

## **Annexure L**

| ARROWSMITH PARENT TESTIMONIALS |                             |          |
|--------------------------------|-----------------------------|----------|
| NAME                           | SITE                        | POSITION |
|                                | VIC                         | Parent   |
|                                | , VIC                       | Parent   |
|                                | VIC                         | Parent   |
|                                | VIC                         | Parent   |
|                                | VIC                         | Parent   |
|                                | Canada                      | Parent   |
|                                | Home schooling in Australia |          |
|                                | Canada and NSW school       | Parent   |
|                                | NSW                         | Parent   |
|                                | NSW                         | Parent   |
|                                | , NSW                       | Parent   |
|                                | NSW                         | Parent   |
|                                | NSW                         | Parent   |
|                                | , NSW                       | Parent   |
|                                | QLD                         | Parent   |
|                                | VIC                         | Parent   |
| Parent Reflections (14)        | VIC                         | Parents  |
| Video                          | VIC                         |          |
|                                | QLD                         | Parent   |
|                                | , QLD                       | Parent   |

attended the Arrowsmith Program for two years and one term. In addition he attended the intensive Clock program at Arrowsmith.

was challenged both socially and academically.

He had slow processing speed and a poor working memory both areas that are so important when learning. At the end of the program he had tripled these areas when re tested. Whilst they are still low it was a huge result which has afforded him the opportunity to go onto high school unassisted. He has achieved marks in the 60-70s% in his yearly exams except for maths which continues to be more of a struggle but still he has got somewhere in the 40s%, an amazing achievement from where he was. In addition, he is able to learn and that's what is a joy to watch. Socially, he's always been liked but now he can hold his own interacting and initiating friendships.

struggled from Kindergarten, from the start, by 10 o'clock in the morning he'd have his head on the desk and be completely exhausted or overwhelmed with what he was supposed to be trying to learn and the environment itself. Today, he gets the school bus at 7.20am attends a large high school, moves easily between classes, is organised and much more focused. His teachers are very complimentary about both his behaviour in class, contributions and work.

had attended many different therapies prior to Arrowsmith. I can categorically say that without Arrowsmith he would not be where he is currently. He is so much more together, happy and enjoying life.

Thank you Arrowsmith.

To whom it may concern,

I can only provide anecdotal evidence here but I am very excited about our son                      progress and I have noticed these improvements in                      academic and social abilities:

1.                      was diagnosed as a failure to thrive infant who remained behind his peers in all developmental areas. Paediatric and psychometric testing throughout primary school consistently put him at 24 months behind his peers. He had no sense of left/right; could not cross the midline, was late to talk, walk etc. He was diagnosed with Dyslexia and Central Auditory Processing Disorder in Year 3.

2. J                      finished Year 6 on a Year 4 level Maths achievement. I have strong doubts that he fully understood any Maths concepts but he has always been quite good at rote learning. He has also been good at using the learning support offered, so I was never sure what was ability, what was rote and what was assistance.

After 2 years in the Arrowsmith Program, he is now achieving a C Grade in a mainstream Year 9 Maths class. He is receiving tutoring at home to catch up on all the missed years and his teacher states that, once he has caught up with a concept, he has a strong grasp of those concepts.

3.                      never understood relationships: he could not tell the time, did not understand the calendar, seasons, birthdays etc. He did not understand family relationships (I know she's called Grandma, but who is she?). He could not understand spatial vocabulary, even though his one strength was spatial. He now tells the time and, more importantly, understands what it means. I can tell him that we are doing something tomorrow and he remembers (as much as any teenage boy!). He also understands family relationships.

4. Literacy was a serious issue. He took years and years to learn his sight words; home readers were a nightmare and then later, reading for information was not a possibility. He still has some way to go, literacy is still an issue - he struggles with word problems in Maths and his vocabulary is quite limited. Jonathan remains a phonological speller.

However, his comprehension abilities have improved immensely. He would have to watch the same movie over and over to understand what it meant. Now we can go to the movies and discuss the film. I have always read age appropriate books that would be beyond his reading ability (I still do). His ability to recall increasingly complex plots and characters is what strikes me most. Two years ago I had to start each night's reading with a summary of the previous night. Now I don't. He also reads for pleasure most nights and I would consider his reading level to be functional at present.

5. As a former high school teacher, I consider his progress in Maths and English to be at a level where he will be able to function in society. That did not look like a possibility before and one psychologist told us that he might never be able live independently. I cannot overemphasise what a relief this is for us.

6.                      has always struggled socially: he did not understand social cues or rules and suffered from chronic social anxiety. He is still shy but last year a teacher in the mainstream school had no idea that Jack had ever been socially inept. That meant a lot to me. He has insights into his own and others' behaviour and friends and family cannot believe it is the same boy.

As a teacher and educational researcher I was initially unsure about the Arrowsmith Program; the lack of peer reviewed literature and empirical evidence concerned me. So it was a leap of faith to enrol Jonathan, who was then 12, in the program. I am happy to say that                      and I feel we have absolutely done the right thing.

Kind Regards,



## COGNITIVE PROGRESS REPORT OBSERVATION FORM

Reporting period: February 2017 – May 2017

Student's Name:

Observations:

has said he:

- Finds it easier to read (physical tracking)
- Understands more words when reading

Towards the end of Term 2, thinking was clearer and he was drawing connections, especially cause and effect and consequences. We hope that will continue to develop and solidify.

has been better organised in terms of getting himself ready for school.

His OT noticed that tasks involving motor planning are now much easier to teach him and he retains the "know-how".

Comments/Concerns:

is becoming more aware of the different mindsets he needs to enter to achieve Arrowsmith goals. He is also developing some strategies to achieve this targets. Sometime he feels frustrated and dejected, so our challenge at times is to keep him positive and engaged. All staff have been very sensitive and helpful in this regard.

Parent:

3 August, 2017

### **A testimonial in support of the Arrowsmith Program for children with learning difficulties.**

I am very pleased to relate the experience of our family with the Arrowsmith Program. I have read and heard criticism of the program in the media and from academic educators, and I welcome the opportunity to add another voice and an alternative view. Having performed my own due diligence before involving our daughter with the Arrowsmith Program, I found that the criticism generally rests on two claims: first, that the results achieved by children who have undertaken the Arrowsmith Program are unconvincing, and second that their parents and teachers are somehow being coerced or deceived by unscrupulous operators. I strongly refute both of these claims.

The critics also maintain that children engaging in the Arrowsmith Program are being deprived of the benefit they would otherwise be receiving from other (supposedly) evidence-based interventions. I will address this point first, as its logic is flawed and ignores the very reason that families are drawn to investigate the Arrowsmith Program in the first place.

Students like my daughter (who is almost fifteen years old) are probably representative of those who were called 'slow learners' when I was at school. For many reasons, often unknown, mainstream teaching and mainstream interventions cannot open the door to learning for those children. Their confidence is gradually eroded, their desire to learn evaporates and their potential as strong and independent adults is imperilled. Socially isolated and often bullied, these students may develop behavioural problems and their mental health is at risk.

As parents of these children, we try every key we can find to unlock that door to learning in hope of avoiding those disasters. When we realize that the best efforts of our schools, OTs, paediatricians and speech therapists are making little or no difference, we are compelled to look for something else. By this stage, most families will have already spent a fortune on those interventions, so why not keep going? We are not depriving our children of proven therapies by accessing non-mainstream programs, we are just continuing our trial and error search for help with our child's particular barrier.

Returning to the question of the Arrowsmith program itself, I can only describe the results I see in my daughter; I can't speak for others. To summarise the diagnosed learning difficulties: my daughter has severe deficits in receptive and expressive language processing, predictably resulting in poor comprehension of both verbal and written material. Numeracy is very weak, as is working memory and cognitive testing places her in the range of 'borderline intellectual disability'. Despite all of this, our daughter's desire to learn is still strong, and she has never stopped trying her best. We became aware of the Arrowsmith Program through Norman Doidge's book on neuroplasticity and when Barbara Arrowsmith-Young presented her own story in *The Woman Who Changed Her Brain*, we felt that this was worthy of further investigation.

Again, to be brief, our engagement with the Arrowsmith program began by enrolling our daughter in a six-week intensive course in (Canada) at the Arrowsmith School in July 2015. Of course, this was very expensive, and we count ourselves lucky to have had the time and financial resources to even contemplate this step. To our surprise, about half of the families attending the course had also flown in from Australia and their long search for help had brought them there. My husband and I began to notice some positive changes in our daughter within a few weeks. The first clear change was that she could read an analogue clock, something she could never do before. Over time there were signs of improving ability to make logical connections, understand meaning and interpret verbal information. A practical example of this was a new and genuine apprehension and appreciation of the

unfolding plot of a TV program or a news story. At the same time, we saw improvement in her conversational fluency and her ability to construct meaning from slightly more abstract information than was previously possible. We began to see a renewed enthusiasm for reading and evidence of deeper involvement with plot and characters.

When we returned home to Australia, we wondered if there would be any changes evident to our daughter's Year 6 teacher. I tried to be low key and casually asked the teacher if she would let us know if she noticed any change. After several weeks, we received an email from the teacher, who said 'it's as if something has been unlocked'; she felt that understanding of real world situations and questions had definitely improved.

In 2016 we returned to for another six week intensive course for our daughter and now have enrolled her in the full Arrowsmith Program in Australia. We have continued to see changes in her speech, her reading comprehension, her understanding of new concepts, her social confidence, even her sporting ability. Of all the interventions we have tried, the Arrowsmith Program is far and away the most effective for our daughter. The evidence that we require, as parents, has been abundant and we are convinced that for our family, it is the right path. If and when we feel the Program has nothing more to offer us, we will stop.

The second criticism of the program that I want to address is the suggestion, however subtle, that Barbara Arrowsmith-Young or her staff at the Arrowsmith Program lack integrity or are not primarily focused on the learning outcomes of the students. Again, I speak only about our own experience, but in terms of professionalism and dedication I have absolutely no doubts about the staff or the administration of the Program. They are efficient and conscientious and have never promised us anything that was not delivered. As with any programmed intervention, I'm sure there is a proportion of students for whom there is no positive result or perceptible improvement. Indeed, this would be expected, whether or not large-scale peer-reviewed studies with randomised double blind methodology have been published.

As of August 2017, our daughter continues to work hard on her Arrowsmith exercises. The most recent change I can report is increased confidence to tackle monetary transactions, evidenced by a willingness to use the school canteen. We have also noted an improving accuracy in remembering and following instructions for completing homework, making school sport choices and ensuring she has the correct books packed daily for school. In her most recent school report she achieved her first ever A grading.

As a final comment, I would urge the NSW Department of Education and Training to make their own study of the results being achieved with the Arrowsmith Program in Australia. The standardised testing of children has probably already been done prior to entering the Arrowsmith Program and comparison of the results before and after Arrowsmith could be compared. There is a rush for places in the schools that are implementing the Program, with more schools running it each year. More and more teachers are being trained to run the Program and they are reporting many successes. Parents are paying the Arrowsmith fees in addition to their normal school fees in almost all cases, so the funding for a broad scale scoping study is already in place.

I submit this statement as a testament to Barbara Arrowsmith-Young's lifetime of work to create and continually improve the Arrowsmith Program. My family's experience with it has been overwhelmingly positive and I hold strong hope that its influence will become more strongly integrated into teaching and learning in Australian schools.

I was wanting to share with yourself and the Arrowsmith team the feedback relating to the past year and half that my daughter has participated in the Arrowsmith Program.

is 14 years old. Her whole school life to date has involved most of her core learning subjects being undertaken through the schools LRC (Learning Resource Centre) with lots of one on one and small group work.

She had been in a nurturing environment.

Our problem was that the key issues holding her back were not improving. She had trouble with telling time, money, maths patterns, organisation, short term memory and processing and lots of trouble explaining things verbally. Unable to comprehend books.

By the time we got to Grade 6 some teachers had commented "she just does not get it".

would ask what time I would pick her up for an appointment, if I answered 2pm she would say when is that? I would have to describe it as in between lunch time and school pick up time, and then it made sense.

would have trouble being organised and if given instructions would only be able to cope or process the first item.

We are now 1.5 years into the program and has improved in so many ways!!!

She can now work out money in shops! She is much more self organised (still room to improve and she is a teenager) but she does not need me to help her every day or rely on me. She does not get as overwhelmed or frustrated. She understands time/the concept/ knows what 11am represents in terms of which part of the day. Is able to direct me through traffic in the city using the iphone maps and not get flustered, is getting better and better at her speech/ not rambling as much. Her life skills are improving as much as her academic and she is starting to thrive.

Participating in general classroom work now as well, her marks are improving steadily.

Only last week she started reading the Animal Farm book to me. She read well and then was able to do a ¼ page reflection using dot points and list the main points within the chapter. She continued the next night with Chapter 2! This was not possible a year ago and a task like this would have ended in frustration and tears.

The changes we describe are small but growing and are making a marked difference to her life and her school work, and her family. We are so thrilled to have the opportunity to participate in the Arrowsmith Program at

Kind Regards,

Before we found the Arrowsmith Program we had serious concerns for our child's future. It was clear to my husband (assistant principal of a large Victoria secondary school with over 20 years experience in education) and I that our child was going to face increasing challenges as she moved through her schooling. The amazing tricks and tropes she had unconsciously put in place to compensate for her learning difficulties would only keep her afloat so long, and we knew as her learning disabilities began to dominate her education and life experience the effect would be significant not only academically but on her self esteem and mental health.

When she was diagnosed with a receptive and expressive language disorder one of our major frustrations was the lack of understanding and clarity around what exactly her challenges were and how they could be effectively addressed in both the short and long term. From every specialist we saw the treatment options presented were generalised and took a "band aid" approach. With no other options we whole heartedly engaged in these traditional methods but were never satisfied with either the approach or the results. It was clear they were not getting to the root of our child's problem and resolving them at their core.

The Arrowsmith Program on the other hand has done exactly that - address our child's challenges at their core and we have no doubt they are being strengthened and resolved once and for all. From the very initial testing process we were so thrilled and empowered to finally have a report that accurately described our child and her challenges. It is simply common sense that in order to address the defects they first have to be properly, specifically identified. From there, a personalised program targeting our child's cognitive weaknesses was put in place and constantly monitored as she moved through, step by step, addressing her weaknesses and "changing her brain".

It is an extraordinary thing to see the lights go on for your child. Previously there was a lot of confusion, misinterpretation, misunderstanding and strain in many areas of our daughter's life, but since starting the Arrowsmith Program we have seen the fog lifting as she begins to understand and appropriately use language, draw logical conclusions based on the information presented to her, understand social dynamics and generally engage in the world around her. I'm not sure if or how these extraordinary gains can be measured, but they are most definitely happening and beyond the incredible, measurable academic gains she is making, the social and emotional leaps and bounds are what we know will enable her to have a happy and hopeful journey ahead.

**From:**

To Whom It May Concern

RE: Arrowsmith Program

Having a child with learning difficulties can be heartbreaking as a parent. We watched our son struggle at school and fail to progress through the conventional teaching methods. Even with extensive compensatory support he never made achievements that would see him close the gap with his peers. He became increasingly more withdrawn from his school work and peers and began to struggle socially as well as academically. After extensive research, we enrolled our son in the Arrowsmith Program. This was not an easy decision for us as he had to leave home at the age of 11 to access the program. Our approach was to always take it one term at a time and our goal was for him to come out of the program requiring less ongoing support during his school years and to acquire more independent learning skills.

After only one term in the Arrowsmith Program, we saw his self-confidence grow, his dedication to school work improve, his social skills improve, and his general happiness improve. After two years in the program, his reading level went from age 6.8 (actual age 11) to 10.6 (actual age 13), his handwriting improved, and his focus and concentration increased to enable him to have less support with his school work. Whilst he has only completed two years of his assessed four years due to family restraints, we are extremely happy with the progress he has made and have 100% confidence that Arrowsmith has changed his path in life. He now has the opportunity to have his future defined by his potential, not his limitations.

(parent of                      Arrowsmith Student 2015-2016)



The Federated Schools of

# ARROWSMITH PROGRAM

Strengthening Learning Capacities

*Reflections from Parents  
of children participating  
in the  
Arrowsmith Pilot*

*June 2016*

Initially I thought I didn't have much to share with you. With more thought here I go... \*\*\*\*\* is really happy to be at school. The program has helped \*\*\*\*\* with herself confidence. For the first time in her schooling \*\*\*\*\* has been mastering her levels and feeling proud of her hard work and endeavour. She can actually see & measure her improvement. Being part of the Arrowsmith Program & mainstream has been a positive experience for \*\*\*\*\*; she has had the initiative & confidence to approach [redacted] to organise a meeting with him to request a Running Club be started once the Casey Area is completed. Today at the inter school sports the teacher from the other school said that a particular child would take extra time as she was part of their Arrowsmith Program. I proudly said that \*\*\*\*\* was in the program! He was gob smacked! He commented what a great leader she had been & that she did a wonderful job being the team manager. Her focus, enthusiasm & organisational skills have definitely improved!

Today I was in a bakery getting lunch, the lady next to me had trouble working out how much money she had & how much her lunch would cost. She didn't have enough money; the people behind the counter barely gave her any attention. I gave her money for her lunch. She was so appreciative. Later I thought I wonder what her story was; life seemed to have been a struggle for her. I thought wow we are so fortunate to be able to give our kids who have a learning difficulty an opportunity to head along a different path. **One where opportunities & possibilities don't have to be only a dream.**

Here is a bit about \*\*\*\*\* Arrowsmith journey.

\*\*\*\*\* is in year 2 & is almost half way through the [redacted] Arrowsmith pilot program. Prior to starting school & in Prep, she was always a happy but very shy, quiet girl who totally lacked confidence. She would never ask questions or be remotely curious about the world around her; she just accepted it. Her younger brother or friends would end up talking for her. She really struggled to get the words out so it was just easier for others to do it for her, despite encouragement from her teachers, parents & carers. When she communicated, it was often one word answers or basic sentences where the words were often mixed up. She struggled to follow more than 1 instruction, no matter how hard she concentrated, so she coped by copying others. While she went to numerous medical professionals including regular Speech therapy over the years, nothing could help her. It was like her mind was "frazzled". She tried SO hard at everything she did, but she could never remember the letters, sounds, numbers, etc. It was like she had never seen it before from one day to the next, and even when something was repeated from one page to the next. It was extremely frustrating for us, witnessing this.

