

Eight Revolutionary Ideas Rooted in The Arrowsmith Program

By: Howard Eaton, Ed.M., Director, Eaton Arrowsmith Schools

I sit in my home office this early July morning, listening to the sprinkler outside provide water to the vegetable garden. My computer is on, with the screen reflecting a blank Word document. I want to share my thoughts, ideas, beliefs on special education, neuroscience and the Arrowsmith Program. I will go for a walk after, taking my dog, Hector, who has been a loyal family friend for the last twelve years. This is almost the same number of years I have been engaged in the Arrowsmith Program. To be exact, it has been fifteen years. During this time the Arrowsmith Program has been my primary career focus. It has been my privilege to learn from a remarkable pioneer in Educational Neuroscience, Barbara Arrowsmith-Young.

The following words highlight what I know Barbara Arrowsmith-Young has brought to the field of Learning Disabilities and Neuroscience. These are revolutionary, paradigm shifting ideas that I hope will one day be common place in public schools around the world; that indeed children and adults of all socioeconomic backgrounds, who are struggling in school, will have open and free access to cognitive intervention solutions like the Arrowsmith Program. These are the top eight revolutionary ideas rooted in the Arrowsmith Program that we must all understand and when possible, should be shared with parents, educators, psychologists, psychiatrists, medical doctors, speech-language specialists and all those involved in the well-being of children and adults who struggle to learn.

#1) Not Lifelong

Just now I went to search for the latest definition for learning disabilities on the Learning Disabilities Association of Canada (LDAC) website. I had last seen it in 2002. I wanted to know whether the 2002 definition was still on the site, or if the definition had changed based on insights from research. It was updated in 2015, but one aspect of the definition remained the same. It still stated that “learning disabilities are lifelong”ⁱ.

What really grabbed my attention when the LDAC web page appeared on my screen was the ad above the text on the official definition of learning disabilities. It is (at this moment in time) an advertisement for the Arrowsmith Program. An intervention program that knows learning disabilities are *not* lifelong.

The irony of all this really outlines where we are at in the field of Learning Disabilities. It is a time of change — as slow as it is. Thousands, upon thousands of educators still believe that learning disabilities are lifelong. It is easy to understand this as the official definition for learning disabilities, as both Canada and the United States highlight this notion. Textbooks on learning disabilities that are used to train educators still state that learning disabilities are lifelong.

The research on the Arrowsmith Program is highlighting the fact that this is not true; that the underlying cause of learning disabilities, weaknesses in neurological functioning, can be improved. If you have time, review the decades of research undertaken on the Arrowsmith Program.ⁱⁱ Research conducted in 2018 and 2019 is showing that the Arrowsmith Program improves functional connectivity between large-scale brain networks with related improvements in cognitive abilities. These brain networks are associated with processing speed and cognitive efficiency.^{iii iv}

The concept that the brain can change (neuroplasticity) is not new. This is not an idea developed by Barbara Arrowsmith-Young alone over the last half-century. The knowledge of brain plasticity has existed for many decades.^v The challenge in education or educational policy-making is that the old ideas are hard to replace. Educational law and policy on learning disabilities are built on the pre-existing idea that the brain is fixed, and that if you have a neurological based disability, it's for life.

How long will it take for learning disability definitions to change, to remove the word *lifelong*, and replace it with less certain statements of permanence? Might we add a sentence to these official definitions like: *"learning disabilities can be caused by persistent neurological dysfunctions and might be remediated through an intensive cognitive intervention program"*?

This is a real challenge for the field. What I do know is that the current definition is creating a false narrative about the potential of children, and even adults with learning disabilities. The current definition is limiting their potential to improve cognitive capacities. More importantly, it is telling school administrators, teachers, children and their parents that your brain cannot change.

