

**Moving Learning Along:
A Study of Educational Kinesiology
(Brain Gym®)**

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**This dissertation is submitted in part fulfilment of the requirement
for the degree of M.Ed. of the University of Wales**

Declarations and Statements

This dissertation is submitted in part fulfilment of the requirement for the degree of M.Ed

Signed.....Date.....

This work has not previously been accepted in substance in candidature for any degree other than the one for which it is now submitted namely Master of Education of the University of Wales.

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This dissertation is the result of my own independent work and investigation, except to the extent stated in the Acknowledgements, and except for what is explicitly attributed in the text to the other sources.

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Abstract

The aim of this dissertation is to demonstrate that the use of established Educational Kinesiology (Brain Gym®) strategies has a beneficial effect on pupils. Therefore, educators who use these techniques will be more effective in helping to teach pupils. The research considers the nature of specific learning difficulties in literacy and mathematics. It considers how Educational Kinesiology (Brain Gym), combined with effective teaching strategies, can have a wide ranging, positive effect on the pupils and their success, achievements and relationship with peers.

The methodology used is 'action research'. It focuses individually on four pupils with widely different specific learning difficulties and one combined group of teachers and other professionals who have completed the four day basic Educational Kinesiology (Brain Gym) course.

Chapter 1 reviews the published literature. The review considers the background to the development of Educational Kinesiology and other movement programs as well as a discussion of specific learning difficulties related to literacy and mathematics.

Chapter 2 describes the methodology of the action research process. The movement approach is used to encourage 'rewiring' of the brain and encourage effective neurological integration.

Chapter 3 describes and evaluates the group of professionals who completed the Four Day Accredited Brain Gym course. The chapter also assesses the confidence gained by the professionals in dealing with stress and learning difficulties.

In Chapters 4 to 7 the individual pupil case studies of the research are described and evaluated. Noticeable changes occurred in the three pupils who had unlimited access to Educational Kinesiology (Brain Gym).

Chapter 8 evaluates the results and their effect on the pupils, teachers and education as a whole. It defines the achievements of the action research and issues for future action required to establish a truly fair education system for all pupils. Brain Gym is only one aspect of the Educational Kinesiology program. There is ample scope for much needed research to demonstrate the effectiveness of Educational Kinesiology as a broad and in-depth procedure to aid neurological integration and natural learning.

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Chapter One

Review of Contemporary Research Related to Movement and Learning

Aim of the Dissertation

This dissertation aims to explain the possibilities of integrating movement, specifically related to Educational Kinesiology, into teaching and learning. It is in response to the challenges experienced by those students who do not readily acquire literacy and mathematical skills naturally, as one is expected to do in primary school.

- 1) To raise awareness amongst educators (teachers, parents, teacher trainers, assistants, educational psychologists, administrators and others) of the significance of movement and its relationship to effective natural learning.
- 2) To ensure that the learner who has specific difficulties in some aspect of learning, is respected and taught in the way that he or she can learn appropriately.
- 3) Develop the ability to use Brain Gym® to manage stress and maintain self esteem, for all those involved in the learning cycle, thus enabling learning to continue naturally and efficiently.

The teacher-researcher in this study has applied the theories from the discipline of Educational Kinesiology along with the one to one structured literacy and mathematics lesson advocated by the Bangor Dyslexia Unit.

Evidence has been gathered in the form of reports, observations, notes, examples of students' work, interviews with educational and medical professionals, parents, guardians, pupils themselves, IEP's, reviews, tests and assessments.

History and Development of Educational Kinesiology (Brain Gym®)

By the incorporation of movement into learning, Educational Kinesiology has taken a different look at the meaning of educating, work and school life.

Dennison (September, 1997) maintains that educators, in their fervour to “stamp in” information, have over emphasized the mental, academic, and performance aspects of learning. As a result, the more physical aspects of learning, the visual, auditory, and kinaesthetic skills needed to process that information have been overlooked. By addressing the student’s physical needs in these areas first, the mental abilities have space to emerge and develop and the individual has a greater chance of learning success.

Dennison developed Educational Kinesiology (Brain Gym) during the period in which he was responsible for teaching literacy skills to teenagers. As a means of succeeding to teach the pupils Dennison researched, completed a doctorate and developed the beginnings of Educational Kinesiology (Brain Gym).

Basically the program developed the body-brain co-ordination so that learning would happen naturally and effectively. A number of disciplines were studied by Dennison and integrated into the discipline. (See Appendix 1A)

Educational Kinesiology (Brain Gym) is fundamentally a study of movement. Monitoring and noticing movement are interpreted with respect to learning potential, postural, attitudinal, educational and developmental integration and not on therapeutic procedure.