Then she began the Arrowsmith Program and within a few months we had a new child! Whatever she was doing; Tracing, Word, Symbol Rec, L Think (very foreign exercises to any Educational professional I know!)...but it was working. Her brain was actually being re-wired. She was beginning to remember things, write more than one sentence, read basic books and remember words, letters & numbers. She could start to express her ideas in writing. But most importantly, her personality was starting to shine. She would look up and smile and say hello to adults (something I'd been trying to instil for years). She would be far more engaging with her friends, joke around and just enjoy life so much more because the world wasn't so hard to



navigate anymore. She was even beginning to ask 'how' and 'why' questions, just like her brother had been doing all along.

It was about half way through the first year of Arrowsmith & I'll never forget the day I yelled out "stop talking \*\*\*\*\*" for the very first time ever. I actually froze and burst out laughing as we'd never used those words with her before. This is because she had never been able to string so many words together, and now we couldn't stop her! Her ideas and thoughts were flowing & she was engaging in everything she did. It was like life was so much easier now as things were becoming natural to her like her peers. She was no longer spending all her energy on just managing her way through the day with having to remember things, where she was going & what she was supposed to be doing.

All these skills continue to develop & mature and it's such a pleasure being a first hand witness of \*\*\*\*\* transformation. I eagerly look forward to continuing on this incredible journey as it really is life changing. This Program is the hope for \*\*\*\*\*future.

As a dyslexic mother, I know what lay ahead for \*\*\*\*\* and it was not something that I wanted for her. Arrowsmith has been invaluable to our family, it has given us hope that we could not get from the normal class room, or even from tutors. \*\*\*\*\* is a bubbly, happy child, but she lacked confidence and struggled in the classroom. Each time she had to sit a test it would set her back further, she could see the gap between herself and her peers growing each term. She wanted to make a change.

**Since starting the Arrowsmith program the biggest change we have seen is her overall confidence.** She can now have a conversation with you and understands the topic, she used to constantly interrupt you and stop the conversation flow so you could break everything down for her, that does not happen as often. She was constantly having a mental blank, as she could not recall the word she wanted to use and used a lot of filler words. Her vocabulary has grown immensely and she just seems to be a happier child. This impacts the rest of our family as the tantrums and frustrations have decreased, resulting in a calmer, more peaceful home. We are now half way through the program and can't wait to see what the next 18 months holds for her future.

A few things that we have seen lately with \*\*\*\*\* are really pleasing to us as a family and \*\*\*\*\* as an individual. \*\*\*\*\* now wants to read whereas before she had absolutely no interest. For example at the confirmation mass last Friday she sat and counted how many candidates were making their confirmation from the programme. She also followed word for word what was said and sung the songs using the programme. She goes to Brownies and is about to take her promise which she has learnt of by heart. She has just completed the Activity Book which has a lot of writing in it and only needed a small amount of assistance with a few big words. Her thinking seems a lot clearer and socially she seems to pick up on cues a lot quicker. We feel so fortunate and grateful to have \*\*\*\*\* in the Arrowsmith programme.

Recently, in the car on our way home from a weekend in Inverloch, we were talking about \*\*\*\*\*'s Arrowsmith achievements. \*\*\*\*\* talked about how she is really starting to know how to spell now. We discussed how, at this stage, she still finds it tricky to spell words on paper but when she spells orally, it is all starting to happen. Then I had an idea ... I explained to \*\*\*\*\* the 100 most commonly used words and the relationship between knowing these words and literacy etc. I asked her if she wanted to see, just for fun, how many she knew now. She agreed. I went through the list and in the car, in the dark, no pen or paper to scribble attempts and 100 words that are listed randomly, no connections etc. \*\*\*\*\* spelled at least 80 correctly, needed a little help with approx. 10 and there were only approx. 10 that she absolutely couldn't spell!!

This is amazing! My husband, \_\_\_\_\_ and I were teary (lucky it was dark!) \*\*\*\*\* couldn't believe it herself. We all reflected that this time last year she couldn't spell 'the'. We have not been doing any work on spelling at home this past year. None! This is all Arrowsmith.

Thank you to \_\_\_\_\_, to \_\_\_\_\_ f and \_\_\_\_\_ schools and to everyone else involved with getting Arrowsmith up and running (and for offering a place for \*\*\*\*\*).

It is not just about learning to spell. It is the way \*\*\*\*\* lights up when she experiences learning in a way that she couldn't before Arrowsmith. We can see that the positive experiences that \*\*\*\*\* is now having around learning are so powerful for her and are changing how she sees herself and are making her feel excited about the learning experiences that are ahead ... **this shift is significant and we believe it to be life changing for her.**

Please find below a summarized snapshot of our experience to date with \*\*\*\*\* and the Arrowsmith program.

**\*\*\*\*\* before the Program:**

Had strained relationships with siblings as she was always arguing/fighting with them; had few friends as she would clash with classmates regularly and be very offended by their behaviour towards her; very impulsive behaviour; considered naughty and disobedient as rarely followed instructions; suffered from separation anxiety; cried every day going to school and it would take 30-40 minutes to get her dressed each morning with constant pleading not to take her to school; in the classroom she gave 100% in the but struggled to learn; found the simple act of writing extremely difficult; couldn't copy from the board; couldn't write the thoughts in her head on paper; wrote backwards; after 2 years of school had very limited reading skills and often wouldn't recognise the same word on the same line; found arithmetic difficult; used fingers for any kind of counting; couldn't remember days of the week, found following any verbal instructions extremely difficult and often got lost on the task at hand; and started to develop a sense of self worthlessness and negative thoughts of herself.

**After 1 month of the Program:**

She stopped saying she didn't want to go to school; got up each morning and

independently got ready for school; separation anxiety ceased and independently walked into school by herself for the first time and hasn't looked back.

**After 3 months:**

Developed a real enjoyment of going into the AS classroom. Her journal record each day included that she "loved Arrowsmith" (and every day since).

**After 6 months:**

Started to develop better relationships with siblings and classmates; developed friendships at school and commenced having play dates for the first time.

**After 9 months:**

Started to read social cues better and modify her behaviour ie, verbalised that "laughing at people when they make mistakes is not nice so we shouldn't do it ". In the past she would see/register the action only and not the person's reaction, often offending people.

**After 12 months:**

Her handwriting legibility had dramatically improved, her own output drastically improved. Before the program her Christmas holiday story was 5 words (and illegible), her Christmas holiday story 12 months later was 3 pages with neat writing; Her ability to follow verbal cues has dramatically improved and can now follow multiple instructions when given to her; Her overall opinion of herself has improved, she sees herself now as an "achiever" because of the mastering of tasks in the AS class.

**After 15 months:**

Most recently she has confessed she "just knows her 1,2,3,&5 times tables". Asked how she knows them, her answer "because it just makes sense now"; Spelling has improved in her head; she can remember the spelling of longer non phonetic word; She understands relationships better between family members, days of the week and months of the year; Has started to watch movies (previously never did because she couldn't follow the story line and got bored).

**\*\*\*\*\*s Arrowsmith experience to date has been extremely positive and rewarding. Her enjoyment of the program has even seen her requesting to complete homework on the holidays. In her own words "I love Arrowsmith".**

We look forward to seeing what the next couple of years of her Arrowsmith journey rewards her with.



I am delighted to tell our personal story of our Arrowsmith journey. And a journey it is! Our daughter is \*\*\*\*\*, now in her second year of the program at . It is important to point out at the outset that it is not all beer and skittles. It is hard work for the students and their families as discipline is required to stay focused on the cognitive exercises and complete the homework on a daily basis.

However, self-discipline is not a negative when it comes to education. I've been a teacher for 20 years and can attest to the importance of determination and grit for real learning to occur. These are the traits that Arrowsmith students must have in spades.

**Is the program addressing my daughter's learning difficulties? Yes it is. We have seen the changes in our child as she analyses the world around her in much more depth. She is engaging in the complexities of human relations like any other primary aged child and growing in confidence in the classroom and beyond. It is a wonderful and hard earned transformation to witness.**

I am convinced that we are pioneers in this education innovation that will become widespread in the near future. The scientific realities of neuroplasticity have shown us that we can teach students not just what to learn, but how to learn. It is an exciting innovation to be a part of for \*\*\*\*\* and all of us. Onward!

Since starting the Arrowsmith journey we are constantly amazed at small things we notice. It may not be obvious at the time, but on reflection we realise it was something \*\*\*\*\* did not do before, or associate in the same way.

He is far more confident in himself and more settled at school and in social situations, these days he can determine if a situation in the schoolyard was significant or just comments from children and does not need to worry about.

**His ability to read unfamiliar words in magazines has progressed significantly**, and if he reads aloud he may try to read an unfamiliar word, he will notice he is trying to pronounce it incorrectly and then adjusts to the correct word. In the past had he even managed to work out the sound, he would not have been able to place it in the context of the spoken form of a word.

He has started to take on spelling words as part of the usual classroom homework, though his list is modified he remembers most words at the end of the week, and will also remember spelling words from previous weeks. He is enjoying these successes and being able to do things from the mainstream classroom. He can now read and spell words starting with "w" with greater accuracy. He could not do the basic M100W w starting words last year.

We are so happy with his progress; if our younger child would benefit from Arrowsmith we would have no hesitation in placing him in the program as well. **We know this program has been life changing for \*\*\*\*\*, and a joy to see him flourish.**

Since \*\*\*\*\* began in the Arrowsmith program at \*\*\*\*\* we have noticed changes for the better in a number of areas. **Before Arrowsmith, \*\*\*\*\* was very much an unobservant child. Now his reading and reasoning and comprehension are all bound together in a more contemplative, attentive search for knowledge in the world around him.** \*\*\*\*\* has become an active reader - books, advertisements, signs, even graffiti. Words that once were never noticed are now used to make observations and connections in his life. For instance, the family have been the happy recipients of \*\*\*\*\*'s reading prowess while we listen to him talking about the contents of books concerning sea-life, superheros, Lego, video games etc. Even driving he observes street signs and reassembles them into words that show that he is making connections. While waiting for the right hand turn light from East Boundary Rd. into South Rd he observed that South and East are two different directions. A sign for a trolley return in a carpark while walking to a shopping centre made him comment that people have to put their trolleys there - an action that he never thought about before. Then he discussed people leaving them all over the street which in turn led to a discussion about lazy people, dangerous trolleys and civic responsibility. \*\*\*\*\* now reads advertisements especially movies on the sides of public transport and is now aware of when movies will be released and reasons out the time, day and date and when or if he could possibly watch it. He understands the classifications of movies and knows that he can watch certain movies while others are off limits.

On a formal note, when \*\*\*\*\* picks up a novel, his reading has become more accomplished with recognition of difficult words. He is usually fluent and he comprehends more in depth what he is reading.

Overall \*\*\*\*\* has become a more settled, easy going child who is not stressed about being different from anyone else anymore. The work he does at Arrowsmith enables him to have a sense of achievement and satisfaction and he is proud to achieve his goals. He is not so impulsive and now thinks about his actions and their effects and takes a more measured approach to situations, especially confronting ones. His memory has improved as well as has his capacity to hold a meaningful conversation.

\*\*\*\*\*'s educational journey has changed since joining the Arrowsmith program in Year 3.

Her experience in Prep through Year 2 consisted of being pulled out of class continually for programs like: Reading Recovery, Math helpers, private Speech pathology, Occupational Therapy sessions and daily homework at home consisting of oral reading, maths and writing with mum. \*\*\*\*\* also struggled with her confidence due to her social awkwardness with her regular peers sometimes resulting in her feeling bullied, rejected or simply ignored. During those years, I was also able to freely enjoy conversations in the car (with my hands-free set) and not worry about \*\*\*\*\* listening while sitting in the backseat because she never really questioned anything; therefore, I didn't think she understood what was being said.

**The Arrowsmith Program has helped directly work on \*\*\*\*\*'s underlying disabilities.**

\*\*\*\*\* is now able to comprehend my phone conversations and I find myself having to censor more private phone calls. I also work diligently with her on the Term breaks on her reading as I thought she would lose all of her reading progress due to the time commitment to the Arrowsmith program but instead she remained stable. \*\*\*\*\* reports to me that she really enjoys some of the activities, her teachers and the students themselves. She asks more existential questions, makes more connections through vocabulary and is able to understand more nonverbal behaviours. There are more but those are the most obvious changes.

I find myself very grateful for the timing of the Arrowsmith program in her life. I firmly believe that the plasticity of the brain combined with early intervention will lead to more connections being made resulting in a greater understanding and knowledge base. I look forward with optimism that \*\*\*\*\* will continue to progress and enjoy her learning journey and reflect fondly on this experience.

\*\*\*\*\* is one of the oldest of the children in the pilot and also happens to be child on the front of the Arrowsmith program prospectus and our case study of her aged 4-10 and all the interventions thus far were profiled in the prospectus. She has never had CEM funding (except for a brief few months years ago) for the Dyslexia and associated learning disorder as she just didn't perform quite poor enough and she doesn't have those typical extreme high then low scores - she performed lower across the board. She could have fallen through the education sector cracks but in partnership with our family would never let her fall. She has always been at least a year and a half behind her age cohort in academic performance but the point of Arrowsmith is to close this gap and address the underlying hurdles holding her back in demonstrating her ability to learn as well as long term impacts on her academic achievement.

I don't expect a silver bullet in the year and half that we have participated and as an academic within the higher education sector I did not expect the impact to be immediately reflected in her academic test scores. I measure the outcomes of this program in the short-term in several ways so far when we reflect on the confident child this program has let emerge:

- **not a single sign of anxiety or clinical depression or associated medical costs compared to 2 years of psychology services**
- **greater participation in school activities where she would never have participated before including dance classes, inter-school sports to choir**
- **an improved self-confidence and belief in herself that she is "smart" with not a single negative reflection of herself spoken since she began the program**
- **an improved ability to socialise with her peers resulting from greater understanding of conversations and relationships**
- **she finally understands humour from Garfield comics to movie plots and is a prolific reader who reads novels for pleasure**
- **she can independently plan ahead without the need of assistance**
- **she is not dependent like she has been in past years to a strict regimented visual schedule, of needing to know everything that was going to happen in any given day in advance**



- a lack of rigidity in her expectations and greater resilience around change
- she can articulate exactly what day it is without the need for a calendar
- she can multi-task and participate in conversations with multiple people
- not a day of school refusal and improved overall health
- an ability to read instructions and complete complex tasks
- willingness to try new things
- an age appropriate desire for independence and responsibilities
- a desire to be a role model for other children and emergent leadership strengths

These are just a few noticeable differences in such a short time. Individually valuable but it is the holistic impact that is indisputable. No intervention program has had the impact Arrowsmith has had. Our greatest evidence is the fact she performed a solo in the Christmas Choir and had so many in the audience in tears. Families and other children have known her since 3 year old kindergarten and in recent years watched her cry every single day she went to school. She was so disengaged and so terribly sad. It was heart breaking to not be able to assist her until now. She is not that same child anymore, the value of this program is she is able to engage in the world, learn and show the community who she is, her skills, talents and as a recent secondary school registrar commented - her "sparkle". Sparkle she certainly does because of her sense of self-worth, wellbeing, attitude to learning that is most profoundly changed for the better. She craves knowledge and that is the critical ingredient for lifelong learning. **I do not believe \*\*\*\*\* would be developing into the young lady she is becoming had she not had this Arrowsmith opportunity.**

Before our son commenced the Arrowsmith program he appeared to be a happy, positive child to others in the class however this was a front to disguise his underlying learning difficulties. \*\*\*\*\* became a master of strategies to avoid any activity that included reading, spelling, maths and public speaking. At home this avoidance would almost always involve emotional outbursts to avoid the reading, maths etc.

In his words he considered himself to be "dumb" regardless of what reinforcement and support he received from his teachers and us as parents.

**\*\*\*\*\*' self-confidence and consequently his self-belief have developed** over the last year due to the Arrowsmith program. He now completes 1.5 hrs. homework 6 nights a week with a positive attitude. He has insight into the benefits of what he is doing and how it is helping him to progress at mainstream schoolwork. **He said to me the other day that he now gets maths. The numbers have meaning and he understands how they fit together.** He also sits down and actively reads without prompting (even reading to his younger brother).

**To watch your child struggle and lose his self-confidence even though you know he is a bright intelligent person is heart breaking. We have seen the Arrowsmith program give our child the skills to reach his full potential.**

\*\*\*\* commenced the Arrowsmith Program with a great deal of enthusiasm and a motivation to do something for herself. Unlike many experiences for children diagnosed with dyslexia, socially she had lots of friends and other than having a few of the normal issues which go hand in hand with girls in the playground she was very happy at her first primary school. She had been diagnosed with dyslexia in Grade 2 and was quite well supported but aware that her reading was not where it should be and she needed quite a bit of input from myself with her homework so she could complete it at the level required for each Grade. As mentioned though she was happy and her decision to want to do the Arrowsmith Program was motivated by an inquisitive mind, a real drive to do better and be able to keep up and of course us really instilling in her that we believed it would be a great opportunity. We haven't looked back since.

Yes, she has found it challenging, at times she was really tired and it is has been really hard for her trying to make new friends at a new school when you don't have a history or some common ground. Would we change it for a second? I would be lying if I wasn't honest in saying we questioned ourselves a few times. Not really about the program itself but whether we had done the right thing by her. She had been happy, did it matter that her reading was not up to scratch. Plenty of other kids get through, and yes it's hard but they make it. Her Dad was dyslexic and he has been successful?? However, having been a Teacher's Aide at a private secondary school I knew that along with making it through there is the potential for a great deal of damage that can take place. So we knew all along there was nothing to lose and so much to be gained.

**Any concerns for \*\*\*\* quickly vanished when during the September school holidays last year she picked up the first of the Harry Potter trilogy (her favourite movies at the time) and had finished all 7 books by the end of the summer school holidays. Ok she might not have read every word perfectly BUT she was reading. I don't just mean reading here and there. She was reading when she woke, in the car on the way to school, on the way home and every night. She wasn't just reading though, she was comprehending what she was reading and that was just as important. The reading bug hasn't stopped. She has gone from a reluctant reader to someone who would more often than not rather read than watch a movie or TV show.** Pretty remarkable when her only outlet from school, sport or the world was through movies.

I have also noticed how much she has matured since being on the program. I hadn't quite realised the social issues that can go hand in hand with dyslexia. I think we were oblivious to it because she had entered Prep from kinder and a lot of her friends went along with her. She is also a very confident child and good at sport so that certainly helped. Taking her away from that comfort zone had exposed some social issues and I feel that the program has been instrumental in her understanding cause and effect. Not to mention the support of St Peter's Primary School.

