



Spina Bifida Hydrocephalus  
Queensland

# HANDWRITING

## FOR THE CHILD WITH SPINA BIFIDA AND HYDROCEPHALUS



## **DISCLAIMER**

This booklet is designed to provide general information about the topics covered, to assist interested parties. It is compiled from information written by staff of SBH Queensland, as well as various publications by authors not related to SBH Queensland. Accordingly, whilst SBH Queensland believes the information is the most accurate and up-to-date available, SBH Queensland accepts no responsibility for the information from other sources. There is still much to be learnt about spina bifida and hydrocephalus, and their causes and prevention. As further developments occur, the information may prove to be incorrect or incomplete. For this reason, and because the information is of a general nature, you should always obtain specific advice about matters affecting you.

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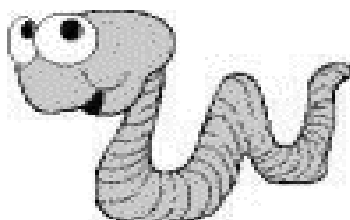
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## CONTENTS

<b>Introduction</b>	6
<b>Fine motor development</b>	7
How does this link to handwriting development?	7
<b>Spina Bifida and Hydrocephalus - The possible influences</b>	9
<b>Components of handwriting</b>	10
<b>Internal Factors:</b>	
Muscle strength, Proprioception, Postural Stability	12
Grasp development and grip strength	13
Speed of performance	13
Posture & Shoulder stability	
Visual Motor Integration (co-ordination and organisation)	13
Dominance, Laterality, midline	14
Organisation and Sequencing	14
Memory and Language concepts	14
Visual Scanning and Acuity	14
Visual Perception	14
<b>External Factors:</b>	
Environmental – seating, lighting, ventilation, noise	15
Interest and motivation and concentration	15
Exposure and experience	15
Fatigue and expectations	16
Implements and adaptive equipment	16
<b>Occupational Therapy – What do they do and when to call:</b>	17
<b>Handy Hints for School</b>	19
<b>Conclusion</b>	20
<b>Appendices</b>	
Appendix 1:	
Resources – state wide	21
References	21
Appendix 2:	
Glossary of Terms	22
Appendix 3:	
Copy of Queensland script	25

## SBH Queensland Services

### SBH Queensland

- Provides a contact point for information and services specific to spina bifida and hydrocephalus
- Empowers people with spina bifida and hydrocephalus to achieve their full potential
- Promotes the value of people with spina bifida and hydrocephalus
- Strives for excellence in the development and provision of programs to people with spina bifida and associated hydrocephalus

## What SBH Queensland can offer you and your child

SBH Queensland offers a range of services for children with spina bifida and hydrocephalus aged 0 to 18 years. These services consist of:

- The library and other information resources
- Support and counselling for new parents
- Support at Lady Cilento Children's Hospital spinal clinic
- Group programs such as: playgroups, mobility clinics and skill training groups
- Annual camp
- Lending of equipment for trial

## Eligible children may also receive individual services from the Education and Therapy Service

**Physiotherapy** - Assistance with mobility, wheelchairs, anything to help your child get around

**Occupational Therapy** - Assisting your child to develop essential skills for school and life

**Speech Pathology** - Focusing on your child's communication, speech, language and feeding abilities.

**Education Advisers** - Support for your school or early learning centre to help them understand and assist your child to reach their potential at school

# INTRODUCTION

Handwriting is a task which most of us do regularly each day without considering 'how' to create each letter we are writing, or 'where' our learning for this all began. It is a skill that influences our lives in many significant ways, from our acquisition of related language skills, to our grades at school, everyday life activities, and employment.

This booklet has been written to provide some basic background information on fine motor skills, focusing specifically on handwriting, and how children with spina bifida may experience difficulties with this task. It has been designed specifically as an education tool on tips to look for when identifying problem areas for these children, rather than discussing specific methods for working with these issues. Many booklets already exist for this purpose, and there are references at the back of this book regarding this.

Do remember that the following information is written on a general basis for both parents and teachers, so some of the information contained in this book you may already know well. As all children with spina bifida are individual in their skills and needs, further information regarding any difficulties your child is having can be found through either your local services, or by calling SBH Queensland.

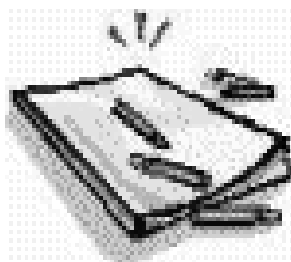


## FINE MOTOR SKILLS & HANDWRITING

As children are developing, their skills are typically categorised into 4 or 5 different groups. Some names used to distinguish these groups are fine motor, gross motor, communication, social / emotional, and self-care skills. Fine motor skills therefore tend to focus on the smaller movements, actions and skills involving your hand and fingers, rather than large arm or leg movements.