McLean: The Triune Brain Theory

While research has moved on from this model it reflects to help teachers' perception of the relationship between neurology and learning. Today there may be more sophisticated and acceptable models however to the researcher-teacher McLean's model is still pertinent for teaching purposes.

Educational Kinesiology (Brain Gym) leans on the use of McLean's triune brain theory as a model for understanding how the brain must interrelate for learning to occur.

1. Neocortex which is the rational, intellectual area. When this area functions well then challenges are seen as positive development rather than stress.
2. Limbic system is the relationship and emotional brain. It plays a dominate role in directing sensory input and emotions and is the area for short and long term memory. It is where learnt reactions, beliefs and behaviours are. Under stress it reacts in "fight or flight".
3. Reptilian controls many of the automatic functions and is concerned with survival. When stressed it acts in "freeze".

"Ideally the pathways between these levels should be open and usable. In practice, many factors in our lives have taught the brain that it is safer to shut off easy communication, and this may become a habit. The pathway may also be closed genetically, or life experiences may not have opened them yet. Because the brain is so adaptable, these blocks are all removable. We can open new pathways at any age."

(Hindshaw, 1998, page 34)

Brain Profiles

Although some researchers disregard the importance of hemispheric brain dominance and regard specific brain profiles as of little significance the researcher-teacher considers them a useful tool for teachers to consider and as an aid to understanding of why a child has a specific learning difficulty. The researcher-teacher understands that while there is probably a tendency for each individual to have a particular brain profile, the profile will vary for different activities and stresses.

(See Appendix 1B page 1 to page 2 for an explanation of Brain Profiles and Dominance.)

Edwards (Taylor, 1996) states

“To function in an integrated state, you need bilateral integration, with access to both hemispheres at the same time, with ears, eyes and both sides of the body switched on”. (page 47)

From an Educational kinesiology perspective this will be more easily achieved in a state of uniform dominance. Dennison (1982) stresses that neither hemisphere should work in a vacuum; the more integrated the brain becomes the less likely it is to retreat to the reflex, instinctive state, associated with the lowest level of reasoning in the reptilian or hindbrain.

“It is only when stress levels abate and the brain is in an integrated state that the mind is receptive for learning”(Taylor,1998, page 59)

In Educational Kinesiology (Brain Gym) children with learning challenges are seen to be learning blocked due to the lack of hemispheric integration. To see how this learning block may effect reading refer to Appendix 1B page 3 to page 4. The aim of Educational

Kinesiology is to interpret this as a temporary block which can be broken down with the intervention of specialized movement and balances.

“Is it possible for the brain to compensate for a malfunction in one area by re-education (re-wiring) the neural pathways.” (Taylor 1998, page 51)

Hence with the cross, mixed or blocked dominance the use of Educational Kinesiology (Brain Gym) movements is to encourage neural rewiring for specific tasks. The aim is to have a stress free system which enables natural, efficient and effective learning.

Visual Integration and the Visual Midfield

Due to the importance of the visual midline, movement, posture and effective learning, an explanation of vision as defined by Educational Kinesiology follows.

The Visual Midfield

In Educational Kinesiology (Brain Gym) the imaginary line which separates one visual field and hemispheric field from the other is known as the visual midline.

A diagram mapping the visual midfield can be found in Appendix 1E and page 2 shows an application of poor binocular vision.

Dennison (1993) suggests that this visual sense is clearly heightened by its integration with the other senses and their interconnectedness within the brain. Vision takes place in the brain not in the eyes. It is an outgrowth of how we learn to move, think, and perceive.

Vision involves:

- Perceptual skills: seeing, hearing, touching and relating to gravity.
- Cognitive skills: thinking, questioning, and processing information
- Expressive skills: feeling, moving, creating and communicating.

According to Dennison (1993), active vision is intelligent vision. For example selecting and screening from infinite possibilities, according to an evolving sense of what is important. It engages us in a relationship with the environment. (See Appendix 1H).