I know that despite \*\*\*\* finding it difficult at times has she has such a great deal of self-belief and is so proud of her accomplishments which would never have happened in a traditional classroom. The Arrowsmith Program has been without a doubt life changing for \*\*\*\*. **The program provides a platform for her to shine, to see that through persistence and hard work she can achieve things that she didn't realise were possible. She has built up her resilience and for me to see my daughter**



read and have a love for the written word has been the icing on the cake. I wholeheartedly believe that the program is worthwhile and has been the best thing we could possibly have done for \*\*\*\*\* at this stage in her life.

Before commencing the Arrowsmith Program \*\*\*\*\* would zone out in the mainstream classroom and her attention span was very limited. It's been amazing to see how focused \*\*\*\*\* now is. She is able to fully concentrate on her Arrowsmith subjects for the full 40 min period. I also really noticed a massive difference to her ability to concentrate for much longer periods of time when I sat with her to do some activities that \*\*\*\*\*'s speech pathologist had given us to complete over the school holidays. Previously I would be able to do a maximum of about 10-15 minutes on the activities before \*\*\*\*\* had lost concentration but over the recent school holidays she sat for over an hour with me doing her speech activities, fully engaging in them and wanting to continue doing them for longer and longer.

\*\*\*\*\*'s confidence has also greatly increased and she really enjoys going to school each day to do her Arrowsmith subjects. I can see that this is because for the first time, her work is individualised to her own abilities which results in \*\*\*\*\* **feeling a sense of achievement and self-worth in FINALLY being able to complete and even master her work.** It has also been so encouraging to see that things are obviously starting to click in a lot of her Arrowsmith subjects as initially it was such a rarity for her to master any of her subjects but now every month she comes home with more mastery certificates than the previous month which is not only so exciting for her but also for us as her parents!!!

A few weeks ago I was also shocked to see her playing a game on our ipad that previously she had no interest in or ability to play. The game is very fast paced and involves lots of dodging and requires the ability to quickly scan the screen for objects jumping in your way that you have to escape. **Her coordination and speed in assessing the dangers ahead is absolutely amazing.** She now gets the top score in the family!!

To whom it may concern:

Our son \_\_\_\_\_, who is currently studying Year 11 at \_\_\_\_\_, has been attending Arrowsmith and working with the Arrowsmith program for the past 18 months. \_\_\_\_\_ was diagnosed with learning difficulties at a young age and has had quite a struggle through school to keep up with his peers.

During his time in the Arrowsmith program we have all observed a distinct, marked and consistent improvement in his cognitive capacity; his self-organisation skills, his communication skills, his self-awareness, his ability and desire to read and write, and his mathematical skills have all improved dramatically.

\_\_\_\_\_ has also proclaimed that his days with Arrowsmith have been the best days of his school life to date. We are now confident as a family that \_\_\_\_\_ will be able to go onto further education post year 12.

We would not hesitate to recommend the Arrowsmith program to any parent with a child with learning difficulties. It has certainly changed \_\_\_\_\_ life.

Best regards

4 August 2017

To whom it may concern,

**Re: NSW Parliamentary Enquiry into Education of students with special needs and disabilities – Arrowsmith Program**

I am the mother of a son with diagnosed dyslexia who has had numerous tests, diagnostics and interventions over the course of his schooling career to date. He is currently in Year 8 at \_\_\_\_\_, Victoria.

We have consulted and worked with speech pathologists, optometrists, psychiatrists, psychologists, educational psychologists and other less conventional programs including Feuerstein, Davis Dyslexia method and a local specialist school called the 'whole brain school' (now Omandus), in order to seek supports to help him through school. All of these interventions have been as a result of observations and recommendations by his classroom teachers and learning support teachers over the years. It has been a costly, pathologizing and distressing exercise and whilst each of these interventions went a small way towards resolving some of his issues short-term, and many of them were operating from a solid evidence base, none of them were able to provide much long-term relief or leg up for him with his learning.

His first primary school eventually admitted that they had reached the end of their resources and didn't know how to support him with his learning. They recommended that I withdraw him and home-school him. This was not a realistic option for us, nor helpful for him socially. We moved him to the local grammar school ( \_\_\_\_\_ ) in the large regional centre near where we live and continued the path of distress and minimal learning, despite skilled and patient interventions and support by highly experienced staff. In effect, apart from the social interaction, from a learning perspective, there was little point him being in the classroom and if anything, it was, from a psychological perspective, becoming a further detriment to his learning.

When the Arrowsmith opportunity came up, we jumped at it, convinced by friends whose children had travelled to Canada to access the program with significant success, and also by the methodology which we were convinced was thoroughly thought through and evidenced over many years of success for many children. The other appeal of the program was that it identified 19 different learning functions in the brain, with a very specific testing that targeted the intervention and exercises for each individual, according to their own pathology. This made strikingly more sense to us than every other intervention we had tried which, despite having a solid evidence base, were a one-size fits all response to an umbrella diagnosis with something like 60 different manifestations and presentations. Finally, something that was able to name, and target his issues and needs specifically.

His experience of the program to date (he is now 18 months in) has been nothing short of miraculous. He continues to be integrated into mainstream classes, including maths and English and had a recent experience in a maths class which he said made him want to cry with relief. Normally he would have been able to focus for 10 -15 minutes before losing concentration, losing his place and losing track of how to tackle a particular problem. On this occasion, he 'woke up' from having focussed through the entire 40-minute lesson, had

completed 4 pages of work and had got most of it correct, despite never having been exposed to the content. He said he couldn't believe how it just flowed, and all of a sudden made sense to him.

During a recent visit to MONA art museum in Tasmania he showed me a piece of art on the walls with words blurred and jumbled and said: "That's what I used to see when I tried to read." I asked if it was like that anymore and he said "no, it's clear now."

We have had feedback from his sporting coaches (he is a super sporty kid and skilled athlete) that something has changed in him, that he can now follow their instructions, and in football, they are noticing his sense of strategy about the game has improved, and his ability to pre-empt play and predict where the ball will go is remarkable. We have had comments from fellow football parents about this also.

He recently successfully auditioned for a lead role in the Year 8 musical and delivered a speech to 100 staff members. These are way outside his comfort zone and he remarked that a year ago he would never have had the confidence to do these things.

The genius of this program is that despite what is going on behind the scenes in the brain (and there is much, by the looks of the outcomes we are seeing), it is also constructed with powerful motivators of layer upon layer of milestones to strive for and be rewarded for. For the first time in their educational experiences, these children are experiencing reward for their efforts. They have always had to work 3 times as hard as their peers and now they have something to show for it. The powerful spiral of self-confidence into motivation into self-confidence into performance cannot be under-estimated.

Neuroplasticity is a relatively new science but it is pioneering innovators like Barbara Arrowsmith and schools like \_\_\_\_\_ school who are able to see around the corners of purist and traditionally 'known' science (a gift of dyslexics) and pre-empt the next wave of knowing which will (and is) in time be proven by purist science. There is much patch protection and much money to be made in the learning disabilities field and I can understand that professions that have long staked their claim in the landscape are feeling threatened. The difference with the Arrowsmith program is that no longer are we looking at the equivalent of well made walking sticks for the blind; no longer are we metaphorically yelling a bit louder at the deaf kids, we are recognising and unleashing their intelligence through a program that actually takes away the disability. It is revolutionary, the results are in from my perspective, and I think this is only the beginning of enormous implications and potential for all children to bring their best selves to the world into the future, and for schools more widely to play their part in that. I and my son are eternally grateful that he is one of the early beneficiaries of it.

Kind Regards,

5<sup>th</sup> August, 2017

To whom it may concern,

**Re: NSW Parliamentary Enquiry into Education of students with special needs and disabilities – Arrowsmith Program.**

I am writing in support of the Arrowsmith Program with a double-barrelled motivation as a father of a student in the program and a General Practitioner in the regional Victorian town of . Part of my work includes working in the Doctors-in-schools youth clinic running out of .

My son has been diagnosed with Dyslexia and has tried many different avenues of education support and alternate schooling before being accepted to the Arrowsmith Program provided through in . Proceeding his Arrowsmith experience, my son was struggling with significant psychological distress as a result of his learning difficulty. Despite psychological appointments and learning resource support his anxiety persisted with increasing anger and self-sabotaging behavior both at school and at home. One of the symptoms of his condition was a habit of chewing, and by 1 term had eaten through 1 uniform and 1 hat just like the very hungry caterpillar. 15-minute maths sheets at home typically had him curled up in the fetal position, expressing suicidal thought and violent outbursts. He believed he was dumb and that his teachers did not understand him and did not know how to support him in the classroom. Meetings with teachers in main class and through the learning resource centre revealed teachers were doing all they could to support his plummeting self-esteem, while trying to provide safe boundaries for his behaviours. My wife and I wondered about a future for our boy who appeared to be destined for struggle and mental health issues, with very little we could do despite both knowledge of what was going on, and the finances to support.

After 18 months of having been involved in the Arrowsmith program, the changes I have seen in my son have been nothing short of miraculous. My son now actually timetables his homework which can involve 1.5 hours on a Sunday. The fetal position has been replaced by a confident, focused boy who bounces into his study and only breaks at the 45 min mark to refill his water. His confidence is sky-rocketing, his uniform is now no longer part of his diet and he has just recently presented a speech to approximately 100 staff at a meeting to present on his Arrowsmith experience. My son was motivated to educate his teachers for greater understanding and to encourage the school to continue to support the program.

There are so many anecdotes to share on the benefits he has gained through Arrowsmith, but to summarise, we have our boy back. Our boy now has hope for the future in which he believes anything is possible. He was amazed to report that he returned to a mainstream maths class and was able to maintain his focus through a whole 40min assessment in which he scored above average, in a maths concept he had had little exposure to, due to needing to attend the Arrowsmith

program. This confirmed my theory that our son was going to gain much more through an education process which was going to focus on improving the function of the brain, instead of trying to shove concepts and data into a brain that had no chance of processing it.

This brings me to my support of the Arrowsmith Program as a medical practitioner and scientist. I have been dismayed at the program being labeled as “controversial” as it has not been tested under rigid level A studies such as randomised controlled studies and the like. Barbara Arrowsmith would be dismayed at me trying to simplify the process, but my take on the program is that it uses the basis of neuroplasticity to facilitate a developing brain to access neuropathways and neurotransmitters to allow that brain to work closer to its true capacity. For students like my son, it provides a way to connect the neurological pathways to provide a chance to improve learning difficulties and enhance learning and development.

With scientific gains in neuroplasticity changing the way we practice medicine and psychology, I truly believe that these concepts are paving the way for a new education for the greater community. To the psychologists in education that report negatively on the program based on evidence, please show me the evidence supporting the way we educate our children currently. The latest NAPLAN results have again shown that our primary school children are going backwards in numeracy and literacy. Yesterday’s news was headlined by a story that “Parents are making headmasters sick”. Apparently research has shown parents complaining about their children’s education has increased mental health issues in the Principals of the schools. How have the governing bodies responded to this? They plan to offer greater access to General Practitioners to provide mental health care plans for school principals to manage their anxiety. I bet that solution isn’t based on a double-blind randomized controlled study. Schools and professional development for teachers now seems to be packed full of concepts to facilitate emotional intelligence and mental health support. Teachers are being taught about “growth concepts” and how to remain positive in a stressful workplace. When will educators look at how to better educate the children instead of dealing with the distress of children and staff failing in the current system. Science suggests that 20% of students in any given classroom across Australia are not being educated in a way that would suit their learning style or diagnosed learning difficulty.

In my role of Doctor-in-school, approximately 60-70% of presentations to the clinic are for GP supported mental health care plans and referrals to counselling and support for educational support. It was no surprise to me that the education psychologist at \_\_\_\_\_, has been the engine driving the Arrowsmith Program in the school. After years of supporting the current epidemic of anxiety in students negotiating our current education system, of course he would jump at a program that has shown to benefit students across the globe through improved psychological wellbeing and actually fixing the learning difficulty as opposed to putting a bandaid on a deepening bleeding wound. Psychologists have been presenting at conferences, and celebrating on TED talks the evidence based support of neuroplasticity. There are a few million Tibetan monks giggling to

themselves during their morning prayers how long it takes for the western world and science to catch up, but this is encouraging.

I hope the education system does not take as long as our health system to take on the science to support a better education process. I thank our fortunate circumstances that have allowed our family to take advantage of the courageous staff and administration at \_\_\_\_\_ who I applaud for taking on the Arrowsmith Program. Unfortunately it has to be seen as courageous and taking risks in an environment adverse to change. As my wife said as she researched flights to move our family to the \_\_\_\_\_ based Arrowsmith program, "it's a no brainer, we have to do it".

## **Cognitive Progress Report Observation Form**

**Reporting period:** February 2017 – May 2017

Please indicate that you have received your child's Cognitive Progress Report by signing in the space below and by **returning this copy to the school first week of Term 3.**

We would like you to include any observations of change that you and/or your child have observed in their learning / social / emotional development as a result of participating in the Arrowsmith Program. There is also space for you to add any comments or concerns you have leading into the second semester of the Arrowsmith Program.

**Your observations and feedback are of great value to us. They are considered and used in the further development of your child's Individual Learning Program as a means of ensuring the quality of your child's program and continued progress. They are also included in our overall assessment at the end of your child's program.**

A few examples you may like to mention are changes in social behaviour at home, school, social gatherings, etc., changes in planning and organisational strategies, changes in vocabulary, reading, comprehension and mathematics skills, changes in personality traits, changes in observations of the surrounding environment, changes in following instructions and memory, improvement in school assessment, etc.

Thank you,

Student's Name:

### **Observations:**

has changed considerably in the past 6 months. His personality has changed and he is a much happier boy. He 'loves' Arrowsmith which is truly astounding (and not what I expected). I think the slow transition into Arrowsmith over the first few weeks helped greatly with this. While he enjoys his school and likes his teachers a lot, Arrowsmith is different and feels special in what appears to be a very safe and rewarding environment for him. I think it is also building his confidence.



home behavior has improved. He has always been a very 'good' student and behaving well in the classroom but at home it has been a different story. This has changed considerably – he appears to be coping better with life and more able to cope with the end of the day and getting through his bath, reading, dinner, etc.

He is more organized. He is packing his bag for school and actually remembering which days he needs to take his sports gear, his homework and his Arrowsmith folder and being able to pack and prepare for this without any assistance.

reading has jumped up by a full year in one term: His reading age jumped from early Yr. 2 level to early Yr. 3 level between mid-term 1 and mid-term 2. We still have a gap of over 12 months to catch up, but it has been a major relief to me that we are now closing the gap (and that it is not getting any wider nor staying the same).

is talking more at home. While his re-telling of a story is still a bit confused, he is at least trying to tell the story now. He appears to be able to take in more of what is going on around him while he is focusing on something else than he could before. For example, previously if he was engaged in a game he would not hear his name being called, or hear me talking to him. Now he can.

My feeling is that Arrowsmith is contributing to this greatly. His health has improved considerably in the first few months of this year so this too is helping him.

**Comments / Concerns:**

**Parent Signature:**

**Date:** 23 June 2017

### Arrowsmith Testimonial for

challenges prior to starting Arrowsmith were his auditory processing and Dyspraxia both Verbal and Motor. These had a huge impact on learning in the classroom.

We did a lot of early intervention with prior to him starting school.

started school reading 3 years above age level; his comprehension was 12 months ahead. His maths was a struggle from the start, understanding friends to 10, was a difficult concept for him. We watched slowly and ever so surely slip from the top groups to the lower groups. His biggest hurdles were keeping up in class as he missed so much of what was being said. His homework was a nightmare for all of us; he wasn't performing to the level he was capable of. We could see his self-esteem was starting to suffer. We knew we had to find something that was comprehensive and encompassed a broader approach than the various therapies and interventions we had already undertaken.

has been doing the Arrowsmith program for 3 years; he started part-time in 2015 when he was in year 5. He would have commenced the program full time if the program was available at a school on the Central Coast of NSW. In s second year he attended the program full-time. We rented a unit in with another Arrowsmith family for him to be able to attend full-time. This year, 2017, started High School and our only option for him to continue the program was on a part-time basis. He has found this year particularly difficult he leaves school at 12 noon two days a week to drive to Sydney to do a 5 hour session. If the program were offered on the Central Coast of NSW would continue the program next year and hopefully complete the program.

educational outcomes are endless;

- he is can now understand and keep up in Maths, this has been a big goal for him as he wants to study Architecture.
- His first science exam of the year he scored 70%, prior to Arrowsmith he could have only hoped for a pass.
- auditory processing difficulties have always been a barrier to him learning a second language, this year he has started learning German. He scored a perfect mark in his exam. During primary school he was always in the bottom group for marks in Language.
- level of written expression is now in the 92nd percentile, this is a surprising result for a child with verbal dyspraxia. His comprehension is improving all the time. His ability to understand and then verbalise what he has read adding meaning to it, makes me excited every single time. We are yet to see this improve his English results as he has a tendency to still play it safe, yet as his confidence grows I have no doubt that his marks will improve with it.

world now has more meaning. He notices more and questions more, some days I think it's like he is trying to catch up on all the years he has missed the meaning of things around him. I'm looking forward to seeing him develop through the rest of his schooling.

His timing is now impeccable; he is always dressed ready to go with all chores done long before his siblings (15yrs & 10yrs) are even close to being ready. He has a sense of urgency and can plan his time well when he has to juggle school homework, Arrowsmith homework and chores.

We recently celebrated 13th Birthday, it was the first time we have seen involved in all the conversations, he was one of the more dominant personalities of the group. Normally he takes a back seat and hangs with only 1 or 2 friends. Seeing him interacting with his friends like this was another outcome we were hoping for but not sure if it would come to fruition.

now enjoys more outdoor activities and in particular bush walking and hiking. Where he once saw the obstacles he now sees the path. He scaled the last part of the walk to Marion's Look Out at Cradle Mountain and is looking forward to the Rim Walk at Kings Canyon where there are 500 steps at the beginning of the walk in October.

I'm looking forward to seeing more improvements in various areas as matures and navigates his way through high school and university.

Sincerely

August 4, 2017

It is with concern that I hear again criticism of the Arrowsmith Program being delivered in Australian schools. My two sons were found to be struggling with literacy from Year 1. Both had reasonable language development for their age and met all benchmarks. However, once they started to learn to read using phonics and sight word recognition, it became apparent that the reading and writing part of the English language were going to be difficult for them. Both sons were diagnosed with Dyslexia around the age of 10, even though they had struggled from the age of 5. They are two years apart.