Although it may have never appeared obvious, children begin to develop their skills required for handwriting, a long time before they ever write their first letter. These skills begin when children are first born and are learning to open and close their hands. They will continue to be learnt, refined, changed and lost, throughout their entire life.

It is interesting to see how so many other developmental steps we look forward to with our children, also help them develop the base skills we want them to have for handwriting. A good example of this is crawling. Though usually seen as a gross motor movement and a way to progress towards walking, crawling also provides the child with important stimulation through their hands, arms, shoulders and trunk. By this continual weight bearing, a child receives feedback via their muscles into their central nervous system (brain and spine), which will later be used in the coordinated movements in their arms and hands. At the same time, your child is building up important muscles in their trunk and arms, creating arches in their hands, and learning about how to control each part of their body either together or separately, all of which will be important in learning to draw and to write.



By the time children become interested in scribbling with crayons and pens, they will have experimented with many different grasps, which they will then try on their writing implements. When beginning, children may use a large whole hand grasp around crayons and pencils as they begin to explore the different scribbles and marks they are able to create. Over a period of years, as the dexterity and strength of their hands grow and confidence in abilities develops, the crayon will slowly move through different positions in their hand, until eventually it ends up in a grasp commonly called a 'tripod grasp'. This is usually seen as children are entering their primary school years. This is the optimal position used for handwriting, allowing greatest flow of movement and least stress on the fingers.

Although we may have been brought up to believe that practice may make perfect, it will also make permanent any incorrect behaviours being used. To maximise the potential of a child, it is therefore very important to encourage techniques which are as correct as possible. If difficulties do occur, it is also important that correct assessment and treatment is sought, as all children are very different, and will require different programs.

**With handwriting it is important that we remain realistic about it, and do not become stuck on achieving the ‘perfect’ grasp, the ideal exit and entry, or copybook handwriting. How many adults would actually pass these tests anyway? Would you?**

With so many other means of communication available to us throughout the world, why is learning to write important?

Writing is used throughout many aspects of our everyday lives. It is used to learn by recording and presenting information to others, to communicate by writing letters and notes or taking down messages. It is important in skills for living independently, tasks such as signing your name, filling in forms and recording your name and address. Many people use writing as a form of self-expression, such as writing a journal, story writing, or through drawing and art. There are not too many jobs that do not require some form of handwriting ability.

It is important to remember that the ultimate aim for handwriting is that it is functionally useful.

Now, let’s look more closely then at spina bifida and hydrocephalus, and how this may influence a child’s learning abilities for the skill of handwriting.





# SPINA BIFIDA AND HYDROCEPHALUS

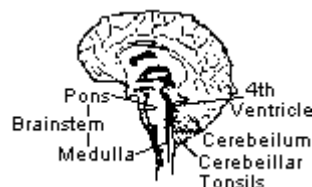
## - Possible influences on handwriting

Although spina bifida is often considered primarily as a condition affecting the lower half of the body, it does have much wider ranging implications, including effects on fine motor skills, concentration and learning. A term which you may have already heard talked about, Arnold Chiari malformation, is one such area of spina bifida which commonly affects different areas of physical ability, such as coordination and dexterity of the arms and hands, and therefore, handwriting.

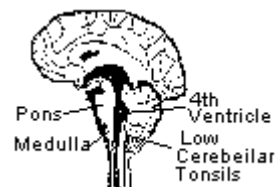
Arnold Chiari malformation, sometimes referred to as the Chiari II malformation or ACM II, is an anomaly of the brain, which occurs in almost all children born with spina bifida and hydrocephalus. It mainly involves the lower brainstem and lowermost portion of the cerebellum, but the anatomy of the entire brain is affected.

When the Chiari malformation is present, the brainstem is elongated and displaced downward into the opening of the base of the skull and top of the spinal canal. The brainstem, cranial nerves and the lower portion of the cerebellum may be stretched or compressed. Therefore, any of the functions controlled by these areas may be affected.

