-esteem by dwelling on the positive (Riddick, 2010).

Alexander-Passe (2007) highlights that parents need to make sure that they don't over compensate for their child with learning difficulties and that it is important that they do not ostracise siblings who do not have a learning difficulty. There are many studies that have shown that dyslexia is passed down through families' by genetics and therefore it should help many families identify dyslexic problems early. Parents should learn from their experiences and help their children understand what they are going through and teach them how to live with it (Scott, 2004).

Many researchers have highlighted that it is important that parents are proactive and look after their children as having dyslexia themselves guide their children through their problems (Scott, 2004). Also parents need to be role models and

need to act the way that they want their children to work because they want encouragement that dyslexia won't control their life and affect them adversely in the careers. Mothers are "superb role models of how to be hardworking and persistent... [they] can demonstrate coping strategies for their dyslexic children" (Scott 2004, p138). Ultimately, it is the mother that does the "detective work" to have their child assessed, diagnosed and get the appropriate help and support. It is the mother who sets the example and is the role model for their child, it is she who focuses on the positives and their strengths to ensure that their child has good self-esteem and feels worthy during their education (Scott, 2004).

“Ultimately, it is the mother that does the ‘detective work’ to have their child assessed, diagnosed and get the appropriate help and support.”

6. PEERS

Humphrey (2003), identified in his study that peers are very significant in the life of a child with dyslexia and this can often outweigh parenting. Peers inside a student's school probably have the biggest social influence because they hold the key to how the student sees themselves socially and this can affect how they perform in their classes. Many dyslexics have been bullied at an early age because they can't keep up with their fellow classmates (Ingesson, 2007).

Dyslexics need to feel like they are in a safe or helpful environment to be able to work at their best because it makes them feel better about their disability and therefore they associate that it is normal to be dyslexic. Usually, near the age of 10 the students start to see the difference in their levels of reading and fall behind in their development quite quickly (Ryan, 1992). In a study conducted by Gans, Kenny and Ghany (2003) they found that children with dyslexia seemed to have usually lower self-esteem than their peers. What this identified was that dyslexic children are more susceptible to having a low self-esteem than their peers and sometimes exaggerate their failures more than their peers.

Peers acceptance affects the dyslexic the most in the classroom because they care how their peers perceive them as learners and can have a large effect on their self esteem. An encouraged and supported dyslexic is empowered in their learning journey (Scott, 2004)

7. PROFESSIONAL SUPPORT

Ingesson (2007), identified that professional early diagnosis of learning difficulties is advantageous in that interventions recommended can be put into place and this is very effective for younger children. Diagnosis will also help to alleviate secondary issues such as low self-esteem and negative effects of learning difficulties such as bullying and stress. Ingesson (2007), describes that the proper explanation of the diagnosis to the child, parent and teacher also helps to reduce the negative effects of dyslexia. Scott (2004), explains that the effects of assessment are “strikingly positive” and explains that the diagnosis can be extremely liberating where they finally understand why it is so difficult for them to learn. Burden (2005), explored the diagnosis by an educational psychologist and identified the relief that parents felt and that it was helpful for them to know and gave them a greater understanding of the problems faced by their child at school. Scott (2004), identifies that dyslexia must be diagnosed correctly and that the testing must be done by psychologists as “without proper diagnosis, the right help cannot be given” (Scott, 2004, pg. 25). A well informed teacher and parent on the diagnosis can ensure that adults do whatever is necessary to support and help the child. Scott (2004), suggests that professionals are needed to diagnose dyslexics because they need to make sure that it is dyslexia and not just a reading difficulty. Otherwise the child could be labelled wrongly and not get the support they need, therefore, not helping the child cope with their learning.

Professionals are very important because they need to make sure that they confirm that children have dyslexia rather than other learning difficulties and show parents and even teachers how to work with the disability. Specialist tuition is another way that professionals can support students with dyslexia. Specialist tutors require appropriate training in being able to support students with dyslexia and in many schools special support in small classes is also provided to ensure that the student can learn (Scott, 2004). Learning strategies such as books on tape, mind-mapping, touch-typing, laptop and tablet PC’s, software aids, audio and video resources, time management such as extra time, and multisensory learning are ways in which specialists support a dyslexics learning (Cogan and Flecker, 2004).