As parents you do whatever you can to support your children, and I as an educator believed that intervention was key. So what did we try: speech therapy, occupational therapy, extra tuition from Dyslexia Speld WA. When the boys were in Year 4 and 2 respectively, we went through the FastForWord program at a cost of \$4000 each. Even though they had some success, they were still not where they needed to be. Over the years the boys fell further and further behind even though they had extra programs that supposedly were evidence based including Toe By Toe, Reading For Sure and others. They also had a teacher's assistant for most of the time. Over the years we spent in excess of \$10,000 a year on extra tuition and support, with little gain.

It wasn't until in June 2014 that we came across the Arrowsmith program. My husband and I decided that we had nothing to lose, both our sons were not going to pass school the way they were going. We immediately enrolled them into \_\_\_\_\_ in Queensland. Yes we were in Western Australia but felt that it was important to try this program. I took a year off work from my school and relocated to Queensland. My sons entered Year 9 and 11. Within a month my youngest son believed the program was working and continued to work through the different aspects of the individualized program. My eldest son worked hard also, however he was also working towards graduation, even though we were not sure if he would be able to. We felt at the end of 2015 that the boys should continue and board at the school.

I am happy to report that my eldest son completed Year 12, graduated from high school with his QCE. He made gains in the program, however it was not until he decided to do his Certificate II in Security Operations this year in an adult program that we realized that he had made significant gains. His writing had improved as well as his reading. He was able to successfully complete the course and sit the external Police examination to obtain his security licence.

My youngest son returned to \_\_\_\_\_ at the beginning of the year but it was obvious he still needed to work on his literacy and we enrolled him into the Arrowsmith School in \_\_\_\_\_ (which opened in March 2017). He is currently enrolled at the school 4 days a week and is completing a Certificate II Building & Construction one day a week. He is unlikely at this stage to graduate with his WACE, however he should be able to complete his certificate. His dyslexia is far worse than his elder brother.

Our concern as parents is ensuring that both boys had a good state of mind which is very difficult when you continue to fail in the normal school system. Both boys feel better about themselves and this is due to the Arrowsmith program.

August 4, 2017

Page 2

A little about myself – I am a secondary school educator with Masters in Arts (Ancient History) and Education, both completed at Macquarie University NSW. I am currently enrolled in my PhD at Edith Cowan University. I consider myself well educated and made the decision to send my sons to a school that offers the Arrowsmith program. Before enrolling I went to Canada and spoke to a number of people and decided it was the right program for my sons. I understand there is a lot of skepticism and most of it based on the fact that there is 'no evidence' nor peer review articles. I think that this is short sighted and while the debate continues as to whether it should be introduced or not, our children suffer. The current system does not work for all children and alternatives need to be found. From my understanding research is taking place and results should be available soon.

I am available for further comments if you require.

Sincerely,

## Arrowsmith testimonial

I have had 2 goals for my son's schooling years; that he would maximize his education potential and that he would enjoy his years at school. Prior to entering the Arrowsmith program neither goal were being achieved. My son believed he was one of the duds in his class year and school was exhausting. He would come home and had no interest in any extra curricular activities. It was as if there was just no energy left to participate in activities or even to have a great interest in his surroundings. I insisted he did at least one sport but he participated with medium interest and enthusiasm.

His last 18 months at \_\_\_\_\_ and participating in the Arrowsmith program have been his best schooling years. About half way through his 2<sup>nd</sup> term in the program it was if he popped his head up out of the clouds and looked around and decided he wanted to participate in his world. He started asking questions and bantering in a conversation. A number of relatives and friends have commented on how much more engaging \_\_\_\_\_ is when they meet him.

My son decided he would train for the athletics carnival and set up a training regime which he followed closely. He continued on with Little Athletics, is playing hockey, training for cricket and tennis and doing karate on a Saturday morning. He recently graded for karate and was the clear stand out best performer in the group of around 16 and was awarded the "Best in Grade" certificate. All of these activities have been driven by my son wanting to do them rather than me pushing him into them.

My son has developed a great group of friends at \_\_\_\_\_ and is able to relate to them better than previously. This continues to be a challenging area for him but I have seen great improvement in his being open another point of view rather than being very black and white in his thinking.

In terms of his belief in his abilities this has been the greatest area of improvement. Arrowsmith has allowed him to succeed from the start of the program in the way it has frequent mastery levels so he can constantly see that he is improving. At his previous school he was struggling to keep up and did not finish much of his work as he could not do it at the speed of the other students. I would tell him he was a bright student with a learning challenge but I don't think he believed it. Now he is confident in his skills. He is so proud that he has mastered 8 handed clocks. He is confident in his academic abilities and he is confident in himself. It is so wonderful to see. In his recent ICAS results he achieved in the top 14% in Science having had no schooling in science this year at all.

Prior to entering the Arrowsmith program I had spent 4 years trying a multitude of programs to assist my son with his learning. Unfortunately none of them were successful. I am grateful that the Arrowsmith program has given my son 2 fabulous years where he has achieved the goal of maximizing his learning potential and thoroughly enjoying these 2 years of schooling. I believe he has a much better skill level and attitude to be able to progress through his secondary schooling years as a result of his Arrowsmith experience. Thankyou for the opportunity.

To Whom It May Concern

I am writing in regard to my Son, . He was diagnosed with Dyslexia and Dysgraphia in grade 3. He is now in grade 6.

has been participating in the Arrowsmith Program for the past 18 months. Our decision to enrol him was a very considered and informed one and very much based on feeling the need to support and help him when mainstream schooling was not working for him.

During his time in the Arrowsmith program, the development and change in has been remarkable. From a personal view, his confidence and assertiveness has grown incredibly stands tall and speaks clearly and with conviction. He recognises this in himself and said to me the other day, “ Mum, I even spoke to a girl on my own for the first time today”.

Academically, now reads novels, and not just the ones with pictures — this has not been prompted by myself, he happily reads independently in bed before sleep. Incredibly, he has not been in mainstream maths for eighteen months. At the end of term 2, was tested and benchmarked to exactly where he should be this term and is back in his maths class. is loving maths and even in the middle group.

motor skills have developed, so much so he now kicks a football with his Brothers! As a mother this is so beautiful to witness. Eighteen months ago his foot would miss the footy and the ball would land on the grass and he would walk away with his ego bruised, shoulders hunched and negative self talk of how useless he was! This program has been so positive for our entire family unit.

I believe that we all learn uniquely and differently, and to learn we need to be understood, supported and nurtured. The AS program provides this and beyond. As a parent I believe your instincts are always right for your child and I know and his fellow Arrowsmith peers would be hugely dis-serviced if the Arrowsmith program was halted. I would be horrified if a decision to cease this program was made from fear, misinformation or lack of understanding or insight.

Sincerely,

## The Arrowsmith Program: Why We Went to Toronto for 6 Weeks and Stayed For 36 Weeks!

I will NEVER forget the day I first heard about the Arrowsmith Program.

In March 2015, I sat down on my lounge and cried and cried. What more I could do to help my daughter, (aged 9 at the time) I was considering home schooling her again as mainstream schooling wasn't working. She was not sleeping at night, highly anxious, being bullied, had no friends and could not grasp simple mathematical concepts despite extensive one to one work with tutors and special needs teachers. We tried so many different programs but nothing seemed to be helping. She was a good reader but her comprehension was poor and she had difficulty putting thoughts and ideas into sentences and struggled socially.

Less than two hours later, I was told about the Arrowsmith Program! I looked Arrowsmith up in 'Google', watched the 60 Minutes program featuring the Arrowsmith story and knew we had to try this program.

Less than four weeks later we uprooted our entire family, sold our car to purchase five tickets to Canada, and were embarking on a hope fuelled journey to the Arrowsmith Summer School Program in for six weeks.

We have been on this journey with since she was three after being told by medical professionals she was autistic, she would never talk, write or go to a normal school. In addition, we were informed by the educational professionals in Grade 1 to brace ourselves as she would "get worse as she gets older" and to put her on medication. From the age of 6, her chance of living a normal life or getting any sort of career seemed to already be decided by these professionals and she was boxed into this 'never going to do so many things.' For our child, I would never accept this and started on the journey of healing the brain.

Whilst our journey has been long and difficult, the Arrowsmith Program has been profoundly life changing not only for , but for our entire family. Words can't describe how life changing this program has been for all of us. I still cry every time I share our journey and now I get asked most days about our journey and the Arrowsmith program. Friends and family are amazed at the progress has made and are true believers in the program. y is currently home-schooled with a tutor and she is now going back into school next year in Grade 7 with little or no learning support. She is very bright and the Arrowsmith program has given her hope and a future.

After three weeks of the six-week summer school program in Toronto, we decided to stay for the whole school year.

For the first time in her life, she started to be able to follow conversations, playing with her siblings, laughing at jokes, understanding movie plots, reading in her head (which was a great struggle for her), doing puzzles and following instructions. Additionally, we no longer had massive (hours long) meltdowns from as she could finally understand why we had made 'that' decision.

The changes were profound and in many areas, but the improvement in Maths which she couldn't count to 100 before we started the program at age 9, and her handwriting is indicative. She has gone from May 2016 starting back at Year One to now having tested in sample National testing and Naplan in Year 6 and passing. I have included some writing samples below to give you some appreciation of improvement. You can see the improvement not only in handwriting but in her ability to construct sentences and outline her social interactions with others (see writing sample 3).

Since our return home to , I have every day come across parents who tell me that their child needs this program. At the summer school when we went, nearly half of the students were from Australia because we all said nothing back here was working for our children. In fact two of us Australians decided to stay in Canada to access the program.

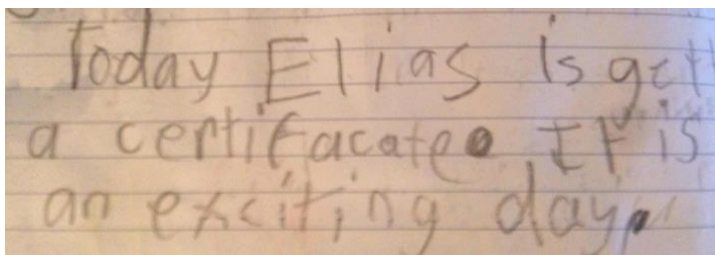
There is a huge need for this program. I believe so passionately in the Arrowsmith Program and have gone to become an Arrowsmith Cognitive teacher, now teacher part-time at a prestige boys school while studying towards a Masters in Education.

As Barbara says **"Having a learning disability absolutely is not a life sentence. You can strengthen very particular parts of the brain to allow them to function and it's amazing when it happens."** Science has proven that the brain has the capacity to change, and now Australian education needs to catch up!

## Handwriting.

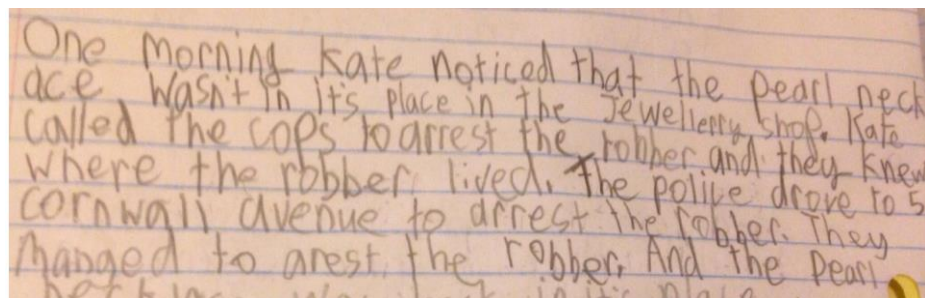
In Grade One, we had to provide a laptop for her as she struggled greatly with handwriting. I had worked hard with her to get to the stage you see in June 2015 at age 9.

June 2015 – Before we started Arrowsmith



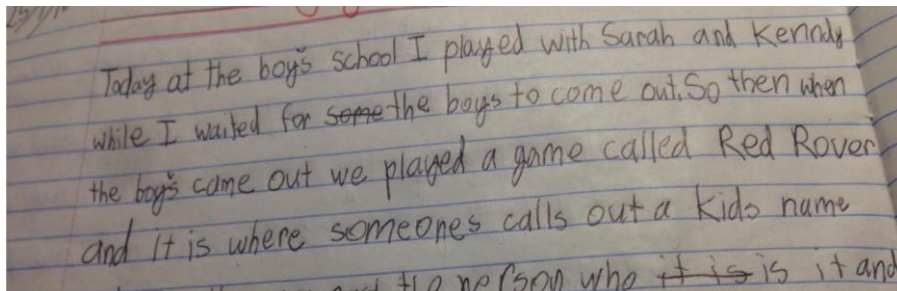
Today Elias is get  
a certifiacate. It is  
an exciting day.

September 2015 - Three weeks into the program



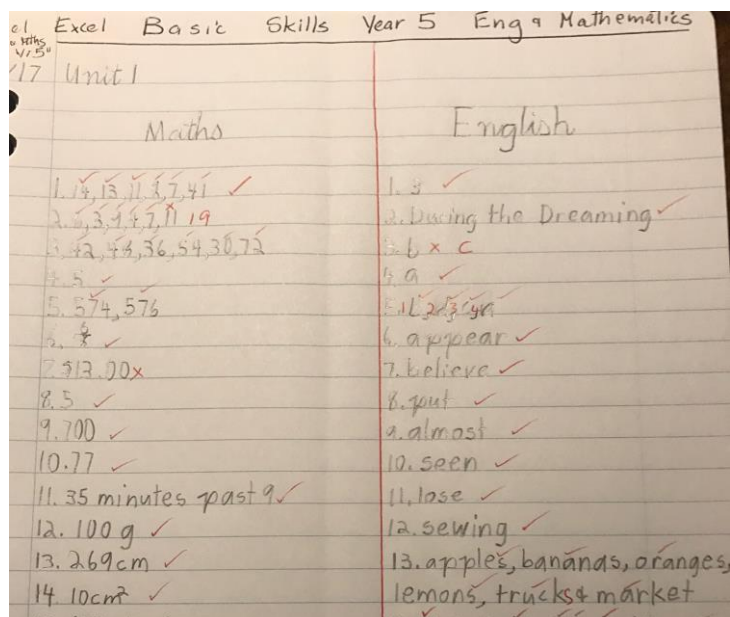
One morning Kate noticed that the pearl necklace wasn't in its place in the Jewellery shop. Kate called the cops to arrest the robber and they knew where the robber lived. The police drove to 5 Cornwall Avenue to arrest the robber. They managed to arrest the robber. And the Pearl necklace was back in its place.

January 2016



Today at the boys school I played with Sarah and Kerindy while I waited for some the boys to come out. So then when the boys came out we played a game called Red Rover and it is where someones calls out a kids name and then you are the person who it is is it and

1<sup>st</sup> Feb 2017 – is now doing Year 5 and doing well!



| Maths                       | English   |
|-----------------------------|---|
| 1. 14, 13, 11, 3, 2, 41 ✓   | 1. 3 ✓  |
| 2. 5, 3, 4, 4, 2, 11, 19 ✓  | 2. During the Dreaming ✓                                |
| 3. 42, 43, 36, 54, 30, 72 ✓ | 3. 6 x 6 ✓  |
| 4. 5 ✓                      | 4. 9 ✓  |
| 5. 574, 576 ✓               | 5. 12/23/24 ✓   |
| 6. 4 ✓                      | 6. appear ✓   |
| 7. 13, 100x ✓               | 7. believe ✓  |
| 8. 5 ✓                      | 8. put ✓  |
| 9. 700 ✓                    | 9. almost ✓   |
| 10. 77 ✓                    | 10. seen ✓  |
| 11. 35 minutes past 9 ✓     | 11. lose ✓  |
| 12. 100 g ✓                 | 12. sewing ✓  |
| 13. 2.69 cm ✓               | 13. apples, bananas, oranges, lemons, trucks & market ✓ |
| 14. 10 cm ✓                 |   |
| 15. 50 ✓                    |   |



3rd August 2017

To whom it may concern,

My son \_\_\_\_\_ is Dyslexic and this is our story.

We found out \_\_\_\_\_ was Dyslexic when he was just 9 years old and at the time I remember feeling a sense of relief.

I was relieved because it turned out that he wasn't hearing impaired like his grade 3 teacher suggested; or visually impaired like his grade 4 teacher suggested; or a disruptive 'noise maker' like his junior school guidance counselor pointed out to us. I felt relieved because after putting him through all the testing and jumping through all the hoops and spending all the money we had to spend to find out what was wrong with \_\_\_\_\_, he was a perfectly healthy boy who just happens to be Dyslexic; and knowing this would mean that his teachers and his school will be able to give him the help he needs. That's what I thought and I felt relieved.

But the school couldn't help us because there was no support for a child with Dyslexia (in fact we were told by that school's guidance counselor that the Education Department did not recognise Dyslexia as a real learning difficulty). The teachers did their best to help \_\_\_\_\_ but their best wasn't working... teaching phonics to a Dyslexic is useless, no matter how slowly you do it.

So we sent \_\_\_\_\_ to reading tuition but that didn't work. We tried regular Speech Pathology sessions and that didn't work either. We spent thousands on the Davis Dyslexia Correction program but that was too difficult because the onus is put onto the parent to deliver the program. We got him a home tutor but there was no real progress. We tried everything available but nothing was helping. \_\_\_\_\_ couldn't read. \_\_\_\_\_ couldn't write.

When it was time for \_\_\_\_\_ to attend High School (year 8 in 2013) we applied to a private boys school in our area. My two daughters were attending the sister school near by and despite his difficulties, we wanted to give \_\_\_\_\_ the opportunity to also attend a good school. The school took our application but would not offer \_\_\_\_\_ a place at the school. In the end (after my persistent follow up calls) the Deputy Principal explained to me, in a face-to-face meeting that they did not feel that \_\_\_\_\_ would be able to keep up with the academic demands of the school so they would not offer him a place. I pointed out to the Deputy Principal that the Australian Education System has made it so that \_\_\_\_\_ can not meet the demands of any school in Australia... and since it was a legal requirement for \_\_\_\_\_ to attend, what difference would it make where he went to school.

***"It is an absolutely sole crushing feeling to be told by a 'professional educator' that your child is too stupid to attend their school".***

So, I wrote to the Principal of the school and I suggested that the discrimination toward my son may need to be dealt with in court. \_\_\_\_\_ started year 8 at that school in 2013 (smiley face). \_\_\_\_\_ was reading at a year 3 or 4 level but still couldn't write much at all.