ANATOMY OF NORMAL BRAIN



ANATOMY OF THE CHIARI MALFORMATION



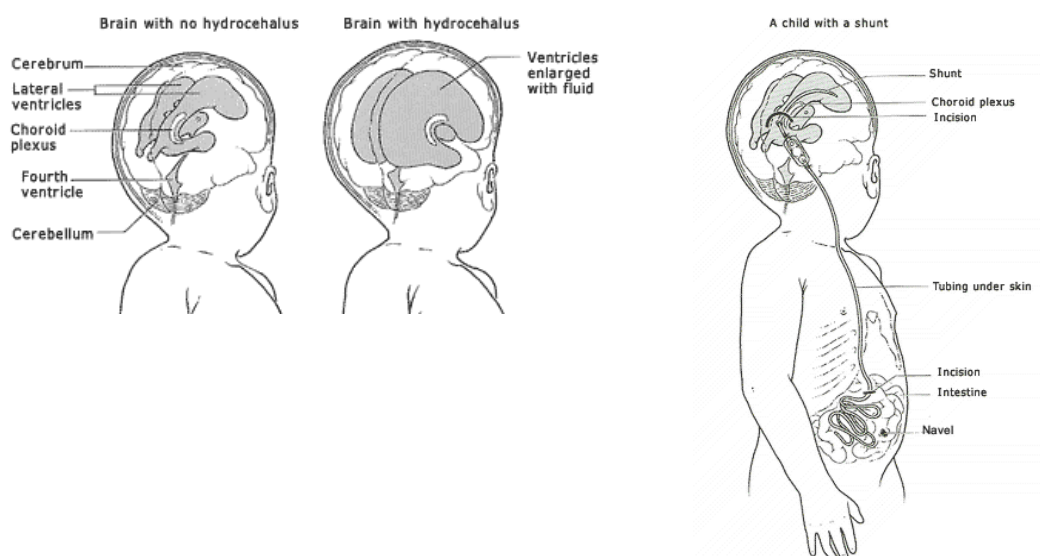
What do these areas of the brain do?

- Brainstem – the origin of many of the cranial nerves as well as the nerves which control the heart, breathing, blood pressure and help control swallowing, sneezing and coughing.
- Cerebellum – controls the maintenance of posture and coordination of muscle action, to produce precise, coordinated movements.

Many children with Chiari Malformation may initially show difficulties as young children when playing with small toys such as Lego or beading, and have trouble doing up buttons and zips in their dressing. Because of these difficulties they experience, the child may not be eager to sit and play with fine motor toys or experiment with drawing and cutting activities, as other children may. This kind of aversion to the fine motor activities when young may be an important indicator of fine motor difficulties, which if not remediated as a toddler, can have an impact on them as a preschooler when they become increasingly engaged in pencil and paper tasks.

Further information regarding the functional and physical difficulties children with the Chiari Malformation may experience are included in the following section.

Hydrocephalus then adds another dimension to the picture. As you may have read, hydrocephalus is a result of a 'blockage' at the base of the brain, which restricts the draining of the cerebrospinal fluid (CSF), from the ventricles in the brain, to the spinal column, to be absorbed back into the body.



Typically hydrocephalus tends to be treated by the insertion of a 'shunt', which is designed to drain the excess CSF from the brain, and carry it to other parts of the body to be reabsorbed. A one-way valve, which is situated outside of the skull but below the skin, is used to help to make sure fluid is draining out, at the right pressure for that person.

If this blockage is allowed to persist it can result in a build up of fluid in the ventricles of the brain, which may cause pressure to the brain tissue. Research has shown that 80% of children with hydrocephalus have some learning difficulties. Although the majority of these children fall within the normal range of intelligence, many will experience frustration and at times struggle with their learning, due to difficulties in one or more of the following areas:

- Hand - Eye Co-ordination: Sometimes called Perceptual Motor Skills
- Comprehension: Understanding what the senses are taking in. Often children with spina bifida and hydrocephalus will have great verbal skills, though they may not understand or remember what they hear or say.
- Attention and Concentration: Especially to tasks which they find difficult or boring

- Difficulty Sitting Still: Children may be very interested in a task, but are unable to stop fidgeting, and appear quite restless
- Memory: Visual and Auditory
- Organisation & Sequencing: Keeping their things and ideas in order.
- Problem Solving, decision making & higher thinking.
- Speed of Work: Not only physical speed, but their ability to also process the information they receive, work through what they need, retrieve any information they need to use, and then recall the correct information required.

Everyone each day uses these skills when learning and doing different tasks, handwriting included. As adults, many of the steps are completed unconsciously, allowing our thoughts and imagination to focus on the topic at hand. For children when learning to write however, they have a long list of new steps that they must keep at the front of the mind, and which are influenced by the areas of ability listed above. They need to remember how to keep good posture and position, how to hold the pencil correctly, what pressure to use through the pencil, how to form the letters, the correct spacing of the letters and words, and more.