The writer used all of these strategies in his learning journey. Books on tape made a dramatic difference to ensure he remained in sync with his classmates. Mind mapping is a good skill for a dyslexic to learn because they can express their ideas quickly before forgetting concepts and the mind-map then is used to develop a more structured essay.

Touch typing can be a vital skill for a dyslexic to learn because they are able to put their ideas into words more quickly when using a word processor with an added advantage of support from the spellchecker. In the words of Sandra Hargreaves,

(2009) in her book on 'Study Skills for Dyslexic Students', she states that the strategies and techniques that help dyslexics to achieve should be implemented and teachers are obligated to make 'reasonable adjustments' to accommodate individual needs.

8. EDUCATION

Teachers play a big part in how a dyslexic child develops; firstly the growth of a dyslexic student depends on how well the teacher works with the student by incorporating appropriate teaching strategies. Riddick (1995), identified in her study that both mothers and children with dyslexia thought that the "teachers they encountered during their school career had a critical role in how they coped at a personal level with dyslexia" (Riddick, 1995, p.71). Secondly, the teacher needs to make sure that the student is progressing and not falling behind because the teacher needs to make sure that the student with dyslexia can understand the work like everyone else. If a student is to succeed the teacher needs to make sure that they are able to cope with the course that they are learning. In fact, teachers must take responsibility for identifying students differing ability and make sure their content is accessible by all (Cogan and Flecker, 2004).

Teachers need to be taught about how to assess a student who may have learning differences and understand how the student learns because they should be one of the first people to see their difficulty with learning. This view is expressed by Humphrey (2003), who states that teachers should be adequately trained and must be accepting of students with learning difficulties. He states that the teacher-pupil relationship is critical for positive learning and the development of positive self esteem. Alodi (2000), indicated that students with dyslexia who were provided support during their educational careers have better relationships with peers and teachers. The role of teachers need to be more of a counselling role and that they need to support students with dyslexia where he states that "it is critical that teachers of children with dyslexia adopt an empathetic stance, like acceptance, this will lead to decreased feelings of isolation or exclusion" (Lawrence (1996) cited by Humphrey, 2003, p.25).

Gwernan-Jones and Burden (2009), in their review of student teachers and their attitudes towards teaching students with dyslexia was positive and that their attitudes towards teaching revealed positive beliefs about their ability to teach, however, they remained unclear as to how this could be accomplished as this was not included in their teacher training. They recommend that postgraduate training would be needed to ensure that teachers were instructed on how to practically support and help students with learning difficulties at school. Humphrey (2003), concludes in his paper that educationalists have the greatest challenge in that they not only have to teach children to succeed but they also need to ensure that their

students value themselves and that self-esteem is critical to success.

Teachers are probably the most important factor in the learning journey because the students are learning from them. Teachers should be open to the idea of dyslexia and should always recognise that it is a real problem. Teachers are probably the catalyst on how well a student performs because if they support them and help them they can really flourish. Teachers who are not understanding of learning differences can be de-motivating, students suffer because they cannot live up to their teachers expectations and also they feel like they are not good enough because they teacher does not support them. Students usually always remember teachers because of their good or bad qualities and their actions can either support or stunt their growth later in life. (Alexander-Passe, 2010)

9. CONCLUSION

Whitehead (2007) suggests that the publicity of dyslexia is vital for the development of positive picture of dyslexia for dyslexics and non-dyslexics alike. This implies that people with dyslexia will feel more comfortable and have a better self concept and also non-dyslexic people like teachers and peers will better informed and will more readily give support to people they know who have dyslexia.

The writers learning journey has been a little bumpy but it wouldn't have been as positive without all these factors in place. Most of his teachers have been understanding and helpful. His parents have helped to organise and support him at school and at home. His diagnosis of learning differences has given him strategies to help him learn and has provided access to exam accommodations such as extra time to allow him to be competitive with his peers. And finally his peers, although not always accepting and helpful in his earlier years, in recent years, they have been supporting and have an appreciation of how difficult it is for the writer to learn. The writer's journey has been more positive than that of his sister who experienced the polar opposite. Firstly, she was diagnosed quite late and therefore was not given the appropriate support that she rightfully needed at the early stages of her education. Secondly, many of her teachers were not very supportive and also misunderstood her difficulties because they were not informed about dyslexia and that meant that they were not sensitive about her learning needs, her learning journey was stressful and difficult.