Dennison (Taylor, 1998, page 59) explains that myelinated nerve fibres connect the 120 visual field of each eye to the opposing hemisphere. The left brain receives information directly from the right eye and indirectly from the left eye. The left brain analyses and processes the visual information through language and logic whereas the right brain interprets the whole picture. Hannaford (2002) states that

“only 4% of vision is light being received by the eye, the other 96% is manufactured in the brain according to other senses and kinaesthetic /emotional reality”. (page 46)

Taylor (1998, page 62) explains how the child whose dominant hemisphere and eye are on the left side of their body will usually experience more severe learning problems. If the left eye scans from right to left then the child will have difficulty reading from right to left. Also there is a greater possibility that the numbers and letters will be reversed. Brown (2004) discusses this issue and suggests Educational Kinesiology methods to help. (See Appendix 1F)

Hearing, Listening and Aural Integration.

According to Dennison (Taylor, 1998, page 65) the integrated lateral listener state happens when nerve fibres carry sound messages from either ear to the opposing hemisphere of the brain. In this state the individual will appreciate the rhythm, tempo and beat as well as understand the meaning of the music.

Taylor (1998, p67), (See Appendix 1D) explains that a child whose dominant ear and brain hemisphere are both on the left side of the body will be able to decode but will have

trouble encoding sounds. Hence due to the concentration required for the mechanics of reading the learners comprehension may be scanty. Also, due to poor tonal input the reading can tend to lack expression or feeling.

Taylor continues to explain that conversely when the dominant ear and brain hemisphere are on the right they may appear to daydream, not listen, lack attention and are easily distracted. It is possible that the child is trying to build a visual picture of the auditory input.

“Hannaford (1995) found in her research that over half of all students are auditory limited (blocked). Such a determination has serious implications for education since the majority of teaching is verbally administrated.” (page 68)

It is important to note the acceptance in education of multisensory structured phonics to aid the development of literacy skills. Whether ‘synthetic phonics’, ‘look and say’ or other approaches these phonics tools have been tested in education as early as 1898. (See Appendix 1G). It is the researcher’s opinion that these phonic programs are successful with pupils who have auditory, digital and visual perception already in place neurologically. Exposing more of this type of program to pupils without this sequence of auditory, digital, visual sequence in place is likely to place further stress on their already unsuccessful learning. This could mean that mastering literacy could become an even greater challenge. In the case study of Pupil A, Chapter 5 and case study Pupil B, Chapter 7, structured, multisensory, phonic programs were ineffective for a considerable time.

The Educational Kinesiology Perspective

Dennison (July, 2004) argues that it is a fallacy that learning is all mental activity.

Moving the muscles activates the brain neurology and aids the integration of learning.

Dennison (July, 2004) states

“So when, in the classroom, we insist that children sit up straight and tall and not move in order to be good listeners, we’re doing them an in-service and preventing a lot of true learning from taking place.” (page 6)

Dennison (2004) describes the fact that movement begins in the cells and as the cells move so the child moves. As the hands are used to solve problems; speech is muscular movement. As people have evolved the muscle movement has guided the development of the brain. Thinking means moving ideas about until one is happy with the conclusion and according to Dennison learning has to be felt in the muscles for it to have been learnt well.

Educational Kinesiology has been designed to categorize three dimensions to the brain.

1. Focus entails concentrating attention, balancing reflex action, moving intentionally towards a goal or purposely away from something that is not working. This focus dimension is activated through the Brain stem, where reflexive movement is initiated and it is basic to an individual’s survival especially during birth and the first year of life. It gives personal strength, the ability to act with intention, depending upon the situation.
2. Centering is activated by the midbrain. People learn to be grounded rather than running or fighting. It enables individuals to experience themselves in relationships.
3. Laterality is activated through the cerebral cortex and is rational thinking and communicating.

Educational Kinesiology work includes a powerful programme for getting the eyes, ears, and hands working together.

Holt (Dennison, 1997) described that children learned effectively, as they played freely, before being presented to traditional established compulsory school. Curiosity leads the children to learn. They made mistakes and were not afraid to try again to do the activity. These young children, given the freedom to play safely were able to assess their actions, decide, choose and teach themselves by trusting their insight and using their logic. Holt observed that these children could often concentrate for a long time, were motivated and enthusiastic.

Dennison (September, 1997) writes

“What Holt described is learning that is anchored to dynamic movement as opposed to the stress-anchored learning predominate in our schools today. Classroom teaching for informational responses, particularly at the elementary level, where the sole anchor is pressure to perform, is teaching that is devoid of intellectual honesty.” (page 4)

Dennison (September, 1997) believes that it is the teacher’s sacred responsibility to give the child the opportunity to experience the rewards of learning and problem –solving and maintains that

“Children learn by touching and manipulating their environment, and by moving within it. The accomplishment of successful mastery over his or her body is far more important to the child’s identity or self concept than the teacher’s approval.” (page 4)

While emphasising the need to move to learn, Dennison (September, 1997) reflects that we can be hindered by the fact that

“Most of us have gone through the public school system, which has become an institution in and of it. As survivors of this system, we have become part of it, and we believe the myth that we must perpetuate the system as it is: we must teach children to conform, adapt, and play the school game, even though we know that it is not representative of the adult, real world in which we move.” (page 5)

Research and Development to Incorporate Moving into Learning.