During the task, they must also think about what it is they have been asked to do, how they will begin and finish the task, what steps are in between in the correct order, remembering where the equipment is, problem solving and working through a difficulty, and finally, keeping up! All the while they have probably heard the person presenting the activity to them say “Now remember how we did this last week...”!

After considering all the possible effects of the Arnold Chiari malformation and hydrocephalus which may be impacting upon the child, it is not a surprise then to think that many children may not be avid writers. It is therefore important for parents of young toddlers and children to sometimes consider why their child only enjoys playing outside and refuses to sit down to work on colouring in. It could be that they're having difficulties and are frustrated by the whole ordeal.

You may find that often by doing fine motor activities **with** your child when they are young you are:

1. Assisting them to maintain concentration on tasks for longer
2. Giving them a person to model off,
3. Developing positive neuro-associations to learning by giving your child praise for when they achieve new skill levels
4. Developing motivation for your child to keep trying the activity more than once.

You may also discover by doing this, that it is only *certain aspects* of fine motor, drawing and handwriting, that your child is experiencing difficulty with. Being able to practice “difficult” things in the safe environment of home is always going to be favoured over the being confronted by their difficulties in the classroom setting.

# COMPONENTS OF HANDWRITING

In the previous section we have discussed the different effects that spina bifida and the related conditions of the Chiari malformation and hydrocephalus have upon the general development of children. The following is a simple breakdown of the different areas of skills that are used specifically in handwriting. Influences can come from within the body itself, and from the external environment around the body. It is how the body is able to deal with the different mixture of factors, that determines the eventual outcome.

For further information on any particular area, please consult with your friendly local occupational therapist!

## Internal Factors

Further information explaining several internal factors can be found in Appendix Two...

- **Muscle strength** – Reduced strength and tone is commonly found in children with spina bifida or hydrocephalus. Often it is not isolated to the hands and fingers, but is generalised throughout the entire body.

**Other indicators:** Other difficult tasks are, carrying heavy items such as their school bag, or playing different games in P.E. such as ball skills or racquet games.

- **Proprioception** – Muscles and joints of the hands and fingers provide the brain with important information about how the thumb and fingers are gripping the pencil (pressure).
- **Postural stability** – Influenced greatly by strength and tone, poor postural stability will influence not only writing performance, but other motor tasks and general concentration. As well as poor sitting postures, children may show immature movements such as winging (elbows raised from the side of the body), or hooking of their wrist, to increase their joint stability, or may feel the need to stand often and quite often become fidgety.

Correct postural positioning involves having feet flat on the floor, bottom at the back of the chair, erect posture and elbows flat on the table. Lower limb deformities and back conditions such as scoliosis etc may impact upon postural stability.



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- **Grasp & Grip strength** – This problem is a common one, and can be seen in many other children without spina bifida or hydrocephalus. Fatigue, pain, difficulties in dexterous movements, and speed are often affected when grasp and grip strength is a problem.



**Other indicators:** These children may also have difficulties with other everyday tasks such as opening their lunch box or pencil case, using scissors, doing up buttons or zips, or even pulling up pants.

- **Speed of Performance** – As you can now imagine, with muscular weakness, fatigue and poor endurance, poor postural stability and grip strength, speed of performance will be affected simply as an outcome. Neatness of work, control of the writing implement, and amount of work produced can be compromised, and must be taken into consideration with classroom, test and assignment expectations.
- **Visual Motor Integration** – The eyes not only must see clearly but also understand what they have seen, the brain then needs to convert this information, break it down into useful motor information to send to the hand, which the hand then needs to follow.

Children with spina bifida and hydrocephalus quite often have difficulties in this area and may be influenced by two other areas:

- upper limb difficulties (as outlined above),
- visual perceptual difficulties (which will be covered soon)

For children who have difficulties in this area, performance of all fine motor activities, particularly handwriting may take longer to learn. Letter formation, copying skills, neatness and accuracy are all influenced by visual motor integration skills.



- **Hand dominance, midline crossing and laterality** – Although dominance is not directly influenced by spina bifida and hydrocephalus, it is an important part of normal fine motor development, and therefore may be indirectly affected.

Your midline is an imaginary line running through the centre of your body, from head to foot. As babies and toddlers begin to play on the right side of the body they instinctively use the right hand and vice versa for the left hand side. To cross the midline requires the integration of the left and right hemispheres of the brain.

Laterality, knowing the right hand side of your body, from the left side of your body, develops along with a child's dominance, through play. Again, this will be affected, if exposure and experience is lacking.