Peers are important in this journey because they have the influence that parents and teachers don't have, the children want to aspire to act more like their peers and sometimes feel bad when they can't keep up with them in class. Therefore, there is usually a gap between the peers and themselves that they try to hide when working in class, for example, dyslexics find it difficult reading in front of their class

and it can make them look like they are a bad reader but really they just can't read as fast out loud. This can make them feel bad and create a bad self concept by how their peers perceive them. It is important that peers have an understanding of the difficulties that dyslexics have in learning which would make the dyslexic feel more comfortable in class.

Professionals are probably one of most influential for dyslexic children as they diagnose dyslexics and help show teachers and parents how they can support the children with dyslexia. Also they are the people who are leading research into how to deal with dyslexia and its effects and develop teaching strategies for the future (Gwernan-Jones and Burden, 2009; Alexander-Passe, 2010).

Teachers are the front line in education and it is critical that they understand what dyslexia is and its effects on learning. "Teachers instinctively teach in the way that they learned so successfully themselves" (Cogan and Flecker, 2004, pxiii) however, teaching a dyslexic student required exploration of all learning styles in a multi-sensory way which will mean teachers need to explore better ways in which to deliver the curriculum. Teachers need appropriate training on how to support and teach children with dyslexia, the better the teacher is at supporting and encouraging them the better they flourish in their education journeys.

"Teachers are the front line in education and it is critical that they understand what dyslexia is and its effects on learning."

Parents are usually the ones that have to pick up the pieces when the other factors fail because dyslexics will usually let out their stress towards their family because they feel comfortable with them. Parents need to make sure that, like teachers, they are there to be able to talk to and make sure their children are excelling in school and also still enjoy school. They need to supervise how the other factors are affecting their children because parents have the largest commitment than any else because it's their child. Parents always need to be there as advocates for their children and they need to focus on the positive and act in a determined way to ensure they succeed. Mothers are at the vanguard of this fight they are the number one supporter of their child's journey.

No single factor will make a dyslexic's journey easy and enjoyable; all the factors work in unison to ensure the dyslexic has a good experience. Without these factors there will be moments and there will be times when it will be annoying, frustrating and oppressive. If the factors are managed well there can be a limit to the uncomfortable times they will encounter which ensures a dyslexic student can have an enjoyable, fun and effective learning experience.

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Thank you
Sean Hewes
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POSTSCRIPT

I grew up in Singapore and lived there for 12 years attending an International School. I am now in Australia studying at Newcastle University. I am undertaking a double degree in Teaching and Technology. I chose this course because I had always loved the aspects of teaching and I enjoy it immensely. I also believe I have a talent for Design and Technology and therefore decided that I would match the two together because it seemed like a profession that I would love.

I am now in my second year doing quite well and enjoying it greatly. It has been quite challenging starting university because of how different the learning environment is in terms of studying independently and also living in a different country. I feel that the main challenges that I have faced have been motivation and organisation.

Motivation has been troubling because I live in Hall Accommodation at university and therefore there are a lot of people that can distraction me from going to class and getting my assignments done on time. I understand that I need to be much more disciplined than my peers to make sure that I get things done on time. As I am not being motivated and pushed by my parents and teachers to get my work done and with good quality, like I had while in high school, I find that distractions get the better of me.

Organisation has not been too difficult but there have been many times where I leave work to the last second therefore creating a sub-par assignment. But besides these issues there have not been too many troubles and my work gets done and I am achieving good grades.

The only area where I feel that my dyslexia is challenging me is the reading that I have to do for some courses, which can be up to 40 pages for each class, and sometimes there is just not enough time for me to finish the reading in time.

Living on college has many positives too. I always have help from my peers when I get stuck with my assignments. The transition from high school to university has be difficult and my university study is still challenging me but I am loving my course and that helps to keep me motivated to become a good teacher. I have had doubts about how much I would like my course, especially when things have been difficult, however, after my first week of teaching placement where I was teaching students for real I realised that it had made the right decision.

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Positive Dyslexia: Working to our Strengths!?

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Professor Tim Miles, the great British dyslexia pioneer, always highlighted the enigma of dyslexia, in that individuals with dyslexia tend to show a 'spiky' skill profile, with great strengths in some skills despite critical difficulties in others.

The global dyslexia community has made great strides over the last decades in terms of identifying individuals with dyslexia; removing barriers to their achievement; and providing support for their reading difficulties. The British Dyslexia Association (BDA) has of course played a leading role and has an outstanding track record with the 'Dyslexia Friendly Schools' initiative.