Year 8 was difficult. The subjects that \_\_\_\_\_ once enjoyed... like music and art became challenging as reading and writing became more necessary. He was easily distracted in class and we would constantly get emails from his teachers regarding his lack of effort with homework and assignments. I recall getting an email from one of the teachers who was

frustrated because                      handed in a written assignment that was only 1 paragraph long and was illegible. At home we celebrated because that one paragraph took                      days to write and although no one could read it,                      knew exactly what it said and it was a great paragraph!

Year 9 continued much the same.                      still couldn't read well even though he was getting weekly speech therapy. We met with the school's guidance counselor who explained that                      had been receiving some classroom support that he was not really entitled to receive because those support resources were reserved for children who had been diagnosed with a recognised learning difficulty (in other words, Autistic Children who receive government funding) and that we should consider having                      'formerly diagnosed'.

We were mortified by this comment and the suggestion to label our son something that he is not; at that point my husband and I basically gave up.                      would just have to tough it out to the end of year 10 and then he could drop out of school. We had nothing left to try.

However, not long after that last meeting with the school councillor we saw the Arrowsmith segment on the 60 Minutes program. We don't usually watch that show but for some reason, that night we did. When we heard the families talking about their own struggles our mouths just hit the floor. I couldn't believe what I was hearing because until that point I had felt like we were the only ones going through these issues... with the schools and the lack of support and the frustration of not knowing what else to do... and the money blindly wasted on tutoring and therapy. We were watching the segment and I said to my husband... one of us is going to have to move Canada!

Thankfully, after some initial enquires I realised that there were schools right here in Queensland that were already offering the Arrowsmith Program and some new ones about to start so we attended an information evening in Brisbane and decided that our best option was to contact

                    is 1,347 km from our home. It's a two hour plane ride plus a one and a half hour drive to get there. Although a far better option than moving to Canada it meant that                      would have to enrol as a boarding student and live away from his family and friends. He was 13 years old and still reading at a year 3 or 4 level.

**will turn 17 next month. He just completed his Arrowsmith program at (3 years) and his reading is amazing. No reading tutors, no Speech Therapists, no Phonics programs... just Arrowsmith. As a parent I now don't worry about his future anymore.                      being able to read means he can now go on to do anything he wants to do. As an adult, imagine all the obstacle you would face if you could not read! The Arrowsmith program managed to do the one thing that all the other schools, and the other teachers, the other tutors and specialists failed to do.**

I tell this story as best I can because just simply saying 'I recommend Arrowsmith' doesn't seem enough. You have to know the disbelief we felt with in an education system that tells us that there is something wrong with our son's learning ability but then can't offer support because the diagnosis doesn't fit their criteria. The anger we felt when a teacher told us that "going to school must be like a living Hell for                      ". Or the frustration we felt when we finally just gave up trying to swim up stream.

I not only recommend the Arrowsmith Program to other parents with Dyslexic children but I recommend the Arrowsmith Program to every school in Australia. I can't dazzle you with statistics and scientific facts... I can only tell you that since completing Arrowsmith, reading is perfect.

## Testimonial for Arrowsmith Program August 2017

My involvement with the Arrowsmith Program over the last four years, as a teacher and program administrator, is where I have witnessed significant changes to students' learning abilities.

The 61 students working with the Arrowsmith Program over the past four years have made, and are making a difference to their cognitive learning capacities. This is reflected in their ability to learn and remember what they have learnt. Students who were non-readers and non-writers are the ones now who have changed their attitudes and habits to one of appreciation and capacity for the printed word. This capacity goes beyond literacy skills. Parents have also commented on significant improvements in mathematical, socialising, organisational, fine motor and gross motor skills.

This ability has brought with it a sense of satisfaction and feeling of self worth. Not only are they capable of keeping up in class, but also willing to contribute openingly without fear of embarrassment.

The psychometric assessments that were conducted at the school, post Arrowsmith Program, shows the results as a notable increase in percentile ranking in Verbal Comprehension, Perceptual Reasoning and especially in Working Memory and Processing Speed as compared to pre Arrowsmith Program ranking.

The evidence of the program comes from the students themselves in the Arrowsmith Program and their parents, who regularly see and value the constant positive changes in their child's overall cognitive, social and emotional development.

My name is \_\_\_\_\_ and I am the leader of the Arrowsmith Program at \_\_\_\_\_ in \_\_\_\_\_.

I became involved in the Arrowsmith Program in 2013 when the school was approached by a parent who was interested in assisting her child with learning difficulties. I attended a conference on 'The Brain and Learning' along with the special education teacher from our school. We had the opportunity to hear Barbara Arrowsmith-Young speak at the conference (Melbourne August 2013), and to speak with her personally as well as with \_\_\_\_\_ who had a son enrolled in the program. After further investigation and careful consideration the Board of \_\_\_\_\_ decided that the Arrowsmith Program provided an opportunity to support students at the school. In 2014 I trained as an Arrowsmith teacher and commenced working with twelve students who ranged from grade 5 - 10. At the start of 2015 we expanded our class to 24 students with a second trained Arrowsmith teacher. At the present time we have an enrolment of 24.

Part of the reason that \_\_\_\_\_ wanted to offer the Arrowsmith Program was the opportunity to assist students with learning difficulties to overcome those concerns and return to mainstream education. We have celebrated the 'graduation' of five students who have successfully rejoined their cohort in regular curriculum classes and anticipate the further graduation of more at the end of 2017 school year.

The Arrowsmith Program identifies the strengths and weakness of the cognitive functions of each student's brain and then provides the exercises to enable that individual to strengthen those areas of weakness by an individualised program of cognitive exercises. The over-arching goal is to bring those cognitive areas up to average functioning and to return the student to the mainstream classroom where they have the ability to proceed in line with their cohort.

As an educator of over thirty years experience it has been so exciting to see students transform their lives. Many students with learning problems enter the classroom with such a sad history of failure and with very poor self esteem. To watch the transformation into students with high levels of focus, the ability to be self motivated and the will to succeed is the greatest reward a teacher can ask for.

Our students present with learning difficulties with reading, writing, maths, auditory processing, attention, memory for information and so on. Some have been given labels such as 'dyslexic' or 'dysgraphic' for example. All are bright students, often of above average intelligence, who just need help to learn. Arrowsmith Program gives them that chance. The children are working on Arrowsmith for 4 X 40 minutes per school day. In the meantime they are also working with their school class groups on Maths, English and other curriculum classes. They spend their recess and lunch breaks with their class friends and move into Arrowsmith during the day for their timetabled sessions.

The most exciting thing about being an Arrowsmith teacher is the joy in seeing the change in the students. To have students tell me that 'suddenly' they get Maths and indeed were helping their friends after years of failing grades is fantastic. When the 14 year old who had a reading age of grade three when she started can't wait to tell me about the first 'chapter book' she's ever read; the boy who started with dyslexia tells me he thinks that he may go to University in 2019 because he thinks he might like to become a teacher - these are moments beyond measure.

I have watched with growing excitement as I observe the changes in our students' abilities and in their optimism for the future. I feel privileged to part of the unlocking of the potential of the young people.

The students themselves are reason for the success of the Arrowsmith Program. Their dedication to working on repetitive cognitive exercise to create the change as a neural level, to dig deep to remain positive and motivated, encouraging classmates and working hard to build their own better futures. That's the very best of Arrowsmith. Real effort for real change.

Arrowsmith Program Leader

03/08/2017

August 3, 2017

Dear

I write as the Principal of a Queensland Independent School that offers the Arrowsmith Program.

We have offered the Program since August 2014 and have seen students graduate from the Program in 2016 and also this year. After initially having one class of 12 students with one teacher, we now offer two classes with 12 students in each class - the addition of the extra class is as a result of the demand for the Program based on the successful outcomes for our students.

Students, from Year 6 to Year 12, are enrolled in the Program. Each student undertakes 4 x 40 minute classes per day, in addition to continuing to study English and Maths, and if time permits, an additional subject of their choice. The cost of a student in the Program is borne by parents.

The Program is based on the science of neuroplasticity; it is possible to retrain the neurological pathways in the brain and the repetitive exercises undertaken by students enable this retraining to occur.

The Program offers our children the opportunity to overcome learning difficulties / challenges that have made their early years of schooling unhappy and miserable as the students have not been able to achieve success in a mainstream classroom. Students undertake a variety of exercises, individually tailored to address their learning deficits.

We have observed students reading better, able to comprehend Maths topics, improve their spelling, writing and comprehension, become more socially aware and responsible, develop confidence in attempting new tasks in the classroom, and pleasingly, transition with success into mainstream classrooms.

The Arrowsmith Program works on addressing a student's deficiencies rather than assisting them cope with the aid of additional classroom assistance or withdrawal into special learning areas.

Our school community has embraced the Program and the students in the Program. The top student in Year 9 Maths last year was a graduating Arrowsmith student; one of our Prefects this year will graduate from the Program at the end of 2017; the two lead actors in the School Musical are both graduates of the Program and the 1st Rugby League team this year featured a boy who graduated from the Program in 2016 and another who will graduate at the end of 2017.

I am an advocate for the Program as I have witnessed how the hard work of students in the Program has seen them change their life. The parents of many of these students had previously tried remedial programs for their children without success - in the Arrowsmith Program the students' brains were changed as a consequence of the nature of the Program. The Program provides lasting long term benefits for students and has changed the lives of students and families who have been enrolled in the Program at the College.

I am an advocate of the Program and I am thrilled with the progress of so many of our students who have either graduated or who are currently enrolled.

Principal



As a first and second year teacher of the Arrowsmith Programme, we are beyond excited by the changes that we, parents and academic teachers are witnessing in the students who are part of Arrowsmith.

Students who could never read an analogue clock can now do so with just a glance.

Students who never understood the concept of addition/subtraction/multiplication/division now do.

Students who only weeks into her activities understood the concept of 'carrying' in her mainstream classroom and could complete the assigned tasks.

Students whose hand writing was unreadable now write freely and neatly.

Students who only attempted spelling words phonetically can now recall and remember accurate spelling.

Students who couldn't or were afraid to read out loud now do confidently.

Students who would hide in the background now put their hands up to answer questions, put their hands up for leadership nominations and confidently MC school assemblies.

Students who couldn't easily get their words out verbally, now speak freely.

Students who couldn't follow oral instructions now do with confidence.

Students who couldn't catch a ball now confidently dribbling in basketball and soccer.

Students who wouldn't enter equestrian competitions now do because they can remember the course that they need to follow.

Students who were hidden, sneaking under the radar with compensation strategies covering how far behind they were, are now loving and enjoying school.

For some of our students, the Arrowsmith Programme is a life changing experience and we are blessed to be a part of their journey.

Kind regards,

Junior School Arrowsmith Teachers

I am writing to support the role of the Arrowsmith Program in the School in which I am the Site Administrator of the Arrowsmith Program. I am also practising as an experienced educational psychologist whose primary work involves assessing, diagnosing and making recommendations for the complete range of learning dysfunctions. I am a Primary Trained teacher with thirty years experience in Rural Victoria as a teacher and Principal. I have also lectured in Educational Psychology at the local College of Advanced Education in the 70's and served in the Department of Education as a Guidance Officer for twenty years. I have devoted my professional life to advancing children's learning irrespective of their gifts or level of functioning.

My current School has a history and great pride in offering a systemic model of support for students with learning difficulties, providing traditional remediation techniques and accommodations, and despite this, there was always a significant proportion of students who did not change, despite herculean efforts of dedicated staff. Something needed to be done for them, and an exchange teacher from Canada increased our awareness of the Arrowsmith approach. Parent curiosities led to me being fortunate enough for my Headmaster to send me on a mission to visit Arrowsmith Schools in Canada in 2015, and to report back. We now have 31 students enrolled, and 7 trained staff. The staff are teaching with a mix of academic and Arrowsmith classes. This model was preferred by our Staff and works well. I was very impressed with the Arrowsmith Program based upon its thorough assessment processes, its uniqueness in being an individualised program, its built in monitoring systems & readiness of feedback provision for staff from a very professional team in Canada, but most importantly, the success experiences for the students as they progress through increasingly challenging tasks. It is hard work for the students, and takes commitment, and involves homework too. The amazing thing that I have witnessed in nearly two years is nothing other than positive change. The changes I refer to have occurred within eighteen months since the launch of our three year pilot program.

As a Site Administrator, I meet all students, staff and parents on a regular basis, and I cannot emphasise to you the power of this program for change in the students. There are many anecdotes I could provide here, but they are all positive, and yielding change in demeanour, in attitude to self and learning, in application and in behaviour in a range of contexts. This program is gold, and a life saver in some cases. The transfer across to academic classes is yielding benefits also. Our School applied PATR & PATM tests to all students initially, and each February. Our students were given choices as to which academic classes to choose from, and Maths & English were not compulsory for the first 12 months, but despite that, our tentative data, using regression analysis, told us that positive growth definitely occurred in English and maths scores with the majority of students.

All our academic staff have noticed huge changes in the students as they approach their academic studies in English and Maths.

I do not hesitate to say that the Arrowsmith Program is of huge benefit in the battery of options to assist any educational body to address deficits in student's learning, and in addition, it's significance in promoting the integration of brain function to assist the optimisation of student potential. This in itself promotes positive mental health & successful relationships.

In short, I cannot believe the difference this program is making, and has made in a short time, to children's lives.

02/08/17

Educational & Consultant Psychologist,

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School Psychologist

August 2, 2017

**Subject: Re: NSW Parliamentary Inquiry into the education of students with Disabilities and Special Needs**

" As a long time teacher and school leader I have applauded a range of special programs which have been successful in broadening the learning of many of our students. However it always worried me that a group of average to highly intelligent students with special needs were unable to be helped. These students have struggled with a range of programs often including synthetic phonics and hands on maths programs. With this in mind I researched plasticity of the brain. I then approached Arrowsmith to see if we could trial their program for some of our bright but otherwise unsuccessful students in need. The whole Arrowsmith team has helped us and we have, and are having, success with the students who we have engaged in the program. Some of our students were non readers by Year 4, others struggled with maths concepts, and still others have more complexed learning difficulties. The successes this program brought the students in confidence, social awareness and ability to concentrate were the first improvements then there was more obvious academic improvements. I particularly feel the students are more successful learners across the whole curriculum.

A specific part of the program known as MSS has also been successful for our students in the first stages of learning. For one group of students we ran a year long successful trial which should be further trialled to reduce the number of students who move into primary years with special academic needs.

I believe our bright young students with learning difficulties have been neglected in our very valid attempt to support our students with more obvious special needs and the Arrowsmith program should be used more widely to address this significant gap in special education.

Principal (retired)

| ARROWSMITH PARENT TESTIMONIALS (additional)       |  |                    |
|---|--|--------------------|
| NAME  | SITE   | POSITION           |
|   | NSW  | Parent             |
|   | QLD  | Parents            |
| ARROWSMITH PROFESSIONAL TESTIMONIALS (additional) |  |                    |
| November 2016<br>August 2017                      | Arrowsmith School<br>Home schooling in Australia | Tutor              |
|   | , NSW  | Mainstream Teacher |

August 3, 2017

I have had students in my class who have participated in the Arrowsmith Program for the last three years. In that time I have seen improvements in reading comprehension; one student improved his reading comprehension age by four years over a two year period. I have seen significant improvements in processing speed, attention, Mathematics and an improvement in retaining what they have learned.

A number of these students have demonstrated improvements in their writing as well. Most notably in sentence fluency, the organisation of their written work and conventions.

One of the most satisfying things I have seen as an educator is the change in their self esteem and confidence. I have no doubt that this is due to their improvements in the aforementioned areas.

If you would like any further information regarding the improvements I have seen, please don't hesitate to let me know.

Kind Regards

Testimonial from

Arrowsmith Program August 2, 2017

Our son \_\_\_\_\_ was diagnosed with learning delays before he started school, and worked with a tutor once every week for all of his primary school years before we began the Arrowsmith program when he started grade 5. We were desperate to NOT endure another year of him flying just beneath the education radar, appearing to be okay as he didn't want to stand out, but not really understanding much of the curriculum at all. We were constantly worrying how he is doing and using his tutor as a measure of progress, or lack thereof, and fighting his resistance to go to school because he doesn't "understand it".

We moved to \_\_\_\_\_ from \_\_\_\_\_ when we were offered a place at \_\_\_\_\_ in Arrowsmith and within a matter of days \_\_\_\_\_ had learned to tell the time, and his anxiety stutter of 5+ years had all but disappeared.

From there he has come along in leaps and bounds. \_\_\_\_\_ could barely do year 2 level maths or writing (heading into grade 5) and now he is quite competent at addition, subtraction, and calculating change which had been a real concern before. His ability to write legibly has also improved 1000%, as has his ability to recall instructions and information.

We really can't speak highly enough of his experience in the Arrowsmith program - in part because he is in a smaller classroom which is much less disruptive or chaotic than a mainstream classroom it gives him a chance to work in a structured space at a level where he can achieve regular achievements which really motivates him - this has been amazing for his self esteem not to mention the advancement in his actual skills. At his grade 6 graduation, he stated that Arrowsmith has changed his life, and he thanked us for bringing him here to do it.

\_\_\_\_\_ is now a B/B+ student having begun year 7 after 2 years of Arrowsmith, now doing science and thoroughly enjoying it, all of which we couldn't even imagine 2 years ago. He is now also able to negotiate situations, solve problems and think outside the square to achieve specific outcomes - these are things most other kids can do naturally, and \_\_\_\_\_ would often have been disadvantaged, but it is a life skill he is starting to develop we believe mainly due to the program.

The Arrowsmith program has been a complete saviour for \_\_\_\_\_ both academically but also personally, and it brings him a lot of previously unknown happiness. As a child who just happens to have learning delays, he deserves to have is opportunity to be happy, and successful, and accepted. I would be really happy to discuss the impact the program has had with anyone who may have any questions.

Many thanks



**Re:**

I began tutoring [redacted] in February 2015 when she was in Yr 4, until she left for the Arrowsmith School in [redacted]. During [redacted] early years of schooling, several profound learning deficits had been identified by her teachers & learning support staff particularly in the subject Mathematics.