- **Organisation and Sequencing** – This relates to a person's ability to put a task, item, or area in order. Good organisational skills are required for many parts of handwriting. Concepts such as 'where did I put my pencils', to 'which side of the page is up', will influence handwriting tasks daily.
- **Memory** – Repetitive practice of correct letter formation will eventually lead to the 'automatic formation' of letters. As adults we know that we do not have to think about how to form letters, our hand is able to form the letters subconsciously. It must be remembered that this is a skill that is not yet established in children and they need to utilise memory strategies in order to produce correct letter formation.
- **Language concepts** – It is easy to understand how difficulties in language concepts such as comprehension, sentence formation, and spelling, will deter a child from being interested in handwriting, particularly when they are facing other difficulties at the same time.
- **Visual scanning and acuity** - Visual scanning is, as its name implies, the ability to search the environment surrounding yourself, with your eyes. Visual acuity is the focus and clarity with which your eyes see an object. As with many other children, short and long sightedness, squints, nystagmus (rapid involuntary eye movements), or lazy eyes will cause difficulties not only in handwriting, if not detected. Your optometrist can assess your child's visual scanning and acuity.
- **Visual Perception** - Visual perception is our ability to make sense of what we are seeing. To do this our body will receive some sensory input through the eyes, which our brain then interprets and if possible, recalls a past experience in order to decide on the understanding, or to make an appropriate motor response.

Visual Perception skills are often broken up into seven different components.

- |                            |                            |
|----------------------------|----------------------------|
| - Visual Discrimination    | - Visual Memory            |
| - Visual Sequential Memory | - Visual Closure           |
| - Visual Figure – Ground   | - Visual Spatial Relations |
| - Visual Form Constancy    |                            |

## External Factors

It's important to quickly check the external factors of where the child is performing their task, and if any of these could possibly be affecting their performance. This is particularly so in educational settings, where external factors are not always easily changed. It is also quite difficult where in a class of 25 children; you may find a wide combination of needs for these areas.

Lots of occupational therapists are now assessing children's sensory needs, which simply helps to look at what type of sensory environment allows the child to function to their optimal level. This can often be helpful not only for the handwriting component, but also for their overall learning and well being.

The following are some simple questions you can ask yourself in each environment in which the child works.

- **Environmental**

- **Seating** – What is the child's posture like? Are they getting adequate postural support? Do they need a back, arm or footrest? Do they need to be towards the front or centre of the room to compensate for concentration, listening and visual difficulties? Can the child leave and return to their desk easily – to see the teacher, to access other items in the classroom?
- **Lighting** – Is the amount of light consistent between the board and the book? Is the light sufficient? Is there glare in the room? Is there a fan flickering light across the board or book? Are there visual distractions in the child's immediate workspace?
- **Ventilation** – Is the room often stuffy? Is the room cold, therefore causing difficulties in smooth movements?
- **Noise** – Is the room in a noisy part of the school? Is the child sensitive to certain noises? Does there tend to be lots of group work and therefore lots of chatter in the room? Is this a child that works well with a dull noise in the background, rather than complete quiet?
- **Interest and motivation vs concentration** – Is the child generally interested in what you are doing? Is there a functional outcome for the child in completing the entire task you are asking?
- **Exposure and Experience** – Do you know the background development to this child – were they delayed as a child, and now progressing at an even rate? Does this child seek out experiences in these areas, or do you need to guide them?

- **Fatigue and Expectations** – Is this child actually physically able to complete the same amount of work as the other children? Quality and quantity? Is the problem with the grasp non-functional or non-ideal?
- **Implements and adaptive equipment** – Does this child usually have glasses, slope boards, triangular pencils, or any other adaptive devices? Do they need to trial some adaptive devices? Are the devices a long-term choice, or a training tool? If they are a long-term choice, are they functional and easy to use outside the school environment?





# OCCUPATIONAL THERAPISTS

## – What they do and when to call.

Occupational therapists are a handy bunch! Handwriting is one of their big areas of interest, though they will tend to look at it from a functional perspective, rather than a perfection perspective.

Generally if difficulties are noted by someone, an occupational therapist will look through a checklist of things with the child, sometimes using standardised testing kits and at times simply observing them within the natural environment, such as the school classroom.

An occupational therapist will look at the child's abilities throughout their whole body; taking into account their posture and abilities in movement, their overall concentration and attention, their learning abilities, physical comfort and fatigue, visual abilities (acuity, tracking and perception), and the external environment. Visual motor skills, grasp and strength, speed and dexterity, dominance, and mid-line abilities will provide valuable information about physical abilities.

The occupational therapist will look at these skills in a setting similar to that expected of the child in their functional environment. As we all know, many children will perform wonderfully if given one-to-one attention, but not so well in a group.