Wouldn't it be wonderful, though, if we could move to a higher level, where every individual with dyslexia – child or adult – was allowed to identify and develop their own signature strengths and skills!? We believe that the time is now right to start achieving this goal, and in this 'opinion' piece, which we hope will stimulate discussion and engagement in the dyslexia community we outline the reasons for what we term 'Positive Dyslexia'.

Positive Dyslexia has its roots in three currently unrelated 'communities of practice': dyslexia, positive psychology, and work psychology. We start with Positive Psychology, a dominant new approach that has transformed approaches to dealing with difficulties.

"... Curing the negatives does not produce the positives. . . . The skills of becoming happy turn out to be almost entirely different from the skills of not being sad, not being anxious, or not being angry". This quote, from the preface to Martin Seligman's book 'Authentic Happiness' captures the spirit of positive psychology – find what you're good at, and 'craft' your life so that you spend more of it doing what you enjoy and are good at, and happiness will result. The approach is based on sound principles, and is closely related to

long-standing evidence that pull-goals (working towards one's own objectives) are much more effective than push-goals (doing something because you're told to do it).

Positive Psychology has three points of focus: Positive experiences such as happiness, pleasure and joy; Positive individual traits including character, talents and interests; and Positive institutions, including families, schools, businesses, communities and societies. Its growing literature has captured the attention of academics and the media.

We are writing this just after the 2012 Olympics. There can seldom have been such inspiring examples of how Olympians and para-Olympians have made extraordinary achievements through the application of effort towards challenging goals. In many cases these achievements have come relatively late – some Olympians have just happened to find that they had real talents for boxing, rowing, cycling, weight-lifting ... And for those lucky athletes, the infrastructure and funding were there to identify and nurture those talents.

So, if we are to identify and nurture the talents of individuals with dyslexia, what are these talents likely to be? Characteristic talents identified by Thomas West and other skills researchers include: good visual and visualisation skills in scientific areas such as mathematics, engineering and physical sciences; abilities to recognise patterns of information especially in work with computers; creative and novel design skills with a special facility for mentally rearranging designs and information; good practical and problem-solving skills (big picture approach), an ability to avoid 'group-think' by taking a different approach.

In summarising these strengths, Brock and Fernette Eide describe four primary talent patterns, the MIND strengths, namely; Material/Mechanical Reasoning (3D spatial processing); Interconnected Reasoning (making over-arching connections between ideas and events); Narrative Reasoning (constructing detailed mental scenes using fragments of personal experience); and Dynamic Reasoning (predicting events through insight-based processing or mental simulation).

In order to further investigate the strengths relevant to positive dyslexia we undertook a series of interviews with successful adults with dyslexia and with experts in the field, aiming both at character strengths and work-related strengths. These interviews confirmed the strengths mentioned above, with a key finding being innovation within the workplace given opportunities for creativity. We also identified work-related strengths that have not previously been noted, including extensive preparation to cope with anticipated challenges, high levels of determination, and resilience to cope with setbacks. Other talents we found include an intuitive empathy with others, leading to a talent for negotiation or for support.

These strengths and talents have two characteristics: they lie well outside any education curriculum, and they are crucial to successful workplace performance. We are not claiming that every individual with dyslexia will have all these talents. Nor that an individual's greatest strength will be world leading. What we are claiming is that every individual with dyslexia will have their distinctive 'personal best' strengths, and we should be able to identify and nurture the talents that will allow them to make their strongest and most distinctive contributions.

This brings us to the third leg of this enterprise – work psychology. Personnel selection involves finding the best person for a given job, but work psychologists have significantly broadened this focus by: considering how to find the most appropriate job for a given individual; how best might an individual or a team 'craft' their roles to optimise their performance; and how to 'onboard' new staff so as to facilitate their inclusion and performance. There have been major developments in all aspects in recent years, but there is currently far too little research on dyslexia in the workplace.

We are convinced that individuals with dyslexia can provide the cutting edge for organisations in many respects—from acting as 'pit canary' for identifying system weaknesses right through to being the creative talent that transforms the organisation's systems or products. But this can only occur in an environment where their strengths are identified and nurtured.

We contend that an individual with dyslexia (of whatever age) must have, as an integral part of their assessment, an analysis of their strengths as well as their weaknesses. Our dream is that this 'profile' of skills should prove the basis of a career development plan in which strengths are discussed, suitable careers identified, appropriate role models found, and then a development programme designed to attain the planned outcomes.