#2) Bridging the Gap: Neuroscience and Education

The Arrowsmith Program is building an important bridge between neuroscience and education. This is important as most teachers (90%) believe that knowledge of the brain is important when designing educational programs.^{vi}

Barbara Arrowsmith-Young is one of the first pioneers in a developing discipline called Educational Neuroscience.^{vii} Dr. Norman Doidge, author of *The Brain That Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science*, wrote an entire chapter on Barbara as it is quite a remarkable narrative of overcoming severe learning challenges. He highlights the fact that Barbara studied concepts in neuroscience while at graduate school and then, ingeniously found a way to translate them into an educational program focused on improving cognitive capacities for children and adults with learning disabilities. In Barbara's book, *The Woman Who Changed Her Brain: How I Left My Learning Disability Behind and Other Stories of Cognitive Transformation*, Dr. Doidge's foreword noted that *"Barbara's own story...is truly heroic, on par with the achievements of Helen Keller."*

In short, Barbara Arrowsmith-Young brought neuroscientific insight into educational practice for children and adults with learning disabilities. She was one of the first to begin to bridge this gap, and it is a critical gap to continue to fill. These two fields of study have a difficult time communicating with each other at colleges and universities around the world. It is getting better, and Barbara, through the

Arrowsmith Program, is playing a significant role in making this happen. Neuroscientists and educators at universities around the world are now studying the Arrowsmith Program. Faculties of medicine and education at several top universities are researching the Arrowsmith Program to discover how both could work together to improve educational outcomes of children.^{viii} There is a long way to go to fortify the bridge between the two fields of study, as problems related to a common language and research literacy exist.^{ix} What is great to see is the Arrowsmith Program is providing these two research fields, and their scientists, a shared language and experience.

#3) Cognitive Assessment to Cognitive Intervention Model for Learning Disabilities

I taught at the Faculty of Education, at University of British Columbia, as a Sessional Instructor. This was back in 2000-2005, prior to my full awareness and engagement in the Arrowsmith Program.

Each year I was asked to teach a course on Learning Disabilities to students in the teacher education programs. The textbook I chose for the course was widely used and praised by academics in the field of Learning Disabilities. The textbook focused on definition, assessment, intervention, and future possibilities for the field. There was, of course, no mentioning of brain plasticity or neuroplasticity. It was all about lifelong problems, bypassing weaknesses, finding accommodations, the importance of technology, and essentially how to help children with learning disabilities *survive* school.

There was one chapter in the textbook that interested me the most. It was the chapter on assessment of learning disabilities. This was because I had my own psycho-educational assessment practice at the time. I would work with psychologists to conduct comprehensive assessments, and with that data make educational recommendations for parents, teachers and school administrators. I was known in Vancouver for writing good reports with practical recommendations.

A challenge I had at the time was that many of my recommendations were not implemented in schools. My assessments were used to designate the child as having a learning disability for funding purposes, write up an Individualized Education Plan (IEP), and then placed in some filing cabinet. Yes, there were teachers that read the assessment, placed recommendations in the IEP and did a monthly review. They were *amazing*; positive development happened for that child as a result, because we found ways to work around their neurological weaknesses.

What was missing in the assessment world was a connection between neurological or cognitive deficits, and the intervention given to the child. If we found a cognitive weakness, say in processing speed or working memory, we did not give an intervention for it; instead, we wrote down a way to avoid that problem in school. We would write in the report that the child should be given extra time on tests or the ability to use a keyboard because their written output was too slow with paper-pencil tasks. There was no intervention, but rather avoidance of the underlying cause of the learning disability. The reason for this was obvious at the time to me. These neurological weaknesses were permanent.

The Arrowsmith Program is the first, and to my knowledge, the only comprehensive assessment-to-intervention program in the world addressing a wide range of cognitive capacities. Thus, unlike a school-based psycho-educational assessment that uncovers a weakness in auditory working memory, and then recommends that teachers write down what they say on the white board, the Arrowsmith Program assessment will identify this cognitive weakness and then implement a cognitive capacity improvement program to strengthen auditory working memory. Again, it is the only comprehensive *cognitive assessment to cognitive intervention* program that can also be implemented in a classroom setting.

#4) Individualized Cognitive Intervention: Progress Measured in Real-Time with Real-Time Feedback

The Arrowsmith Program Assessment was created to help teachers, parents and children understand the underlying cognitive capacities that are responsible for learning. As well, an individualized Arrowsmith report is provided to identify one's unique and specific combination of cognitive strengths and weaknesses. Many parents note the report is so comprehensive that they now understand why their child is struggling both academically and socially.