If you are working with children with spina bifida and hydrocephalus and are concerned about their handwriting, give your local OT a call. As mentioned at the beginning of this book, it's better to work with a skill early on in the development, before bad habits are formed.

For many children with spina bifida and hydrocephalus, handwriting and note taking in their upper years of school does become difficult, simply from the amount that they are expected to take down, and the rate at which it is given (or expected). The following is a short list a solutions that are used throughout many schools in Queensland, which teachers have mentioned are useful:

- **Keyboard and Typing**

Keyboarding is often introduced to children during the mid-primary years, with short lessons on the use of the keyboard and mouse begun at regular periods over the school week. By the time children make the upper grades and highschool, it is hoped that most are more advanced in their speed and accuracy, allowing them to complete many of the classroom activities and assignments on the computer rather than through written work.

Note taking during class is done at times, where and when portable computers are available for these children. Work is then saved and taken home to be completed for homework.

- **Scribes**

Scribes are often handy for all ages, depending on the testing topic. They are often able to help and also overcome comprehension difficulties, allowing the child to respond correctly following further explanations of meanings.

Scribes are important to use when larger quantities of written work are required, for example, in creative writing. A scribe can allow the child to achieve greater quality, without time concerns. The choice between teacher and peer often depends on the particular child, and their ability to work well with others.

- **Copies of the teachers notes**

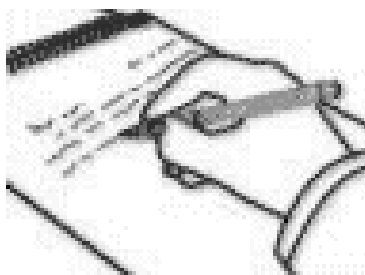
Could the child have a copy of the overheads to jot further notes on while listening to the teacher? Often when copying down work the child may be concerned about getting the information down, rather than listening to the discussion or explanation of the material contained in the message. If copying is required, could the child have a copy of the teacher's notes next to them on the desk, particularly if they are slow or experiencing difficulties in copying from the board?

- **Dictaphones**

These are perhaps not used as commonly as the other suggestions, though have worked well for a small group of students for particular listening subjects such as English or SOSE. Dictaphones allow the student (particularly in upper highschool and tertiary education) to re-listen to the lesson, take down notes at a later date to join into the class discussion, or to confirm what they had taken down at the time. We do however recommend that children using these need to become confident in asking the teacher if it is ok to use these in the classroom.

- **Equipment and adaptations**

- Slope boards: Good for students with visual perceptual difficulties. It assists them to copy from blackboards and helps children with low muscle tone.
- Pencil Grips: Good for children with decreased grip strength.
- Regular rest intervals can help to decrease fatigue in the muscles of the hand.



## HANDY HINTS FOR SCHOOL

To avoid this list becoming monstrous, we've chosen a few of the commonly used hints, which schools throughout Queensland are using.

- Before bringing in modified furniture, properly assess a quick modification to the existing normal equipment. Children with handwriting difficulties often feel singled out to begin with, without bringing in lots of very different materials.
- If you have a motor warm up program given to you for one child, try and do it with the whole class or small group of children. You will often have several children in the class with difficulties who will benefit from this. If you don't have one written up, ask an OT.
- Think about this question - Do you notice this child has handwriting difficulties because you know they have spina bifida or hydrocephalus? Is their handwriting within the average range? Low average is still average, and may need a few simple modifications, rather than intensive programs targeting the one child in particular, creating another difference from other children of that age.
- Blocks of treatment are usually only effective for children during that developmental stage. By the time they are in mid-primary school, if difficulties are still noticed, unless worked out actively by the student, coping strategies need to be put into place, such as keyboarding skills.
- Children with spina bifida and hydrocephalus typically fatigue faster by the end of a school day. Remember that when they then go to do their homework, they are going to be working at a lower energy level than other children. Ask the parents how the children are coping with the amount of homework and perhaps look at reducing the amount taken home.
- For older grades, think about what are the important aspects of the lesson – is it the writing, or the learning of the content? If it's the content, is there an alternative that the child can use for their handwriting?
- Although using some coping strategies is often difficult and feels like more work to begin with (for example, giving copies of lessons notes), most teachers report that they adapt to things quickly. Many say they find that in the end it reduces the amount of one-to-one work with the child they were squeezing in anyway during the day and increases the happy work feeling within the room, and therefore the overall productivity of the whole classroom.
- If spelling is compounding the speed of handwriting, particularly in the middle to upper primary sections, perhaps look at giving spelling free times, for children to simply write and spell as it comes, going back to fix things up at the end of the work piece.