So, how can Positive Dyslexia build on the foundation built by the British Dyslexia Association and other dyslexia organisations to achieve these goals?

We propose to apply the general methods that proved successful for positive psychology, which is a co-operative venture between experts in different areas, with strong involvement from the

“We are convinced that individuals with dyslexia can provide the cutting edge for organisations in many respects—from acting as ‘pit canary’ for identifying system weaknesses right through to being the creative talent that transforms the organisations systems or products.”

extended dyslexia community, including most importantly the legion of individuals with dyslexia and their supporters who are best placed to provide the insights and the impetus needed to provide the necessary inspiration and acceleration.

We have completed the necessary initial research, focused on strengths of individuals with dyslexia, and analysis of best practice in matching individual skills and personality profiles to different professions and roles, and we hope to stimulate the dyslexia community to commit to the goal of developing the agenda further.

Positive psychology has stimulated a rethink of approaches to depression, to health, and even to education, by focusing on positive individual experiences and aspirations as the driver for future happiness and success. Positive dyslexia has the opportunity to focus and strengthen these powerful ideas, stimulating individuals with dyslexia to work to their strengths.

ABOUT THE AUTHORS

PROFESSOR ROD NICOLSON

Professor Rod Nicolson from the University of Sheffield has a lifelong interest in learning, and his research with Angela Fawcett on dyslexia is internationally recognised for both theory and practice. He is currently leading the research movement into Positive dyslexia www.shef.ac.uk/psychology/staff/academic/rod-nicolson

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The Role of Positive Emotions in Learning

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Emotion is said to be the on/off switch for learning in the brain (Vail, 1994). Research has showed that positive emotions (such as academic enjoyment, pride, etc) predicted high achievement at end of semester exams whereas negative emotions (such as boredom, hopelessness, etc...) predicted low achievement on the same outcome measures (Pekrun, Goetz, Titz, & Perry, 2002). Thus, positive emotions may play a facilitating role in learning.

Fredrickson's (2001) broaden-and-build theory provides a basis for how positive emotions could impact learning. The theory hypothesises that positive emotions (e.g. joy, interest, etc) broaden humans' thoughts and behaviours and thus facilitates more adaptive responses to the learning environment. This in turn creates more learning opportunities and builds enduring personal resources. Fredrickson (2001) shows that people experiencing positive emotions have more flexible thoughts, are more creative, show more integrative thinking, are more open to information, and are more efficient. These support the "broaden" aspect of the theory that suggests that positive emotions broaden cognition. Fredrickson also shows that positive states of emotions expand attention and negative states narrow attention. For the "build" aspect of the theory, Fredrickson showed that positive emotions build psychological resiliency, an enduring personal resource.

By measuring positive and negative emotions and broad-minded coping at two time-points five weeks apart, Fredrickson showed that individuals who experience more positive emotions than others became more resilient to adversity over time (i.e. develop enhanced coping skills). In addition, there is also evidence that show that positive emotions undo lingering negative emotions: Fredrickson used a time-pressured speech preparation task to induce anxiety in participants and increased their anxiety-related sympathetic arousal. After this, participants were randomly showed one of four films that elicited positive emotions (joy and contention), neutral (control), or a negative (sadness) emotion. The participants who were shown either one of the two positive emotional films exhibited faster cardiovascular recovery

than those in the neutral condition and participants shown the sad film had the slowest cardiovascular recovery. This provides evidence to support that positive emotions are able to undo negative emotions (in this case, anxiety). Relating this to learning, the theory suggests that positive emotions broaden a student's thinking and build enhanced coping skills. Thus, a student who experiences more positive emotions should have better outcomes in school and is also better able to cope with negative events that happen as compared to a student who experiences more negative emotions. As the Fredrickson (2001) paper was one of the first expositions of the broaden-and-build theory, the theory still needs much research, especially in its direct application to student learning.