In addressing the needs of pupils who face challenges in developing literacy and mathematical skills, the following discussion explores some factors which provide a background to the relationship between movement and learning; linking the sensory system, vestibular system and proprioception to learning.

Characterization of non-learning in a classroom could be recognized as physical phenomena. For example, movement or non-movement by a student can be identified as a response to learning. Peace (2004) writes

“It can often be seen with the children we teach that they predominately use only one side of the body for some academic tasks. For example, whilst writing with the right-hand, the child's left arm will hang from the shoulder and is not used to steady the paper or to turn the page. Another example is a child who will pick up cards or Cuisenaire rods only with the right-hand. The left-hand hangs limply from its shoulder but never automatically comes in to help turn cards over or pick up the Cuisenaire rods. Children who find academic work straight forward and natural will automatically be using two hands for these activities.” (page 15)

According to Hocking, (1997) new learning taxes the Central Nervous System. If the system is struggling to process reflexive behaviour it is likely to be overloaded when new learning takes place as it does in school. Hocking (1997) comments

“The complex learning environment causes some children (and adults) to either switch off or become disruptive due to their inability to cope with incoming stimuli. The person is often labelled as ‘day dreaming’, ‘not concentrating’, ‘lazy’, ‘defiant’, ‘uncooperative’, ‘dyslexic’, ‘trouble maker’ or ‘ADD’, despite constant effort by the child, parents and teachers.” (page 4).

In some cases, as in the above examples, structured malfunction in assessing the brain for learning is manifested through observed student behaviour. In other cases where traditional learning proceeds, such signs may not be obvious yet learning may not be fully opportunized without having access to the entire brain -body system. In researching explanations for learning disorders, researchers have examined the central nervous system and presented arguments for an understand of the senses, reflexes, vestibular mechanism and proprioception response.

The Visual and Auditory Senses

All the senses work together as a development of the child proceeds from conception throughout life. The natural development of the brain, central nervous system and body is dependent on the integration of the senses. The senses need to work together.

Goddard (1996) explains how important it is to consider all of the senses. Frequently children experiencing learning difficulties with academic work will be seen by different specialists who will never discuss, together, the challenges that the child is experiencing. For example, an audiologist looking at the deficit in hearing may examine the child. Then totally independently, without referring to the audiologist, the occupational therapist may examine the child for coordination disorders.

According to Goddard (1996) all the senses should be considered by professionals working with the child experiencing learning difficulties. The entire professional then should discuss the different sensory challenges as a “whole” difficulty. This does not usually happen and is a weakness in the present referral and diagnosis system used to assess learning difficulties.

Hearing tests do not necessarily pick up all problems possible in the hearing sense. Goddard (1996) mentions the example of hyperactivity. Children can sometimes hear too much which could result in problems with socialisation speech and concentration. This is not measured in any hearing tests and a child with this disability would be dismissed with no hearing disorder.

Goddard (1996) emphasises the importance of children listening to live music and the benefit they receive from the high frequency sounds, which tend to be lost with today's recorded music. Goddard (1996) holds that

“Previous generations of children learnt multiplication tables, alphabets and Latin verbs to tunes. Understanding of what they had learned came later, but the tune and rhythm aided recall.” (page 54)

Goddard (1998) refers to the problems uninhibited reflexes can have on vision: The Asymmetrical Tonic Neck Reflex (ATNR), has an effect upon the ability to eye track while reading. The Tonic Labyrinthine Reflex (TLR), effects eye convergence, Moro Reflex affects eye fixation and The Symmetrical Tonic Neck Reflex (STNR) works with eye tracking up and down and adjusts binocular vision when the eyes move from one distance to another. As Goddard (1996) states

“To make effective use of the sight eyes provides, the child must also make use of other sensory information. The foundations for these interconnections are laid down during the first year of life, at the same time that pathways are formed between the eye, the brain and body.” (page 60)

Tendon Guard Reflex

Unfortunately according to Dennison (1994, page 16) for some learners reading, writing, speaking and listening are perceived to be threatening to survival and the learner holds back or withdraws from the learning activity and functions in the Survival centres of the brain stem. The physiological response to this danger is contracted muscles, which affect the posture by shortening the tendons in the back from head to heel. The connective tissue throughout the body is contracted. This confounds the vestibular system and sense of balance. The effect of this posture is readily observed in the rounding over of an individual's posture. To compensate and maintain balance the individual maintains balance by rounding the shoulders forward. The teacher-researcher observed this to be a common characterise of all children in the Case Studies A, B, C, and D.