- Would a change in paper thickness or pencil style from HB improve legibility and decrease smudging?
- Is handwriting the only area of difficulty? For example, can the child draw with confidence, but shy away from handwriting? If so, is there a language difficulty that needs attention before the fine motor?

## CONCLUSION

Although the information in this booklet has been very general, we hope that you have gained further insight into spina bifida and hydrocephalus, and the influences on handwriting. If this booklet has helped you to create many further questions, then we have achieved one of the important aims.

For further information about this booklet, please contact SBH Queensland.



## APPENDIX 1

### RESOURCES AND REFERENCES:

1. Activity books containing dot-to-dots, mazes, find-a-word, colour by number, tracing etc. These can be purchased from stores such as Woolworths, Coles, Crazy Clarkes, and Newsagents.
2. Tubular grips for pencils can be purchased from many newsagents. Note: These often contain latex, and are therefore unsuitable for some children with spina bifida hydrocephalus.
3. Thicker pencils / pens – These can also be found in your newsagents or shopping centre.
4. Independent Living Centre (ILC) – These are great people to call if you have a query about adaptive equipment or writing implements. They keep on file product information regarding product availability, pricing and distributors.  
Address: Goring St Coorparoo. Ph: (07) 3397 1224
5. K & K Creative Toys – Suppliers of children's toys and educational equipment  
Three Brisbane – based locations:
  - Clayfield: 730 Sandgate Rd. Ph: 3256 2269
  - Enoggera: 196 Wardell St Ph: 3354 1044
  - Indooroopilly: 8 Lambert Rd Ph: 3371 7747
6. Brodies Bookstore: Stocks many educational tools for a range of ages.  
Address: 73 Wellington Rd East Brisbane. Ph: 3217 3377
7. ABC Shops – Variety of centre throughout Queensland  
Myer Centre Brisbane Ph: 3377 5455
8. SBH Queensland: 21 Tillot St Dutton Park  
Ph: 3844 4600
9. SBH Qld Inc Booklet – VISUAL PERCEPTION: Practical Strategies for Teachers  
Available through SBH Qld #3844 4600
10. P.Armstrong, D.Jones; (1991) Developing Handwriting Skills, Maryborough.
11. K. Levine; (1991) Fine Motor Dysfunction: Therapeutic Strategies in the Classroom, Arizona, USA.
12. B. Rubell, (1995) Big Strokes for Little Folks, Arizona, USA
13. L. McCormick, (1988) Finish-Me Pages: Reinforcement Worksheets, Arizona, USA.
14. N. Marsh, (1998) Start to Finish: Developmentally Sequenced Fine Motor Activities for Preschool Children, Arizona, USA

## **APPENDIX 2**

### **GLOSSARY:**

- **Muscle strength** – Reduced strength and tone is usually generalised throughout the entire body. This can compromise several aspects of handwriting, in particular grip strength, postural stability and speed of performance. As a crane or backhoe requires a stable cab for the arm to work from, so does your arm require a stable base from which it can move with security and stability. Due to the fact children with spina bifida hydrocephalus often have decreased muscle strength in their trunk and shoulders, the strength, dexterity, and control in the hands and fingers is often compromised by an unsteady base.
- **Postural stability** – As mentioned, this is influenced by the muscle tone throughout their body. Many children may prefer to stand to maintain their body in an upright position, as sitting creates greater strain on their hips and back, often with poor posture resulting. When sitting, many children will use their elbows and forearms to increase the stability of their arms, which will consequently lead to poor joint isolation and movement. This constant increase of muscle use throughout their whole body will not only cause these children to fatigue more easily, but decreases the flexibility available to produce fluid movements with their pencil.
- **Grip strength** – Decreased grip strength is a common problem. You may notice these children holding their pencils with more than three fingers, or using more than the tips of their fingers to stabilise the pencil on. They may also experience sore fingers from holding their pen too tightly to compensate, or pencils constantly slipping out due to loose grips.

If they are able to hold the pencil with a correct grasp, they may find it difficult to maintain over long periods of time. They may find their fingers and hands fatigue at a faster rate than other children, and therefore result in poor endurance when completing long written tasks such as essays and exams.

- **Visual Motor Integration** – The understanding of visual information and transferring that into a motor response. Poor handwriting can often be a result of the integration between visual input and motor output being underdeveloped. Using a variety of techniques the occupational therapist is able to facilitate development of this integration process.
- **Hand dominance** – Hand dominance may be slower to develop in children who show a greater dislike for fine motor activities, and avoid experimentation when young. Encouragement to use both hands during an activity, one as lead, the other as the assisting hand, helps a young infant or toddler to work out and establish a dominant side. For children in kindergarten or preschool who continue to swap, often it may be due to fatigue with one hand, that they swap to the other, though they may have a higher skill ability in the first hand. Encouragement to continue with the one hand, and have a break rather than swap, will help to consolidate this.