Reschly, Huebner, Appleton, & Antaramian (2008) examined the application of Fredrickson's broaden-and-build theory with a sample of students in grades 7 to 10 to specifically apply the theory in the context of school experiences. There were a total of 293 participants in this 3-year longitudinal study. The study employed three questionnaires, the first was the Positive and Negative Affect Schedule - Children (PANAS-C) used to measure positive and negative emotions. This is a good questionnaire with good evidence supporting its validity and internal consistency values of between 0.87 to 0.94. The second questionnaire was the Self-Report Coping Scale (SRCS), used to measure Fredrickson's concept of "broad-minded coping". This scale had only adequate levels of reliability and validity, in particular test-retest reliability over a 2-week period ranged from 0.6 to 0.73. Although this was not ideal, the scale's ability to closely approximate Fredrickson's concept was deemed more important than its relatively moderate reliability scores. The third questionnaire used was the Student Engagement Instrument (SEI) used to measure student engagement (both cognitive and psychological engagement) and learning at school. Validity and reliability measures of the SEI ranged from 0.72 to 0.88 (internal consistency) and 0.77 to 0.92 (alpha coefficients), deemed adequate for research use.

The results of the Reschly et al.'s (2008) study revealed that Positive Affect (PA) were significantly correlated to several engagement subscales with correlation coefficient scores ranging from 0.37 to 0.47 (all $p < .01$). Interestingly, Negative Affect (NA) was significantly negatively correlated with engagement (-0.18 to -0.25, all $p < .05$). In addition, there was a significant correlation between PA and coping strategies ($p < .01$) but there was a lack of significant association between NA and coping. Also, regression analyses reveal a mediating effect of problem-solving coping strategy on the relationship between PA and engagement. There were other significant results that are not reported here as they do not directly relate to the role of emotions and learning.

The pattern of results reported here provides support for the idea that positive emotions were related to broaden cognitive and behavioural coping strategies,

mediated by broadened problem solving coping strategies. This supports Fredrickson's broaden-and-build theory as positive emotions broaden a student's cognitive resources and builds personal coping resources and a greater student engagement in school activities and more supportive relationships with adults (e.g. teachers). This shows the importance of positive emotions to engage a student in learning. Conversely, negative emotions negatively impact on a student's engagement in learning and in contrast to positive emotions, negative emotions do not lead to enhancement of resources for coping. This study was not intended to be an intervention study that aimed directly to promote positive emotions in participants to measure learning outcomes, nevertheless, it provides strong support that positive emotions play a facilitating role in learning by increasing engagement and enhancing problem solving and coping strategies.

Linares et al.'s (2005) research examined a teacher-led programme called the Unique Minds School Program (UMSP). This programme focuses on promoting cognitive-social-emotional (CSE) competencies (self-efficacy, problem solving, and social-emotional functioning) in the presumption that such improvements in CSE skills will result in classroom level changes and thus result in improved academic learning. Although not explicitly mentioned in the paper, this aim is in line with Fredrickson's broaden-and-build theory (Fredrickson, 2001). There were a total of 119 participants across two schools and 13 classrooms and included 8% classified as special education students. The demographics of the participants reflect the general population in New York City (the location of the study). This longitudinal study had three repeated observations of the participants started in grade 4 (Baseline), then again in spring of the first evaluation year (year 1) and again in the spring of the second year (year 2).

The study was well conducted with good teacher training and consultation, and on measures of intervention integrity, the teachers met 70% fidelity standards (how well the protocol is followed and delivered) and 83-88% dosage standards (how much of the protocol was followed). The outcome measures used included the Morgan-Jinks Student Efficacy Scale (MJSES), the Teacher Observation of Classroom Adaptation-Revised (TOCA-R), and the Classroom Observation Rating Scale (CORS), all of which had adequate validity and reliability scores to be used in research. In addition, an interviewer rating of problem-solving skills containing a set of five vignettes to assess problem-solving strategies was also used. Although not a standardised measure, the

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vignettes were modelled after previous research and also had a perfect $r=1.0$ agreement between raters. Thus, this was also seen as a good measure of problem solving skills. Standard academic grades and tests of academic achievement of reading and maths were also used.

The results of the Linares et al. (2005) study showed that there was across the three time conditions, students in the intervention school reported significantly higher MJSES total self-efficacy than students in the comparison school. Students in the intervention school also used a significantly higher number of different problem-solving strategies over time than those in the comparison school. In addition, students in the intervention school were consistently described by their teachers as more socially emotionally competent over time on the TOCA-R total and all four subscales. Specifically, attention, concentration and social and emotional competence improved from baseline to Year 2 for intervention students, conversely, for comparison students, authority and compliance and lack of aggression deteriorated (i.e. more problems and more aggression) also from baseline to Year 2. Interestingly, students in the intervention school over time and after 2 years received higher maths grades than those in the comparison school, this is in spite of the fact that at baseline, the comparison school actually had significantly higher standardised maths scores. This pattern of results illustrate that the UMSP leads to consistent gains in CSE competencies (including emotional skills such as ability to develop positive emotions) and more excitingly, actually led to a higher learning outcome (as measured by maths grades). With the CSE training, students paid attention more, stayed on task longer, showed empathy and compassion for others, and helped each other in the classroom (Linares et al., 2005). Again, this provides strong evidence that positive emotions in the classroom can facilitate learning.