Prior to being engaged in the Arrowsmith Program, I conducted thousands of psycho-educational assessments. My goal was to get a measure of intelligence, discover other cognitive capabilities, along with areas of academic achievement in reading, writing and math. My team needed to determine if the child's potential to learn (IQ score) was in any way not showing up on measures of achievement. By reporting to the parent whether the child's intelligence was average or above average, the children will do better in areas of achievement and in school-based subject matters. The reason their child was struggling in school was because they were not getting the proper instructional format, such as extra time on tests, or the teacher was not writing down information they were saying on the board. This was not the child's fault; the school and the teachers had to do better.

Well, I can go down that road, complain about schools and how we poorly deliver curriculum to children with learning disabilities. Teachers can argue back that they do not have the time or resources to help all the children with learning difficulties, each with their own unique cognitive weakness, in their classroom. Yes, we can all agree to that point. So, what do we do? I suggest we look at the Arrowsmith Program as a solution. The Toronto Catholic District School Board (TCDSB) adopted the Arrowsmith Program for years in multiple schools and had remarkable outcome data. Again, I recommend you to look at this research and see just how many children did not require in-school resource room support after receiving the Arrowsmith Program.^x These children with learning disabilities, many receiving intensive resource room time, were able to go into the regular classroom setting without extensive assistance due to improved cognitive capacities after their targeted cognitive intervention designed around their Arrowsmith cognitive assessment.

I like this quote from Ed Batista, "make feedback normal [and] not a performance review." I don't know a lot about Ed, but I love that quote because it relates to schools, education and working with children and adults with learning disabilities. Everyone should embrace feedback, but oftentimes we are fearful of it. This is especially the case for those with learning disabilities, because it has often been negative.

The Arrowsmith Program is designed around normalizing feedback, making it immediate, seeing feedback as a way to grow your potential to learn and to set new goals in your program. Barbara Arrowsmith-Young was aware, having had a learning disability herself, that a program that worked on one's cognitive weaknesses would be challenging. Thus, she needed to design the delivery of the program in a way that would inspire one to move forward through a challenging task. She worked to develop a program that would incrementally challenge a child on a specific cognitive task, give the right feedback to reinforce success when necessary, and move them to mastery level of that cognitive task over time. Once achieved, a higher level of cognitive challenge would be presented to that child.

The Arrowsmith Program is now extremely effective with feedback for both the student and teacher through technology advancement. Today, teachers using the Arrowsmith Program walk around the classroom with tablets that display each child's cognitive program and level of engagement on their cognitive intervention program at that moment in time. Each child can see in real-time how they are doing when engaged in the programs. Thus, teacher-student interaction is high, feedback is constant, and their progress is measured by the second.

Teachers are motivated by the desire to make a difference in the lives of their students. Arrowsmith allows teachers to realize this goal when working with students with learning disabilities. Too many students with these disabilities are not engaged in school and leaving before graduating or graduate with minimal course requirements. Today, research supports this finding as related to dropout rates for those with LD^{xi} and/or ADHD^{xii}. This needs to change. We need to give these students a reason to engage in school.

#5) Connections Between Neuroscientific Research and Academic Success: The Importance of Working Memory

Achievement remediation may not be the most critical school-based intervention need for children with learning disabilities. Why would that be the case? Does one not need to read, write or understand math concepts? Of course, that is a real need, but what is important to recognize is that one needs underlying cognitive capacities to acquire those achievement skills. For example, the brain needs to have neurological abilities with verbal and visual-spatial working memory to achieve in mathematics.^{xiii}

Working memory is a part of short-term memory and allows us to hold information temporarily for processing. It is important for holding information, reasoning through information, and expressing information. A weakness in working memory capacity can be extremely problematic for a child or an adult.