- **Organisation and sequencing** – spina bifida and hydrocephalus associated difficulties with planning and organisation stem from an impaired ability to know when and where to start. Some students manifest this in their day to day tasks whilst others struggle predominantly in novel or unstructured situations.

The child

- Will often be helped by colour coded books and equipment.
- May require ample practice.
- The younger child could use one colour for everything including books, reading folder, pencil case, and bag etc. so that their possessions are easily recognised.

- **Memory** – Some students with spina bifida and hydrocephalus have poor short – term memory. However, it is more common for them to have problems with storage and retrieval. Visual memory is often weak. Associated difficulties include:

- copying, especially off the blackboard
- Finding a spot on the page after having glanced away for a moment
- Sequencing

Auditory retention is generally better, therefore, use of speech i.e.: talking to oneself, audiotapes and rhythm may be useful.

- **Language Concepts** – Although students with spina bifida and hydrocephalus often have large vocabularies and appear to have no trouble understanding single words, many have problems formulating language for written work and conversation. Difficulty in connecting sentences, or relating a sentence back to the original thought may be apparent, particularly in speaking exercises and written work.
- **Visual scanning** - Visual scanning is the ability to search the environment surrounding yourself, with your eyes. Children require good abilities to scan in all directions, that is horizontally, vertically, diagonally, circular, and irregular directions, in a smooth, regular fashion. This does not include moving the head from side to side, as many children with poor scanning skills will demonstrate. Good scanning allows children to catch a ball, follow an object moving through space, and read and copy a passage from a book or chalkboard.
- **Visual Perception** – Visual perceptual development begins with the early infant's everyday play experiences. Young infants use movement, vision and touch to explore the environment immediately around them, learning how to recognise shapes, sizes, positions, and differences. Relationships between different objects and people to the child will slowly be learnt. It is important that they learn through all modalities, and not rely on just one. The young child will begin storing all of this information, to be used again at an appropriate time later. For handwriting however, visual perception is the major input channel, through which our brain receives the information. Our brain slowly works through the

information to work out which letter it is, what size it is and whether or not it is the same as something that has already been seen.

Visual Perception skills are often broken up into seven different components.

- **Visual Discrimination**  
The ability to discriminate between different objects, shapes, symbols, letters, numerals and words (same and different). Children with difficulties in this area may invert and reverse letters and numbers, punctuate and use capitals incorrectly throughout sentences, spell incorrectly, show difficulties in learning to read, and be unable to find or sort objects of similar size, shape or colour, etc.
- **Visual Memory**  
The ability to recall from memory objects previously seen. Difficulties with visual memory may be related to long or short-term memory. Children showing memory difficulties may also have difficulties in retrieving the information from their memory, and therefore need to approach the question from a different perspective. Children with difficulties in this area may have trouble copying from the board to paper, forget past events such as outings, forget instructions given visually, etc.
- **Visual Sequential Memory**  
The ability to remember and to be able to recall a sequence of letters, shapes, numbers, words, objects or events. Difficulties in this area impact upon a child's reading and spelling ability. Incorrect sequencing of numbers may influence remembering items such as telephone numbers. A series of instructions given visually may be more difficult to remember than if given verbally.
- **Visual Closure**  
The ability to recognise an incomplete figure or form as a whole when only parts are visible. Children with difficulties in this area may have problems recognising words or groups of words, thus affecting spelling and reading, or have trouble identifying objects in their room or desk, if partially hidden by other items.
- **Visual Figure – Ground**  
The ability to distinguish an object from its background. Children with difficulties in this area may have problems finding objects in their messy desk or room, copying items from a cluttered blackboard, reading from a small print book, and sorting out objects in a pile.
- **Visual Spatial Relations**  
The ability to visually perceive and understand the position of objects in relation to other objects. Children with difficulties in this area may feel clumsy or hesitant in their movements, have difficulties in understanding directional concepts such as up and down, or have difficulty in copying designs or movements.
- **Visual Form Constancy**  
The ability to recognise two objects that are the same, when presented in different formats. For example upper case vs lower case letters. Again children with difficulties in this area can find reading, spelling, and copying from the board to be quite confusing and tiring.



### APPENDIX 3

#### COPY OF QUEENSLAND SCRIPT

a b c d e f g h i j k l m  
n o p q r s t u v w x y z