Another intervention study that examined the effect of promoting social, emotional, and behavioural skills looked at a programme called the Social and Emotional Aspects of Learning (SEAL) piloted by 25 Local Authorities (LA) in the United Kingdom (Hallam, 2009). The study used a repeated measures design that had two time periods (pre-assessment and post-assessment) and two key stages (Key Stage 1: aged 5-7 years and Key Stage 2: aged 7-11 years). Questionnaires used for the study were specifically designed by the authors and were not standardised tests. The questionnaires were adapted for use with young children from existing measures and consulted LA coordinators and LA project staff to ensure that the developed measures were appropriate and valid. However, little was reported on the actual validity and reliability scores of the questionnaires used and instead, the authors referred readers to Hallam, Shaw, and Rhamie (2006) for questionnaire information. Unfortunately, the Hallam et al. (2006) paper was a 225-page research report prepared for the Department for Education and Skills in London and was not published in a peer-review paper.

Hallam et al. (2006) also did not report any validity and reliability measures for the questionnaires. Hence, there are serious doubts about the validity and reliability of the questionnaires, in spite of the fact that this research was published in the Oxford Review of Education, a peer-reviewed well regarded journal. Questionnaire responses were received from 29 head-teachers, 84 teachers/teaching assistants, and 19 non-teaching staff. Questionnaire data were available from 78 schools, totalling 4257 children at Key Stage 1 prior to the introduction of the pilot initiatives and 2163 following it. At Key Stage 2, 5707 children completed the questionnaire prior and 3311 children following the pilot. Due to the large scale of this study, it would be premature to dismiss it just on the basis of questions of the validity and reliability of its measures. Unfortunately, an analysis of the procedure of the implementation of the SEAL programme revealed more weaknesses. There were many inconsistencies among the various schools implementing the programme. Some schools restricted implementation to particular year groups, in others, the whole school participated. Implementation was sometimes absorbed into the existing curricula or as a particular focus, taught every day or two or three times a week. To add to all this, there were missing data in that not all the head-teachers, teachers/teaching assistants, or non-teaching staff actually completed the entire questionnaire.

Despite all of these weaknesses, the results do show that all three groups of staff believed that the SEAL programme promoted the emotional wellbeing of pupils with a total of 91.8% of staff agreeing or strongly agreeing with the statement and only 3.3% disagreeing with the statement with the rest reporting "don't know". However, in terms of perceptions of the impact on school work, only 62% of head-teachers agreed or strongly agreed with the statement "SEAL has been successful in raising the standard of learning achieved", furthermore, only 29% of teachers agreed or strongly agreed with the same statement. This points to the notion that although students' emotional competencies improved, this may not have translated to any actual impact on learning. Analysis of the results of the pupils' responses also showed a gender difference in general with boys showing a positive change whereas the girls remained the same after implementation at both Key Stages.

Moving from the quantitative results, the qualitative findings of the study suggest that the SEAL programme helped teachers in four main aspects. Firstly, to understand their pupils better and made the teachers more aware of their responsibilities as role models for the children. Secondly, enhanced staff confidence in dealing with behavioural issues in the classroom. Thirdly, enabling teachers to have a dialogue with pupils about behaviour and fourthly, teachers were more aware of children's circumstances and realised that children do have emotional baggage. Overall, even though there were many limitations to the study and there was a lack of a proper control group, the results do point towards the role of emotions still playing at least some facilitating role in learning, not only for

the learners but also for the instructors.

The role of positive emotions in learning can be thought of in terms of Fredrickson's (2001) broaden-and-build theory. Positive emotions lead to cognitive broadening that in turn leads to building of coping resources and increased well-being that then leads to improved learning. The studies reviewed here show that including emotional skill training in schools has a facilitating impact on student learning and improve overall student wellbeing. One important point to note is that if positive emotions influences learning for children in general, what more for children with special educational needs? More research could thus specifically look at emotional skill training for children with special educational needs.

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