[redacted] had a sound level of competence in concrete areas such as memorising addition & multiplication facts. However when simple converse operations were presented, [redacted] was completely unable to calculate the answer e.g  $11 - 10 = ?$

Other areas which presented major difficulties included: counting forwards & backwards to 100 by anything other than 10s; mathematical reasoning & problem solving; conceptualizing & working with larger numbers; (no concept of) fractions & decimals; spatial awareness; basic aspects of time – analogue & digital, & other units of measurement; simple calculations & problem solving with money; classifying & categorising objects; copying accurately from written material & accurately recording auditory information; discussing abstract concepts etc

[redacted] clearly had heightened abilities in areas which required simple rote learning e.g. spelling. She was a competent reader for her age though her language comprehension was restricted & her ability to infer & draw conclusions from what she read was very limited.

An initial evaluation of [redacted] ability in mathematics on her return to Australia in May 2016 indicated a marked improvement across most aspects and a dramatic improvement in some. The areas of most significant improvement were:

- the ability to comprehend mathematical concepts (such as measurement & conservation of volume) - problem solving - visualizing a word problem & choosing the appropriate mathematical operations to solve it.
- visual & auditory memory & processing skills - comprehension of the order of numbers & where each sits in relationship to the other, especially counting backwards E.g. by 10s from 445. Before she left, [redacted] was not able to perform this kind of task without high levels of assistance & it was clear she had no real understanding of what she was doing.

**All of this is particularly significant considering [redacted] had done no formal academic school work while away.**

In addition, the speed at which [redacted] was able to perform the elements of maths in which she already had a sound ability, such as memorizing of number facts & performing simple 3-4 digit operations, had significantly increased.

Additionally, [redacted] ability to engage in more complex verbal interactions, discuss abstract concepts, express empathy for others & reflect on her own feelings & reactions has improved dramatically. Since May, [redacted] has covered all Yr3 maths national curriculum content areas & is now becoming competent with early Yr 4 areas. One of the greatest improvements I feel, is [redacted] ability to quickly understand most concepts which have been re-presented to her, when previously she was totally unable to do so, no matter how many different ways they were presented. Also, [redacted] handwriting & control of writing implements had vastly improved, & has continued to do so.

**[redacted], November, 2016.**

### Update on

### Academic Progress – 3<sup>rd</sup> August 2017

During the course of 2017, [redacted] has continued to make significant improvements in her competency across the Stem subjects, particularly in mathematics.

[redacted] has worked diligently, at a greater pace than expected and with greater independence. Her language comprehension and processing skills have advanced, enabling her to understand more complex concepts and detailed explanations. [redacted] is more able to understand requirements of written tasks and is confident to undertake them, without having to rely as heavily on teacher explanation and input. This is a huge advance on [redacted] path to her return to a mainstream classroom environment.

As a result, [redacted] has become competent in most aspects of the Maths and English curriculum which have been covered so far. She would currently be in Yr 6 in a formal schooling setting in Queensland. Although it is difficult to be specific, it is estimated that [redacted] is currently achieving at a standard close to that expected of an end Yr 5 early Yr6 student in English (average standard), and an early to mid Yr 6 student in mathematics (average- above average).

[redacted] does still have some challenges such as consistency and working at a pace which ensures greater levels of accuracy and attention to detail. Nevertheless, the major hurdles so evident and debilitating in her early years of schooling, such as the inability to understand even the most basic of mathematical concepts, have well and truly been overcome.

[redacted] is enrolled to enter Yr 7 in 2018 and it is anticipated that with family and tutoring support she will continue to progress and succeed in her academic endeavours.

**Home school teacher & tutor**

## Arrowsmith testimonial

I have had 2 goals for [redacted] schooling years; that he would maximize his education potential and that he would enjoy his years at school. Prior to entering the Arrowsmith program neither goal were being achieved. [redacted] believed he was one of the duds in his class year and school was exhausting. He would come home and had no interest in any extra curricular activities. It was as if there was just no energy left to participate in activities or even to have a great interest in his surroundings. I insisted he did at least one sport but he participated with medium interest and enthusiasm.

His last 18 months at [redacted] and participating in the Arrowsmith program have been his best schooling years. About half way through his 2<sup>nd</sup> term in the program it was if he popped his head up out of the clouds and looked around and decided he wanted to participate in his world. He started asking questions and bantering in a conversation. A number of relatives and friends have commented on how much more engaging [redacted] is when they meet him.

[redacted] decided he would train for the athletics carnival and set up a training regime which he followed closely. He continued on with Little Athletics, is playing hockey, training for cricket and tennis and doing karate on a Saturday morning. [redacted] recently graded for karate and was the clear stand out best performer in the group of around 16 and was awarded the "Best in Grade" certificate. All of these activities have been driven by wanting to do them rather than me pushing him into them.

[redacted] has developed a great group of friends at [redacted] and is able to relate to them better than previously. This continues to be a challenging area for [redacted] but I have seen great improvement in his being open another point of view rather than being very black and white in his thinking.

In terms of his belief in his abilities this has been the greatest area of improvement. Arrowsmith has allowed him to succeed from the start of the program in the way it has frequent mastery levels so [redacted] can constantly see he is improving. At his previous school [redacted] was struggling to keep up and did not finish much of his work as he could not do it at the speed of the other students. I would tell him he was a bright student with a learning challenge but I don't think he believed it. Now he is confident in his skills. He is so proud that he has mastered 8 handed clocks. He is confident in his academic abilities and he is confident in himself. It is so wonderful to see. In [redacted] recent ICAS results he achieved in the top 14% in Science having had no schooling in science this year at all.

Prior to [redacted] entering the Arrowsmith program I had spent 4 years trying a multitude of programs to assist [redacted] with his learning. Unfortunately none of them were successful. I am grateful that the Arrowsmith program has given [redacted] 2 fabulous years where he has achieved the goal of maximizing his learning potential and thoroughly enjoying these 2 years of schooling. I believe he has a much better skill level and attitude to be able to progress through his secondary schooling years as a result of his Arrowsmith experience. Thankyou for the opportunity.

## **Annexure M**

Report on the TCDSB Study of  
the Arrowsmith Program for Learning Disabilities

Prepared by William Lancee, Ph.D.

January 22, 2003

## Study Consultant

Dr. William Lancee is Head of Research in the Department of Psychiatry at Mount Sinai Hospital and Assistant Professor, Department of Psychiatry, University of Toronto. He has a Bachelor in Mathematics from the University of Waterloo. In the first part of his career, he was a statistical consultant to major pharmaceutical companies. Later he received his Ph.D. from the Institute of Medical Science at University of Toronto, and has designed and carried out more than 20 peer reviewed collaborative studies, including large-scale epidemiological studies as well as psychotherapy intervention studies. He is author of three published psychological measurement tools: The Nurse Observed Behaviour Scale; the Staff Patient Interaction Response Scale; and the Perceived Family Burden Scale. He has supervised 15 graduate students. His special interest is in the mathematical modeling of complex systems using cellular automata, genetic programming, and neural networks. He has published 37 papers on a wide variety of topics. Recent papers related to family issues and child development are:

Maunder R., **Lancee, W.J.**, Greenberg, G., Hunter, J., Fernandes, B. Insecure attachment in a subgroup of ulcerative colitis defined by ANCA status. Dig Dis Sci, 45, 2000, 2127-2132.

Hazelton, R. **Lancee, W.J.**, O'Neil, M.K. (1998) The controversial long-term effects of parental divorce: the role of early attachment. Journal of Divorce and Remarriage, 29(1)1-18.

Beitchman, J.H., Brownlie, E.B., Inglis, A., Wild, J., Ferguson, B., Schachter, D., **Lancee, W.J.**, Matthews, R., Wilson, B. (1996) Seven-Year Follow-up of Speech/Language Impaired and Control Children: Psychiatric Outcome. Journal of Child Psychology and Psychiatry 37(8)961-970.

Levene, J.E., **Lancee, W.J.**, Seeman, M.V. (1996) The Perceived Family Burden Scale: Measurement and Validation. Schizophrenia Research, 22, 151-157.

Beiser, M., **Lancee, W.J.**, Gotowiec, A, Sack, W., & Redshirt, R. (1993). Measuring Self-Perceived Role Competence Among First Nations and non-Native Children. Canadian Journal of Psychiatry. Vol 38, 412-419.

## Report on the TCDSB Study of the Arrowsmith Program for Learning Disabilities January 22, 2003

### ***Introduction:***

Learning Disabilities (LD) seriously affect academic and emotional development and are unlikely to remit without specialized intervention. Students with learning disabilities tend to fall farther and farther behind their peers in academic performance and subsequently tend to have a low sense of self-worth. Klein and Mannuza (2000)<sup>1</sup> followed 104 children with LD who initially did not have emotional difficulties. Sixteen years later, these children, when compared to 124 controls, had a much lower status occupational level and continued to struggle with a high prevalence of psychiatric and addiction disorders.

Various special education programs have been developed to address learning disabilities. The approach of the Arrowsmith Program is first to distinguish finely between elemental cognitive impairments and then to implement an individualized highly task-oriented program that exercises and challenges the identified deficit. It is thought that these highly targeted exercises create ways for the brain to provide the necessary functionality for encoding and decoding spoken and written discourse, and for storing, organizing, and integrating knowledge. If this is successful, the child can rejoin his or her peers in normal academic progress. It should be understood that successful graduates of the Arrowsmith Program will require some time to make up for the learning time that was lost due to the original impairment. The authors of the Arrowsmith Program have high expectations for their successful graduates and believe that they will become academically and occupationally competitive.

### ***Objective:***

At the beginning of 2001, the Toronto Catholic District School Board (TCDSB) enrolled 30 students (grade 2 to grade 7, from 4 schools) in the Arrowsmith Program (AP). These students were identified by the TCDSB as having learning disabilities. All 30 students were below the age-adjusted 33%-tile in at least one of the three subtests of the Wide Range Achievement Test 3 (WRAT3) – (i) spelling, (ii) timed arithmetic, and (iii) word recognition. Twenty seven students scored below 15%-tile in at least one of these tasks – that is, lower than 85% of other students at the same age. An additional 10 learning disabled students from a fifth TCDSB school were assessed over the school year but were not enrolled in the AP. It was the intention that these students would function as a comparison group.

In October, 2002, Arrowsmith School commissioned William Lancee, Ph.D., who is an experienced research scientist at the University of Toronto, Faculty of Medicine, to review, analyse and report on data from the TCDSB/AP study. The data entry, data verification, data organization, and defining statistical transformations were completed by the middle of December, 2002 when data analysis commenced.

### ***Study Design:***

The study design was limited by ethical and practical constraints. It was decided that all students from a given class should receive the same intervention. Therefore it was not possible to select AP students on a random basis. Whole classes could have been randomized to receive AP or not, but this would have seriously increased the required sample size and would have been too costly.

<sup>1</sup> Klein, R.G. and Mannuza, S. (2000). Children with complicated reading disorders grown up. In L.L. Greenhill (Ed.), *Learning disabilities: Implications for psychiatric treatment*. Washington: American Psychiatric Press.

Without randomized controls, it would not be possible to definitively attribute differential improvements to the AP program, since the following selection biases may occur.

- (1) It might be that AP students were more amenable to spontaneous improvement or other non-AP factors. However, spontaneous improvement in LD is highly unlikely, especially in a single school year.
- (2) The possibility that other non-specific factors such as *attention* and *time* could have favoured the AP students is also unlikely, since comparison students received similar added attention and learning time.
- (3) It could be argued that if students who were selected for AP had less severe LD, they would be more likely to improve. As will be shown in the result section, this possibility could also be rejected, since initial severity was not predictive of degree of improvement.

The approach taken was to test for pre-post improvements in the 30 AP students, and then test whether this was different from the pre-post changes in the 10 comparison students. Because of the small sample sizes, the power to detect statistically significant difference between the two groups was low. Nevertheless, if statistical differences were found, they could be accepted with confidence.

### ***Study Sample:***

There were no study dropouts, and all 30 AP students and 10 comparison students were followed up.

Because the basis for selection was LD, there was no control over grade and gender. The 30 AP students form a very heterogeneous group. For example, by chance there were six grade 4 female students compared with one grade 4 male, and there were eleven grade 5 male students compared with no grade 5 females.

Although all study students had LD, no single definition was used to select students for the study. There were three comparison students who were close to normal range on at least one WRAT3 subtest (75%-tile or higher). None of the 30 AP were functioning close to this level. This lack of equivalence at the start made direct comparison of the two groups difficult.

At the risk of reducing the size of comparison sample too much, the three highest functioning comparison students were considered to be outliers and were treated as a separate subgroup for some of the statistical analyses.

Due to the time course of the study and schedule of assessments, AP students were assessed at baseline and 12 months later (typically from February, 2001 to February, 2002) but comparison students were assessed at baseline and only 9 months later (from January 2002 to November, 2002). Both time frames reflect pre-post school year time frames. Although it was not anticipated that comparison students would improve spontaneously in four months, improvements in the two groups were prorated to reflect these different time frames. For example, improvements in the thirty AP students were considered relative to an expected (non-LD) progress of 12/12xGE. The ten non-AP students were considered relative to 9/12 xGE.



### ***Measures:***

Pre and post measures include the following 12 standardized Achievement and IQ tests:

- the Wide Range Achievement Test 3 (WRAT3)
  - (i) spelling; (ii) timed arithmetic; (iii) word recognition
- the Woodcock Reading Mastery
  - (i) word identification; (ii) word attack; (iii) word comprehension; (iv) passage comprehension
- the Monroe-Sherman Achievement Tests
  - (i) copying text; (ii) auditory memory; (iii) visual memory
- the Otis-Lennon Mental Ability IQ Test (timed task)
- the Peabody Picture Vocabulary IQ Test (task is not timed)

All standardized achievement and IQ scores were adjusted for age using standardization tables to yield percentile (%-tile) scores. Grade Equivalent (GE) scores (functional grade levels), were also calculated for the WRAT3 and Woodcock tests. Students in the normal range are expected to increase their GE score by 1.0 for each successive school year and stay relatively constant with respect to their %-tile scores. Students with learning disabilities can be expected to have no or only a small increase in GE over a school year, and are expected to decrease their %-tile scores as they drop further behind their age-equivalent peers.

Eighty of the 960 test administrations were done jointly by two different test administrators (one designated by the TCDSB and one by the AP). These score pairs correlated highly ( $r=.90$ ). In all but two cases the tests scores were identical, indicating excellent adherence to test protocol.

AP students are assigned exercises based on specific cognitive deficits. Therefore the Arrowsmith Program uses assessment tools (AP authored) to test performance on elemental cognitive functions. These tests were also done at pre and post by the 30 AP students and by the 10 comparison students. The AP tests were used to determine if improvements in standardized tests could be linked to improvements in the hypothesized elemental cognitive functions.

Students in the AP and their teachers and parents completed a comprehensive satisfaction questionnaire at the 12-month follow-up time point.

### ***Results of standardized achievement and IQ tests:***

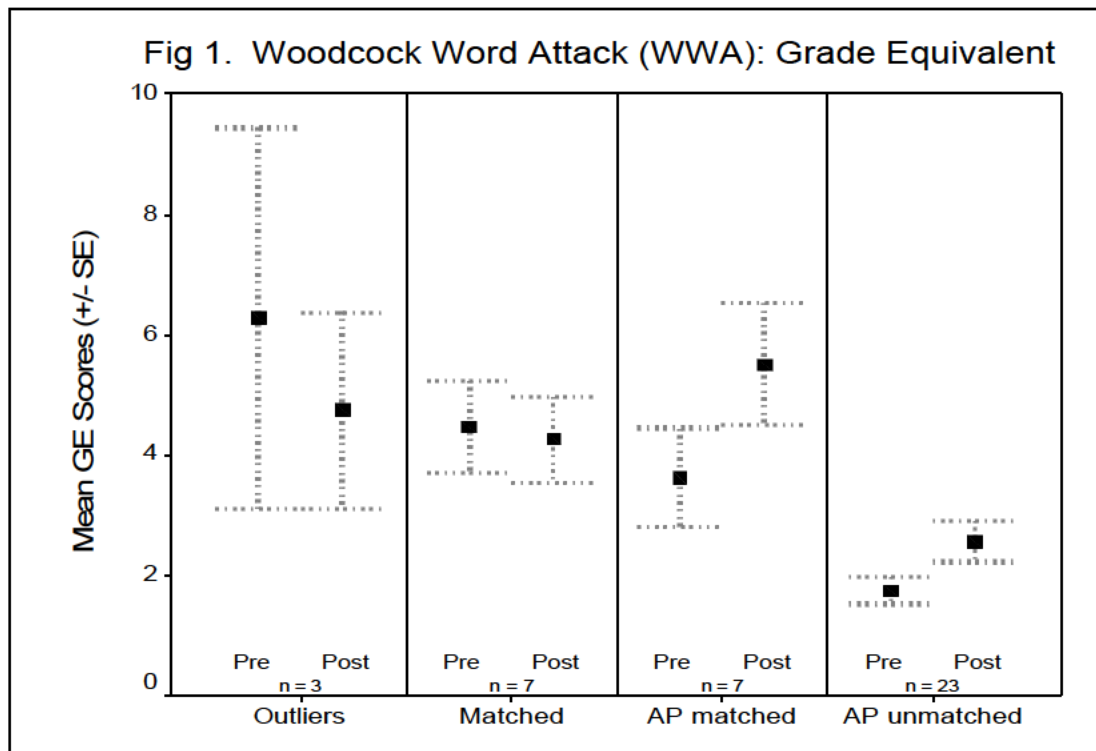
All 40 students completed the prescribed achievement and IQ tests at pre and post intervention times. In less than 1% of 960 subtests (40 students x 12 tests x 2 time points), students were unable to complete the subtest in the time allocated. In order to use all available data for each student, the rare missing test scores were estimated mathematically.

[*Technical note.* First a linear prediction equation for the missing assessment was generated using all available pre scores. This equation was then applied to estimate the missing score. Since the same equation is applied to both pre and post data, this approach does not distort the results, and since there were only a few missing data points, interpolation inflates the degrees of freedom only slightly. Setting the statistical criterion at  $p<.001$  (rather than the usual  $p<.05$ ) compensates conservatively for this effect.]

For each of the 7 non-outlier students in the *comparison matched group*, an AP student was found who best matched him or her with respect to test scores at baseline. The following four groups were delineated:

- |                             |      |
|-----------------------------|------|
| 1. comparison outliers      | n=3  |
| 2. comparison matched group | n=7  |
| 3. AP matched group         | n=7  |
| 4. AP unmatched group       | n=23 |

Figure 1. illustrates the average changes that occurred in each group over the school year with respect to one of the achievement tests, the Woodcock Word Attack (WWA). [Note that the results for other achievement and IQ tests are provided in Table 1, and show a pattern that is very similar to the WWA test.]