Today, there is a significant body of research that has informed psychologists and neuroscientists, and less so educators, that working memory can be improved, and with this improvement, can help children succeed in areas of achievement.^{xiv} As well, research is showing that working memory skills are more important than one's IQ score in predicting academic attainment.^{xv} Thus, at times, there may be a real

need for cognitive capacity intervention before achievement intervention. This can be observed in non-responders to math or reading intervention programs.

I have seen hundreds of children with learning disabilities not benefiting from reading or math programs. These programs are delivered by excellent tutors or teachers, and yet that child's progress in reading and math is very slow. These tutors and teachers are puzzled, as they have had other children advance very quickly with them over the years. Why is there a discrepancy in their levels of progress? The answer lies in the underlying cognitive capacity profiles of those children. Some have more severe verbal working memory deficits. They may also have more severe visual-spatial working memory deficits. As a result, they will each respond differently to the achievement intervention, say in mathematics.

A problem arises when the parent or teacher continues to try the math intervention without success. The child begins to feel utterly useless, a failure and disappointment. We are trying to provide the child's brain with sensory information they cannot process, memorize and therefore, understand.

Neuroscience research is now showing that we can improve these cognitive capacities and should do so before introducing achievement skills. The Arrowsmith Program Assessment can identify these cognitive capacity weaknesses. Then the Arrowsmith Program provides the cognitive intervention to improve these weaknesses. It is imperative that we put children in educational experiences they can manage neurologically. In cases where they can't manage, we now have the knowledge to strengthen the underlying cognitive capacities so that they *can*.

#6) Teachers Can Directly Improve Cognitive Capacities of Students and Not Work Around Weaknesses in Brain Functioning

I have been writing a book on the 150 Australian families that moved to Vancouver, British Columbia, Canada to have their children enroll in the Arrowsmith Program from 2010 to 2019. There are fewer each year now since 23 schools in Australia adopted the Arrowsmith Program during that time. As part of my research for the book I decided to interview some of the schools in Australia that adopted the program. I wanted to see how the recently trained Arrowsmith Program teachers were doing, moving from the regular resource room model of intervention for children with learning difficulties to a more cognitive intervention model.

What these Australian teachers said was quite profound. One teacher in Melbourne said, *"I would never go back to a resource room model. I can't imagine it. I can now improve the child's brain, and not have to work around their weaknesses. No, no, can't imagine it."* Another from Sydney noted, *"it is so rewarding to provide this program to my students. I am giving them more hope, [and] more control over their lives."*

This is a revolutionary change in teacher education and teacher skill development. The Arrowsmith Program is educating teachers from around the world on brain functioning, how the brain changes, learns, and how to best develop neurological abilities. The Arrowsmith Program is allowing them to directly improve the quality of life of children not just in school, but for the rest of their lives.

The teacher is no longer feeling as if they are just trying to get the child through school. No longer do teachers feel like they are doing the work for the child. Instead, they are coaching children to do tasks they never imagined they could accomplish, let alone even focus on for just a few minutes.

#7) Students Are Finally in Control of Their Success and Developing Self-Awareness

I have had many meetings with parents and their children who are struggling in school. I often hear the parent state how much they are doing to help their child with homework. Whether it is to remind them to do homework or assist them as they work through a school-based project, they are spending hours repeating elementary school or high school with their child. I will also hear the child say that they go to a special education classroom or resource room to get extra help as they often did not understand the teacher in the classroom. The child will say to me, “Ms. Williams is really nice, and helps me a lot. She does things for me like writing out my answers or reading things I don’t understand.”

Essentially, what I described above is not highly unusual for families with children with learning disabilities. It is worrisome when this is teaching the child that external forces, chance, luck and adults are controlling their lives. It also teaches that life can be unpredictable, as there is someone there to help you, and at other times, not. There is a lot of research since 1966 about the locus of control.^{xvi} The finding of data is that the more external the locus of control is in a child, the more negative the outcomes for academic achievement, personality, and social adjustment. In fact, findings show that maternal prenatal external locus of control accompanies reduced mathematical and science abilities in children.^{xvii} During pregnancy, the more the mothers feel that life is about luck or fate, the more the likelihood of the external locus of control showing up in their children. It is uncertain whether the father influences their children, however, I would bet it is not good either.

The Arrowsmith Program provides an educational platform that teaches both the child and parent that success is based on their effort, their ability to set goals and to achieve them over time. The Arrowsmith Program teacher does not provide answers, reduce workload, or ask parents to re-teach concepts at home. The parent is not in the educational environment, other than to encourage and cheer their child onto success. Slowly, over time, the child can begin to build an internal locus of control. Children or adults with an internal locus of control realize that their success is dependent on their own engagement in life. You are not successful in the Arrowsmith Program because of luck or fate, but rather it comes from determination, resilience and responsibility.

This development of an internal locus of control can then lead to a better sense of self-awareness. Here the impact of the Arrowsmith Program gets very interesting to me. This is one of the most revolutionary concepts that Barbara Arrowsmith-Young is introducing to the field of Learning Disabilities. I will take this one step at a time, as it is important to be clear on this concept.

First, the Arrowsmith Program does provide a child or an adult with the opportunity to see the control of their lives coming from the internal mind, and not external forces influencing their lives (i.e., teachers

explaining or parents helping). This is where it all begins, in the self-discovery stage—that what I do and the amount of effort put into a task, will shape who I am.

Second, the Arrowsmith Program provides the child or adult with cognitive programs that builds self-awareness. That is, there are parts of our brain, like the parietal temporal occipital association area^{xviii}, that allow our minds to develop meaning from the world around us. Self-awareness is hard to achieve without developing the meaning of the world around us. These parts of our brain need to be developed and challenged.

Barbara Arrowsmith-Young developed a cognitive program called Symbol Relations. Over time, the task progressively gets more challenging. Brain imaging shows that children who do this task engages parts of the brain responsible for reasoning, or cause-and-effect problem solving. In just a 6-week summer intensive program, research showed that three large-scale brain networks responsible for self-awareness show improved connectivity.

Finally, let's bring this all together; the relationship between the ability to have an internal locus of control and its development in children and adults. The Arrowsmith Program first begins to develop this approach to life by how the individual engages in the tasks and second, the program itself builds neurological functions that allow that individual to better understand themselves as related to the world around them. The combined effect is life changing for that child or adult. It is not uncommon for an adult engaged in the Arrowsmith Program to state, *"I no longer live in a fog. I live in real-time. I know what I can do, and how I can achieve it."* If this is not a statement of self-awareness, I am not sure what one would be.

#8) Learning Disability Narrative Change

The Arrowsmith Program is changing the current learning disability narrative. It is very difficult to change the narrative of a field of study. It is usually accomplished in small steps, over many decades. This is the case for the impact of the Arrowsmith Program over the last forty years.

The current narrative in the field of learning disabilities, is as stated above, that these are lifelong disabilities. That the brain is fixed, and that children and adults with these difficulties must be understood as needing strategies, technology or other specialized instruction to work around their neurological weaknesses. Yet, they are smart as well, with average to above average intelligence. Some become famous like Albert Einstein, Thomas Edison, and more recent names like Jay Leno, Paul Orfalea, Charles Schwab, Cher, Whoopi Goldberg, Richard Branson. And even more recent names like Orlando Bloom, Keira Knightley, Michael Phelps and Daniel Radcliffe.

So, there is the narrative. You have a lifelong disability that you need to find ways to work around your weaknesses, and if you do so, you can quite possibly be successful like those famous people. I used to embrace this narrative whole-heartedly. It was all I knew.

The Arrowsmith Program is slowly revolutionizing this narrative. It is important that we do, because what we have is not working in schools today. Dropout rates are still too high.^{xix} Depression and anxiety^{xx} in those with learning disabilities is too high. Suicide rates are higher in this population and particularly with women.^{xxi} Economically having a learning disability is not good.^{xxii}

The narrative from the Arrowsmith Program is clear. If you have a learning disability you can improve your cognitive weaknesses. These are not lifelong neurological deficits. YOU oversee your success, not others. You can develop a better sense of self-awareness. You have more possibilities in life for career choices. You do not need to look up to famous people with learning disabilities to feel good about yourself and accept your fate. You can achieve so much more. As Barbara Arrowsmith-Young states, “It is through cognitive transformation that we help unlock each individual’s gifts, allowing them to dare to dream.”