Notice the differences in starting level. The *comparison outliers*, by definition, had relatively high GE scores at baseline, whereas the *AP unmatched group* had the lowest baseline scores. The matched groups were equivalent at baseline. Because of the small number of subjects in the outlier group, the error bars are large for this group.

The mean scores of AP students went up, while the mean scores of comparison students stayed the same (or went down slightly for those with high starting scores). The change from pre to post was very similar for the AP matched and unmatched group, indicating that differential starting levels did not appear to affect changes over time. Therefore the matching process was discontinued, and all 30 AP students are contrasted with all 10 comparison students in Table 1.

Table 1. Improvements in average Achievement test scores: Grade Equivalent  
[Means and (Standard Deviations)]

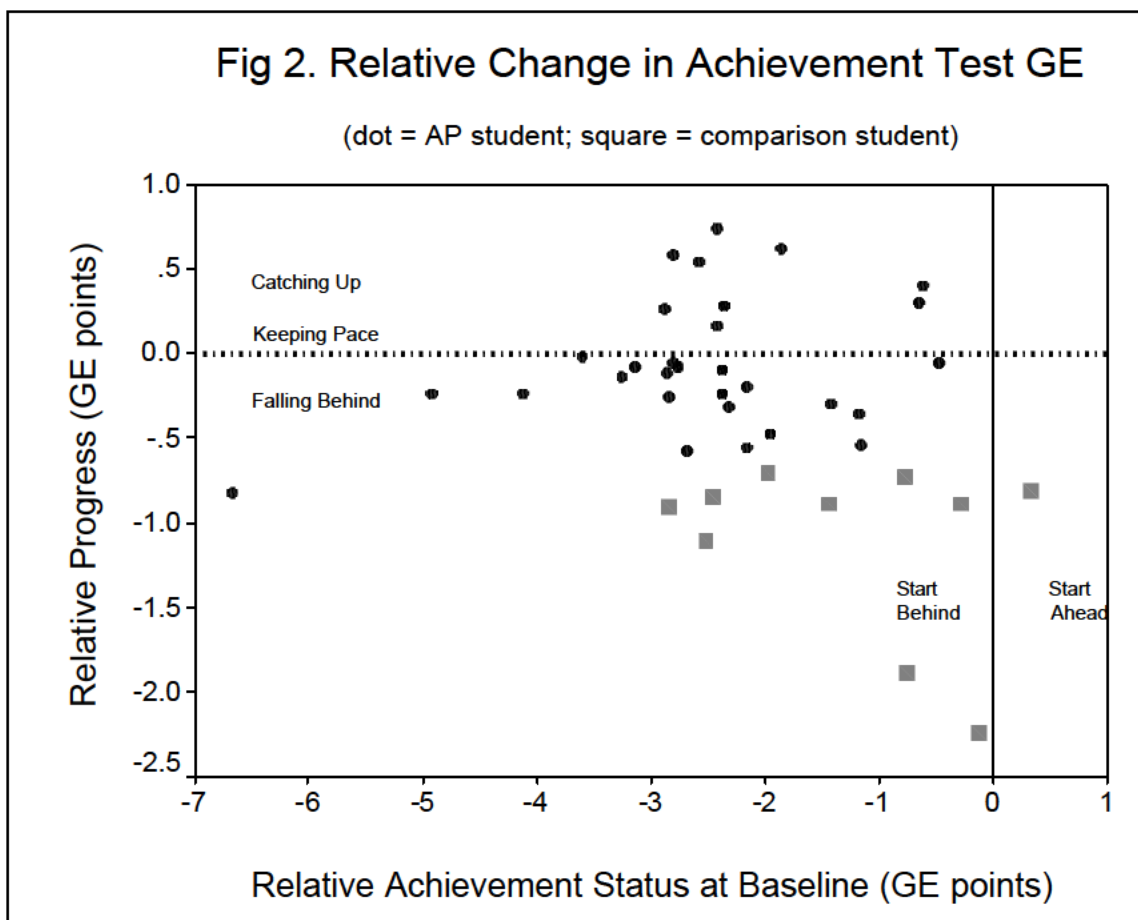
|                                | 30 AP Students |               |               | 10 Comparison Students |               |                | Significant<br>difference<br>AP vs Comp. |
|--------------------------------|----------------|---------------|---------------|------------------------|---------------|----------------|--|
|                                | Pre            | Post          | Change        | Pre                    | Post          | Change         |  |
| WRAT-spelling                  | 2.4<br>(1.88)  | 3.4<br>(2.12) | 1.0<br>(0.80) | 4.4<br>(2.42)          | 3.7<br>(1.95) | -0.7<br>(1.08) | $F(1,38)=30.1$<br>$p<.0001$              |
| WRAT-timed arithmetic          | 2.9<br>(1.27)  | 3.8<br>(1.37) | 1.0<br>(0.57) | 4.7<br>(1.50)          | 4.7<br>(1.19) | 0.0<br>(0.45)  | $F(1,38)=22.7$<br>$p<.0001$              |
| WRAT-word recognition          | 2.5<br>(1.89)  | 3.9<br>(2.52) | 1.3<br>(0.98) | 4.8<br>(3.14)          | 4.9<br>(3.32) | 0.1<br>(0.32)  | $F(1,38)=15.6$<br>$p<.0001$              |
| Woodcock-word identification   | 2.7<br>(1.52)  | 3.6<br>(2.17) | 0.8<br>(0.76) | 4.4<br>(2.36)          | 4.3<br>(2.19) | -0.1<br>(0.26) | $F(1,38)=12.9$<br>$p<.001$               |
| Woodcock-word attack           | 2.2<br>(1.58)  | 3.2<br>(2.26) | 1.1<br>(0.83) | 5.0<br>(3.20)          | 4.4<br>(2.06) | -0.6<br>(1.42) | $F(1,38)=21.2$<br>$p<.0001$              |
| Woodcock-word comprehension    | 2.8<br>(1.24)  | 3.8<br>(1.27) | 1.0<br>(0.40) | 4.7<br>(1.57)          | 4.8<br>(1.59) | 0.1<br>(0.29)  | $F(1,38)=44.4$<br>$p<.0001$              |
| Woodcock-passage comprehension | 2.4<br>(1.14)  | 3.4<br>(1.24) | 1.1<br>(0.49) | 4.2<br>(1.70)          | 3.8<br>(1.22) | -0.4<br>(0.75) | $F(1,38)=46.4$<br>$p<.0001$              |

Table 1 shows, that on the average, the AP students improved significantly on all of the above achievement tests by approximately one GE in one school year. In contrast, on average, scores of the students in the comparison group did not advance in the school year.

### ***Relative Progress***

In order to investigate the effect of baseline differences in severity and the effect of different observation time frames, a summary measure of achievement in terms of GE was derived. This measure was based on the achievement tests in Table 1. The seven GE scores of each student were examined at each time point separately. After the lowest and highest scores were eliminated, the remaining five scores were averaged to form an overall GE score. This approach removed scores that may have been high or low for spurious reasons. Using this technique, each student received a single pre GE score and a single post GE score.

Improvement was defined in terms of deviation from expected (for non-LD students) change in GE. For example, a AP student who was observed over 12 months should have progressed 12/12xGE if she did not have LD. Let us assume that this particular student started at 2 GE below her actual grade. Therefore her *Relative Achievement Level at Baseline* was -2.0. If this student progressed by 0.35 GE, then she fell 0.65 further behind her non-LD peers. Her *Relative Progress* was -0.65. A student with a *Relative Progress* of +0.65 would be catching up with her peers. Each point on Figure 2. represents a student in terms of these *relative scores*.



There were 9 out of 30 AP students (30%) who had a positive Relative Progress score, indicating that they were catching up to their peers. There were 8 AP students (27%) with a Relative Progress score close to zero, indicating that they were progressing at the same rate as non-LD students, although not catching up. All remaining 13 AP students (43%) increased their GE scores somewhat in the 12 months, but continued to fall further behind their peers.

For the most part, the non-AP comparison students form a horizontal line around the -.75 mark, indicating that GE scores did not tend to change during the 9 months (.75 years). This lack of progress resulted in a loss of .75 GE in 9 months.

A greater proportion of non-AP comparison students were at a higher baseline GE level. However, baseline values did not appear to effect relative progress. Therefore, a postulated ceiling effect where comparisons students might have already achieved the level that AP students are now achieving, is not supported by the data.

### ***IQ Tests and Percentile Scores***

The changes in percentile scores on the Achievement and IQ tests are more difficult to interpret. The reason for this is that unless a LD student is actually catching up, his or her %-tile scores will be going down over the school year. Since IQ assessment requires the completion of tasks, lack of progress in task performance means that the same performance becomes a lower age-adjusted %-tile, even when the student is *not losing intellectual capacity*. With this caution, the %-tile results shown in Table 2 are very similar to the GE results.

Table 2. Improvements in average Achievement and IQ tests: Percentile Scores  
[Means and (Standard Deviations)]

|  | 30 AP Students |               |                | 10 Comparison Students |               |                | Significant<br>difference<br>AP vs Comp. |
|--|----------------|---------------|----------------|------------------------|---------------|----------------|--|
|  | Pre            | Post          | Change         | Pre                    | Post          | Change         |  |
| WRAT-spelling  | 14<br>(19.9)   | 19<br>(23.0)  | 5<br>(10.2)    | 34<br>(25.8)           | 22<br>(18.9)  | -12<br>(16.6)  | $F(1,38)=15.1$<br>$p<.001$               |
| WRAT-timed arithmetic  | 12<br>(10.5)   | 15<br>(11.6)  | 3<br>(7.9)     | 41<br>(25.6)           | 31<br>(22.5)  | -10<br>(6.6)   | $F(1,38)=23.2$<br>$p<.0001$              |
| WRAT-word recognition  | 11<br>(15.8)   | 20<br>(23.2)  | 10<br>(11.6)   | 35<br>(26.5)           | 31<br>(27.2)  | -5<br>(4.2)    | $F(1,38)=14.1$<br>$p<.001$               |
| Woodcock-word identification   | 18<br>(16.5)   | 22<br>(21.4)  | 3<br>(6.8)     | 43<br>(25.8)           | 29<br>(16.4)  | -14<br>(13.6)  | $F(1,38)=29.8$<br>$p<.001$               |
| Woodcock-word attack   | 16<br>(14.0)   | 22<br>(17.7)  | 6<br>(7.4)     | 41<br>(19.9)           | 32<br>(14.6)  | -9<br>(8.2)    | $F(1,38)=29.4$<br>$p<.0001$              |
| Woodcock-word comprehension  | 16<br>(14.7)   | 20<br>(14.5)  | 4<br>(5.4)     | 42<br>(23.7)           | 33<br>(23.1)  | -9<br>(4.1)    | $F(1,38)=48.7$<br>$p<.0001$              |
| Woodcock-passage comprehension   | 14<br>(10.9)   | 19<br>(12.8)  | 5<br>(4.9)     | 34<br>(19.3)           | 22<br>(15.0)  | -13<br>(7.2)   | $F(1,38)=74.0$<br>$p<.0001$              |
| Monroe-Sherman Achievement Visual Memory   | 19<br>(16.8)   | 37<br>(30.3)  | 19<br>(23.9)   | 35<br>(22.1)           | 33<br>(18.6)  | -3<br>(7.5)    | $F(1,38)=7.4$<br>$p<.01$                 |
| Monroe-Sherman Achievement Auditory Memory   | 20<br>(15.1)   | 38<br>(23.4)  | 18.4<br>(20.9) | 42<br>(23.6)           | 24<br>(21.9)  | -18<br>(20.3)  | $F(1,38)=22.8$<br>$p<.0001$              |
| Monroe-Sherman Achievement Reading Comprehension<br><i>*only GE scores are available</i> | 2.8<br>(1.24)  | 4.2<br>(1.59) | 1.5<br>(0.74)  | 5.0<br>(1.47)          | 4.8<br>(1.74) | -0.2<br>(0.63) | $F(1,38)=41.7$<br>$p<.0001$              |
| Otis-Lennon Mental Ability I.Q. Test (timed tasks)                                       | 15<br>(13.9)   | 30<br>(17.0)  | 15<br>(15.1)   | 47<br>(28.7)           | 47<br>(28.4)  | 0<br>(6.3)     | $F(1,38)=8.7$<br>$p<.01$                 |
| Peabody Picture Vocabulary I.Q. Test (task is not timed)                                 | 21<br>(23.0)   | 29<br>(22.6)  | 7<br>(8.2)     | 41<br>(24.1)           | 30<br>(25.0)  | -11<br>(17.6)  | $F(1,38)=20.3$<br>$p<.0001$              |

Note that the largest gains in the AP students were on the Monroe-Sherman Achievement tests and on the Otis-Lennon Mental Ability test. These tests are more closely related to specific AP exercises than other tests in the table.

*Association between improvements in Achievement/IQ tests and improvements in AP tests*

If improvements were due to specific AP exercises then we should expect to see strong correlations between changes in AP test scores and changes in Achievement/IQ test scores. Note that all 40 students, including the comparison students completed these tests. Note also that these tests/exercises were developed by AP and test names are based on postulated deficits in specific brain functions and specialized brain areas. The following AP tests scores were examined:

**Motor Symbol Sequence** – Exercises the muscle memory for symbol sequences which is important in learning written spelling sequences. It also exercises eye tracking in reading. Improvements should be related to the mechanics of reading and spelling.

**Phrase Memory** – This exercises promotes memory for chunks of informational units. Improvements should relate to improvements in spelling as this improves the child's ability to retain rules for spelling patterns. Passage Comprehension should also improve because the student can retain more of the information as he/she reads so can answer more factual questions based on what has been read. Improvements here should also be related to the Monroe Sherman Auditory Memory test which requires holding and chunking letters that are sounded out by tester.

**Predicative Speech** - This exercise promotes learning vocabulary in sentence context and the ability to remember complex sentences necessary to extract meaning. Improvements should be related to improvements in the Woodcock Passage and Word Comprehension and Peabody Picture Vocabulary.

**Broca's Area** – Exercises the ability to remember individual speech/phonemic units and then blend them into a word. This ability is necessary for learning to read phonetically. Therefore improvements should be related to improvements in Word Recognition and Word Identification. Improvements in this area allow the student to read more words correctly and therefore process information more efficiently – resulting in better task performance on a variety of comprehension tests. Since the Woodcock Word Attack (WWA) is a test of correctly sounding out nonsense words, improvements on Broca's area should also improve WWA. Since it requires the student to remember the sounds of letters, the Monroe Sherman Auditory Memory Test should also improve with improvements in this area.

**Supplementary Motor Skills** - Students have to do rapid mental numeric calculations and it requires tremendous focused concentration and accuracy. This is an exercise that stimulates the ability to sustain attention to tasks that have a self-correction feedback loop. Improvements in this should improve WRAT3 Timed Arithmetic, as well as help with the attentional skills required in word recognition and reading comprehension.

**Clocks** – This task exercises fast assimilation of the meaning of symbols (represented by increasingly complex faces of clocks). Improvements in this area should impact on most of the Achievement/IQ tests involving need for fast comprehension of abstract concepts. Deficits in this area impair both reading and mental arithmetic. More memory-specific skills should not be affected.

**Left Frontal** – Exercises the ability to integrate symbolic meanings from a variety of sources. Improvements here should be reflected in all Achievement/IQ test results.



As can be seen in Table 3, correlations between improvements in specific AP areas and improvements in Achievement/IQ tests are largely as expected.

Table 3. Correlations: changes in AP scores WITH changes in achievement/IQ %-tile scores  
(Pearson Correlation Coefficients)

| <b>Achievement Tests</b>                     | Motor Symbol | Phrase Memory | Predicative Speech | Broca's Area | Suppl. Motor | Clocks | Left Frontal |
|--|--------------|---------------|--------------------|--------------|--------------|--------|--------------|
| Monroe-Sherman Visual Memory                 | .24          | .23           | .10                | .26          | .35          | .28    | .26          |
| Wide Range Achievement Test Spelling         | .41          | .42           | .22                | .25          | .24          | .26    | .45          |
| Wide Range Achievement Test Word Recognition | .17          | .23           | .20                | .50          | .50          | .40    | .41          |
| Woodcock Word Identification                 | .41          | .30           | .27                | .50          | .36          | .37    | .53          |
| Woodcock Passage Comprehension               | .41          | .50           | .43                | .57          | .60          | .45    | .62          |
| Monroe-Sherman Reading Comprehension         | .32          | .41           | .46                | .46          | .42          | .52    | .58          |
| Woodcock Word Attack                         | .30          | .32           | .18                | .55          | .58          | .45    | .46          |
| Wide Range Achievement Test Timed Arithmetic | .17          | .19           | .17                | .32          | .56          | .56    | .53          |
| Woodcock Word Comprehension                  | .34          | .31           | .41                | .44          | .50          | .62    | .61          |
| Monroe-Sherman Auditory memory               | .26          | .38           | .23                | .40          | .56          | .58    | .52          |
| <b>I.Q. tests</b>                            | Motor Symbol | Phrase Memory | Predicative Speech | Broca's Area | Suppl. Motor | Clocks | Left Frontal |
| Otis-Lennon Mental Ability                   | .51          | .46           | .33                | .11          | .24          | .31    | .36          |
| Peabody Picture Vocabulary                   | .29          | .30           | .39                | .40          | .47          | .45    | .59          |

#### Shading Legend

|  |                              |  |
|--|------------------------------|--|
|  | $r < 0.35$ , NS              |  |
|  | $r \geq 0.35$ ; $p < 0.05$   | (explains more than 12% of variance of test) |
|  | $r \geq 0.40$ ; $p < 0.01$   | (explains $\geq 16\%$ of variance of test)   |
|  | $r \geq 0.50$ ; $p < 0.001$  | (explains $\geq 25\%$ of variance of test)   |
|  | $r \geq 0.60$ ; $p < 0.0001$ | (explains $\geq 36\%$ of variance of test)   |

These results support the defining principle of the AP program: that carefully targeted exercises aimed at improving elemental cognitive abilities will result in broader improvements seen as increased scores on achievement and IQ tests.

### ***Relationship between improvements and satisfaction***

The 30 AP students, their parents and teachers completed a 24 item satisfaction questionnaire. Improvements were seen by at least 2 raters (teacher and student; student and parent; or teacher and parent) in more than 80% of students in the following areas: reading comprehension; ability to focus on task; understanding ideas; legibility of written work; confidence; self-esteem; and ability to self-advocate. Between 70% and 80% of students were seen as having improved in: telling time; remembering factual information; listening skills; organizational skills; and understanding and following instructions.