Howard Eaton, Ed.M.

Director/Founder

Eaton Arrowsmith School

www.eatonarrowsmith.com

ⁱ <https://www.ldac-acta.ca/official-definition-of-learning-disabilities/>

ⁱⁱ <https://arrowsmithschool.org/research/>

ⁱⁱⁱ Jagger-Rickels, A. C., & Rose, G. M. (2018) 'Exploring the Relationship Between Improvement in an Intensive Learning Intervention and Changes in Resting state Functional Connectivity', paper presented to Sixth Biennial Conference on Brain Connectivity in Montreal, 26-28 September, presented 27 September 2018.

^{iv} Jagger-Rickels, A. C., Rose, G. M., & Kibby, M. Y. (2019) 'Effect of Comorbid Learning and Neurodevelopmental Disorders on Resting-state Functional and Effective Connectivity in Adolescents', poster presented to Cognitive Neuroscience Society Annual Conference in San Francisco, 23-26 March, viewed 26-28 March 2019.

^v <https://en.wikipedia.org/wiki/Neuroplasticity>

^{vi} Pickering, S. J., and Howard-Jones, P. A. (2007) Educators' views of the role of Neuroscience in Education: A study of UK and International perspectives, *Mind, Brain and Education*, 1(3).

^{vii} https://en.wikipedia.org/wiki/Educational_neuroscience

^{viii} <https://support.ubc.ca/projects/new-frontier-education-science-arrowsmith-young-collaborative-neuroscience-education/>

^{ix} Devonshire, I. M., and Dommett, E. J. (2010). Neuroscience: Viable Applications in Education? *The Neuroscientist*, 16 (4), 349-365.

^x <https://arrowsmithschool.org/wp-content/uploads/2016/12/tcdsb-report.pdf>

^{xi} <https://www.seattletimes.com/education-lab/report-washingtons-dropout-rate-is-high-for-students-with-learning-disabilities/>

^{xii} Fried, R., Petty, C., Faraone, S. V., Hyder, L. L., Day, H., and Biederman, J. (2016) Is ADHD a risk factor for high school dropout? A controlled study. *Journal of Attention Disorders*, 20 (5), 383-389.

^{xiii} Van de Weijer-Bergsma, E., Kroesbergen, E. H., and Van Luit, J. E. H. (2015) Verbal and visual-spatial working memory and mathematical ability in different domains throughout primary school. *Memory & Cognition*, 43 (3), 367-378

^{xiv} Soderqvist, S., and Nutley, S. B. (2015) Working memory training is associated with long term attainments in math and reading. *Frontiers in Psychology*, 6: 1711

^{xv} Alloway, T. P., and Alloway, R. G. (2010) Investigating the predictive roles of working memory and IQ in academic attainment. *Journal of Experimental Child Psychology*, 106 (1), 20-29

^{xvi} Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychology Monogram*, 80, 1-28.

^{xvii} Golding, J., Gregory, S., Ellis, G., Nunes, T., Bryant, P., Iles-Caven, Y., and Nowicki, S. (2019) Maternal prenatal external locus of control and reduced mathematical and science abilities in their offspring: A longitudinal birth cohort study. *Frontier in Psychology*, 10: 194.

^{xviii} <https://en.wikipedia.org/wiki/Parietal-temporal-occipital>

^{xix} <https://thejournal.com/articles/2017/05/17/students-with-learning-and-attention-issues-three-times-more-likely-to-drop-out.aspx>

^{xx} Nelson, J. M., and Harwood, H. (2010) Learning disabilities and anxiety: A meta-analysis. *Journal of Learning Disabilities*, 1 (44), 3-17.

^{xxi} <https://www.additudemag.com/study-people-with-learning-disabilities-more-likely-to-attempt-suicide/>

^{xxii} <http://www.ldao.ca/introduction-to-ldsadhd/articles/about-lds/learning-disabilities-statistics/>