The correlation between improved comprehension as seen by teachers correlated highly with the Relative Progress GE scores (Pearson  $r = 0.49$ ;  $p < 0.01$ ).

### ***Conclusion***

Despite some study design limitations and small sample size, the study results strongly support the Arrowsmith Program as instrumental in changing the developmental course of the majority of children with LD in this sample. In only 12 months, almost one third of the AP students were on a course that brought them closer to their peers. Another 27% improved their performance at the same rate as expected from their non-LD peers, that is, they stayed at the same distance but did not fall further behind. All other AP students (43%) improved at least somewhat on the various achievement tests. None of the 10 students in the comparison group progressed substantially beyond their entry status.

### ***Selected comments by AP students***

*The arrowsmith program is a great program. When I first started arrowsmith it was kinda hard for me....started it but one year later the arrowsmith program was a lot easier for me and I think that the arrowsmith program should continue because it is a fun program to do.*

*I like myself more now then before I started the arrowsmith program.*

*It's a good program and it is fun so I hope I will pass. I like sup motor and clocks on supmotor I am on 2B1 and on clocks I am on 3 hands*

*I like this program because it makes me thing faster like clocks i am in four hands and I can tell the time in seconds and my goal is to fish clocks for good. Sometimes I don't like this program because it get's to frustrated sometimes. That's why sometimes I don't like this program but this program is pretty good for kids with learning disabilites and that all I have to say about this program*

*I rilly like is porogram. I under sant that I have a dsibility and I am very thankful four this porogram. It as helped me allot in difrent areas. Thank you*

### ***Selected comments by parents***

*We can't believe the change in our son. He has become confident in the way he walks into a room. His head is held high and no longer hangs low. This is an amazing program. His report card are all As Bs and his teacher writes that he's a pleasure to teach and is a hard worker, that is a first. We are so pround of him.*

*When my son was put into arrowsmith he could not read, write and do basic things without being upset, because it was just too difficult. But with the arrowsmith program his confidence has increased dramaticly and he is now pretty close to being at his grade level. I am so grateful for the program and because of it my son has a real good chance at a good future. This program is so important. Without it many children would suffer.*



## **Annexure N**



**Center for  
Teaching  
Brain  
Literacy**

James B. Hale, PhD, MEd, ABPdN  
Scientific Director

7 August 2017

**Arrowsmith Program Evidence-Base**

Dr. James B. Hale has had a relationship with the Arrowsmith program for the past 6 years. During this period, Dr. Hale has worked with Arrowsmith leaders, staff, and affiliated faculty (although efforts were interrupted when Dr. Hale was recruited by the Singapore government to develop neuropsychological services in that country). Barbara Arrowsmith Young has an excellent understanding of brain-behavior relationships as she is able to converse lucidly about neuroscience, education, and how the Arrowsmith program is designed to remediate student learning deficits. Her approach was developed with A. R. Luria's teachings in mind. A. R. Luria is probably the most influential neuropsychologist of all time, impacting the practice of neuropsychological teaching, research, and service world-wide.

This interdisciplinary, collaborative effort with Arrowsmith led to two separate empirical studies that examined the efficacy of the Arrowsmith program. Pre-post repeated measures MANOVA's showed the Arrowsmith program not only helped develop student cognitive skills/functions, but also improved academic achievement as well. Both studies obtained university human subjects approval from an institutional review board, and were peer-reviewed before the different results were presented at two separate professional conferences (American Psychological Association/Canadian Psychological Association).

The question has been raised whether the Arrowsmith program is evidence-based. There is a great deal of discussion regarding what constitutes an evidence-based program, with no uniform guidelines or expectations agreed upon by most experts in the field. A rigid approach to evidence-based practice suggests only those programs that use randomized controlled trials with a placebo or sham intervention count, and results can only be considered for the specific age group, given population, and/or particular method used in the study. This strict approach to what is considered evidence-based has been largely dismissed as irrelevant for practitioners, researchers, and policy makers alike. In fact, considering that children with disabilities are not uniform in the cause or presentation of their learning problems (i.e., different subtypes), the rigid approach to evidence-based practice would eliminate most educational or school-based interventions, especially for children with special needs who have not been researched sufficiently using strict experimental designs. In fact, the two most common alternatives for brain-based education in schools – Differentiated Instruction and Universal Design for Learning – do not meet strict evidence-based guidelines, even though they are commonly used in schools and receive substantial government support for implementation.

An alternative evidence-based approach, taken by prominent US professional organizations (e.g., American Psychological Association, American Medical Association), is that research evidence is used to guide but not dictate practice, and the intervention should be tailored to individual needs. In addition, evidence can include many types of research (not just RCT's) and even interventions without formal research in which data are used to judge treatment effects (i.e., single subject designs). The research we conducted was a quasi-experimental approach because true experimental designs are quite difficult to achieve in naturalistic environments such as schools. Thus, our work constitutes a preliminary evidence-base in support of the Arrowsmith program. In addition, given the more commonly accepted definition of evidence-based practice, Arrowsmith's approach is clearly evidence-based in that data-driven decision making is used to guide initial placement of students in the curriculum/interventions, and then used to judge treatment effects, which in turn leads to programmatic changes for the student in question.

Ongoing research efforts are being undertaken to further solidify Arrowsmith's impact on student brain functioning, cognitive functioning, and academic achievement using controlled experiments and more sophisticated empirical designs. The Arrowsmith leadership is committed to these independent scholarship efforts, and has made it clear that they do not wish to influence the scholars engaged in this work to establish the treatment validity of the Arrowsmith program. Ongoing research efforts include multiple disciplines, ranging from classroom educators to neuroscientists, and should provide additional evidence regarding Arrowsmith's treatment efficacy, and thus further establish its credibility as an evidence-based practice. Having conducted many learning disability subtype and intervention studies, including studies that document brain changes reflecting achievement gains, it is clear to me that the potential of Arrowsmith's approach is substantial should promising results be confirmed in more sophisticated research designs.

Arrowsmith's purpose – to remediate brain dysfunction in children with learning disabilities – is not only a noble aspiration, it is in line with current neuroscience evidence. Although many special education teachers are told to accommodate learner differences by providing compensatory interventions (e.g., student with poor math skills is given a calculator), this is actually counter-productive in terms of brain development, neural plasticity, and academic achievement. According to our seminal article published last year in *Trends in Neuroscience and Education*, providing interventions that build brain structures and functions is what we should be doing in education, not providing accommodations that weaken deficient networks by relying on proficient ones. In other words, we should remediate cognitive and academic weaknesses, not provide compensatory accommodations for the deficits. In essence, using strengths to compensate for weaknesses undermines brain development. Thus, Arrowsmith's approach has the potential to do what few other special education programs do – build brain structures and functions that can potentially mitigate or ameliorate the child's disabling condition.

Obviously more research is needed, and Arrowsmith appears to be invested in ensuring that high quality empirical work is carried out by acclaimed researchers who continue to examine both Arrowsmith assessment tools and intervention efforts.

## BRIEF BIO

James B. Hale, PhD, MEd, ABPdN, is a retired Professor of Educational Neuroscience, Nanyang Technological University/Singapore National Institute of Education, rated as one of the top 20 universities in the world. Having served over 1000 children in school, clinic, and medical settings, Dr. Hale is a board-certified and licensed Pediatric Neuropsychologist, certified School Psychologist, and certified Special Education Teacher (SLD/EBD endorsements). He is current Scientific Director of the Center for Teaching Brain Literacy, an educational service organization that conducts research on children and educators that examines the relationship between brain functioning, assessment, and classroom instruction. A internationally renowned presenter and critically-acclaimed author with over 50 peer-reviewed publications, Dr. Hale recently represented the field of neuropsychology for the American Psychological Association in the *APA Handbook of Clinical Psychology* and the *APA Handbook of Psychopathology*. He is past-Chair of the American Academy of Pediatric Neuropsychology Empirically-derived Disorders of Attention (EDDA), which influenced the National Institute of Mental Health (US) Research Domain Criteria (RDoC) approach to disability identification and treatment. He is also the lead author of a 58-expert author White Paper on a neuropsychological approach to specific learning disabilities identification and intervention. He is the principal author of the critically-acclaimed best-selling book, *School Neuropsychology: A Practitioner's Handbook*, which is used worldwide for pre-service and inservice training of the educators, psychologists, and allied professionals who serve the needs of children with and without disabilities.

# Effects of the Arrowsmith Program on Academic Performance: A Pilot Study

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## Abstract

The Arrowsmith Program (AP) is a cognitive-based intervention program designed to remediate processing weaknesses in children with specific learning disabilities (SLD) by providing targeted interventions that strengthen the specific underlying processing deficit. Presumably causing the SLD. Pre- and post-intervention WJ-III achievement data was collected on 15 students in the AP program. NPStat non-parametric randomization tests revealed significant improvements across academic variables, and paired sample t-tests revealed differences between pre- and post-testing for most academic domains. Results suggest that targeting underlying processing weaknesses in SLD can impact real-world outcomes such as academic achievement.

## Introduction

- The AP consists of a program of intensive and graduated cognitive exercises designed to strengthen cognitive weaknesses that are presumed to contribute to SLD
- The AP is based on neuroscience research regarding brain plasticity that suggests it is possible to strengthen weaker cognitive functions that underlie learning challenges through a program of targeted and graduated cognitive exercises
- AP research and practice has identified 19 specific learning dysfunctions that vary across individuals with SLD, including those that affect both posterior and anterior brain functions
- Recent case study research conducted on the AP suggests that most participants experienced significant increases in cognitive, academic, emotional and/or interpersonal functioning<sup>1</sup>
- Targeting processing weaknesses instead of achievement deficits is controversial<sup>2</sup> and has not received sufficient empirical support<sup>3</sup>, thus further investigation is necessary

## Research Questions



- Does targeting and strengthening cognitive deficits impact academic achievement across reading, mathematics, writing, and language domains?
- Does the AP graduated targeted intervention approach result in improved academic performance at the single subject and group level of analyses?

## Method

- Woodcock Johnson III Achievement data was collected for 15 students (11 male, 4 female;  $M$  age = 9.3 years;  $SD$  = 1.36 years) of average intelligence prior to AP entry and again following intervention implementation ( $M$  time between testing = 28 months;  $SD$  = 8.36 months)
- Individual treatment response was assessed using a non-parametric randomization test (NPStat)<sup>4</sup> which approximates multivariate analyses in the absence of normal data
- Paired sample t-tests were used to compare pre-post group means

## Discussion

- At baseline entry into the AP, children with SLD mostly had low average WJ-III AC, with math and writing fluency in the borderline range
- Following AP intervention, academic scores improved and were in the average range except for math fluency
- Strengthening cognitive/neuropsychological functions presumed to underlie academic achievement deficits improves reading, mathematics, and writing by targeting the cause (i.e., cognitive deficit) rather than the symptoms (i.e., achievement deficit)
- Targeted interventions based on knowledge of brain plasticity can lead to improved short-term academic performance across a broad range of domains

## Results

Table 1  
Pre-Post Differences on WJ-III Achievement Variables

| Cluster            | Subtest                    |      | Mean   | t     | p      |
|--------------------|----------------------------|------|--------|-------|--------|
| Reading            | Letter Word Identification | Pre  | 87.80  | 5.57  | < .001 |
|                    |                            | Post | 98.33  |       |        |
|                    | Reading Fluency            | Pre  | 81.50  | 8.48  | < .001 |
|                    |                            | Post | 90.14  |       |        |
| Mathematics        | Passage Comprehension      | Pre  | 85.53  | 8.85  | < .001 |
|                    |                            | Post | 96.20  |       |        |
|                    | Word Attack                | Pre  | 88.53  | 5.21  | < .001 |
|                    |                            | Post | 101.93 |       |        |
| Writing            | Calculation                | Pre  | 82.47  | 11.69 | < .001 |
|                    |                            | Post | 94.13  |       |        |
|                    | Math Fluency               | Pre  | 72.47  | 6.61  | < .001 |
|                    |                            | Post | 84.07  |       |        |
| Receptive Language | Quantitative Concepts      | Pre  | 87.60  | 6.20  | < .001 |
|                    |                            | Post | 101.27 |       |        |
|                    | Spelling                   | Pre  | 81.93  | 5.40  | < .001 |
|                    |                            | Post | 91.00  |       |        |
| Writing            | Writing Fluency            | Pre  | 74.85  | 8.15  | < .001 |
|                    |                            | Post | 94.69  |       |        |
|                    | Writing Samples            | Pre  | 84.73  | 7.48  | < .001 |
|                    |                            | Post | 100.80 |       |        |
| Receptive Language | Understanding Directions   | Pre  | 93.07  | 4.62  | < .001 |
|                    |                            | Post | 98.20  |       |        |

- Inspection of individual response curves and NPStat nonparametric randomization test results revealed significant single-subject treatment response across all WJ-III achievement variables ( $F$  range 24.83 to 128.96;  $p$  < .001)
- Paired sample t-tests (a phase set at .001 to guard against Type I error) revealed improvements in broad reading and writing areas, receptive language, and most math areas ( $t$  range 4.62 to 11.69;  $p$  < .001)
- In contrast, no significant differences emerged between pre and post results for Story Recalls, Applied Problems, Spelling of Sounds, and Sound Awareness



## Future Directions

- Research is needed to determine how strengthening cognitive deficits translates into real-world classroom achievement and long-term academic gains
- Future research with larger sample sizes, neuroimaging and neuropsychological data, and different SLD subtypes is also needed
- Cognitive interventions based on individual processing domains (e.g., auditory processing, fluid reasoning, processing speed) could determine if the treatment effects are general or specific in action

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# A Brain-Based Intervention Program That Changes Cognition: Implications for Academic Achievement

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## Abstract

As a cognitive-based intervention program, the Arrowsmith Program (AP) is designed to strengthen deficit cognitive functions underlying specific learning disabilities (SLD) rather than providing achievement intervention or compensatory strategies. Pre- and post-intervention cognitive data was collected on 15 students enrolled in the AP program. NPStat non-parametric randomization tests revealed single-subject improvements across all cognitive domains except verbal ability (Gc) and long-term retrieval (Glr). Paired samples t-tests revealed improvements in short-term memory (Gsm), auditory processing (Ga), fluid reasoning (Gf), and processing speed (Gs)

## Background

- Neuroimaging literature (Aylward, 2003, Finn et al., 2013) suggests systematic intervention targeting weak academic areas changes brain function and normalizes atypical learning patterns in children with SLD
- Designed to remediate specific cognitive processing deficits underlying SLD in children, the AP is built upon a neuroscience foundation and evidence of neuroplasticity
- It is unclear if strengthening neuropsychological functions underlying academic achievement could improve reading, writing, and mathematics by targeting the primary cause (i.e., cognitive deficit) rather than the symptoms (i.e., achievement deficit)

## Research Questions

- Do children with base-line cognitive deficits show improvements in underlying cognitive skills following an AP intervention program?
- Does participation in the AP result in improved cognitive performance at the single subject and group level?

## Participants and Methods

- Woodcock-Johnson III Cognitive data was collected on 15 students (11 males; 4 females;  $M$  age = 9.3 years;  $SD$  = 1.36) pre and post entry into the AP Program ( $M$  duration = 28 months;  $SD$  = 8.36 months)
- NPStat non-parametric randomization tests, which approximate multivariate analyses in the absence of normal data, were used to judge changes in cognitive function for each participant
- Paired sample t-tests (alpha level set at .001 to guard against Type I error) were used to compare pre-post group means

## Results

- Inspection of individual response curves and NPStat nonparametric randomization test results revealed significant single-subject treatment response across WJIII Cognitive variables ( $F$  range 8.92 to 114.05;  $p$  < .001)
- Paired samples t-tests revealed improvements in Ga, Gf, Gs, Gsm ( $t$  range 4.40 to 12.92;  $p$  < .001)
- No significant differences between pre and post results for Verbal Ability (Gc), Visual-Spatial Thinking (Gv), Long-Term Memory (Glr)

Table 1. Pre- and Post Mean Analysis for WJ III Cognitive Variables

| CHC Factors        | Subtests          |      | Mean   | t     | p     |
|--------------------|-------------------|------|--------|-------|-------|
| Auditory Process   | Sound Blending    | Pre  | 102.00 | 2.01  | <.001 |
|                    |                   | Post | 115.87 |       |       |
| Fluid Reasoning    | Concept Formation | Pre  | 103.73 | 5.61  | <.001 |
|                    |                   | Post | 114.27 |       |       |
| Processing Speed   | Visual Matching   | Pre  | 69.47  | 12.92 | <.001 |
|                    |                   | Post | 89.00  |       |       |
|                    | Decision Speed    | Pre  | 79.87  | 5.85  | <.001 |
|                    |                   | Post | 95.47  |       |       |
| Short-Term Memory  | Numbers Reversed  | Pre  | 87.33  | 5.14  | <.001 |
|                    |                   | Post | 96.87  |       |       |
|                    | Memory for Words  | Pre  | 94.20  | 7.27  | <.001 |
|                    |                   | Post | 111.67 |       |       |
| Phonemic Awareness | Incomplete Words  | Pre  | 84.73  | 6.06  | <.001 |
|                    |                   | Post | 102.80 |       |       |
| Working Memory     | Auditory WM       | Pre  | 96.20  | 4.40  | <.001 |
|                    |                   | Post | 101.80 |       |       |

## Discussion

- Children with baseline cognitive difficulties showed significant improvement across cognitive domains in short-term memory, auditory processing, fluid reasoning, and processing speed
- Given that these cognitive domains are associated with processing weaknesses that underlie most SLDs, improvement should ameliorate achievement deficits in children with SLD
- Results suggests that targeted and individualized interventions designed to remediate cognitive deficits may lead to improved academic performance across a broad range of domains
- Brain plasticity allows for restructuring of cognitive processes, thereby enabling improved cognition and academic performance

## Future Direction

- Brain-based intervention programs that target underlying cognitive weaknesses associated with academic achievement could lead to better learning in children with and without SLD
- Research studies on AP outcomes show preliminary positive findings, but carefully controlled studies are needed to support program treatment efficacy
- Future research with larger sample sizes and different SLD subtypes is needed
- Research is necessary to determine how strengthening cognitive deficits impacts academic achievement across reading, writing, mathematics, and language domains, and/or has the potential to ameliorate SLD.

## BrainGain Laboratory



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