Proprioception

Edwards (2002) describes proprioception as the perception of joint and other body movements, as well as position of the body and body segments. It starts to develop at three months in utero and is fully functional by birth. If there is inefficient processing of sensations in the joints, muscles and ligaments the child has difficulty interpreting sensations about the position and movement of arms and limbs. A poor sense of body awareness and body position is evident in clumsy, uncoordinated movement. Functions of the Proprioception System as described by Edwards (2002) are:

- It tells us about our own body movements and body position.
- It provides us with the information that helps to integrate touch and movement.
- It helps us to check on the spatial orientation of our body, and our position in space.
- It gives feedback on timing and speed of movement, how fast and how far a muscle is stretching, and how much force the muscle is exerting.

- Proprioception increases body awareness and contributes to motor control and motor planning.
- It also helps us to use our body parts efficiently and economically.
- Proprioception allows us to run smoothly, dance, stretch, move, stand, and lie-down.
- It gives us emotional security in movement
- It allows us to trust that what we want our body to do, it will do efficiently.

Goddard (1998) explains that poor proprioception is common among children with learning difficulties. For example the child may have to continually get enough feedback from their muscles to know where they are in space. There will probably be inefficiency in the visual sensory channel. Goddard (1998) clarifies that a child with poor depth perception could rely too much on proprioception feedback. Goddard (1998) writes

“The child who attempts to use proprioception to compensate for weaknesses in another channel may be the child for whom “practice makes perfect sometimes” and who will, at times, produce excellent results but appears to be inconsistent in his performance.” (page 61)

Edwards (2002) suggests that proprioception can be aided by any activity that requires heavy work input, such as pushing, shoving, pulling, climbing, jumping and carrying heavy objects. These movements will stimulate the sense of proprioception.

The Vestibular System

Vestibular function Edwards (2002) explains is the second earliest appearing sensory perception. Prenatal maturation prepares the system for the effects of gravity after birth, enabling the baby to orient himself in space and to make adaptive or exploratory head, limb and eye movements.

According to Edwards (2002) the vestibular system has a strong influence on muscle tone. When the vestibular system is inadequately processing incoming information, not enough stimulation reaches the muscles and the child presents with minimal low tone.

An example of inadequate processing is when a baby does not go through the crawling stage. The weight-bearing for crawling is absent and the child skips the crawling phase and will stand up and walk early.

Edwards (2002) explains that the low-toned baby finds it difficult to lift his head against gravity and begins to compensate by lifting his/her shoulders to support the head. This limits the amount of independent head and eye movements, and lack of stimulation of righting reflexes. The child lacks the opportunity to visually scan the body and the environment and these results in decreased visual perception and body image development.

As the baby moves into the next stages of motor development, the child tends to raise the scapulae, which results in the shoulders being held in a rounded position, with fixing of the elbows into the sides of the body for stabilization. This prevents the hands and arms from moving into the weight-bearing position for crawling. These children then skip the crawling phase and stand up and walk early, or the crawling phase is very short. Edwards (2002) writes

“The stimulation of both sides of the brain in a cross lateral pattern is limited and the child learns to function homolaterally. Those core muscles which normally develop contra-laterally do not have the opportunity to develop and cross lateral patterning does not take place. Dissociation of movement between the shoulder girdle and the hips does not develop effectively and the child learns to move in gross homolateral patterns, moving the whole body as he looks around, instead of just the hips or shoulders. This further strengthens homolateral learning and does not encourage nerve nets to form across the corpus collosum resulting in poor bilateral integration of the brain and body.” (page 21)

Goddard (1996) emphasises the need for sensory integration

“When assessing a child with learning, language or behavioural difficulties, it is not sufficient to merely identify hearing problem, a reading problem, the coordination problem, etc. It is necessary to look further and to ask, what does he hear? How does he see? Under which specific situations it is his balance poor? Does he have the mature combination of movements necessary to read, to write and to speak? If the child does not see, hear or move in the way that it is assumed that he should, the very foundations of learning are lacking.” (page 64)

Jenson (Potter, 2003) writes

“Many specialized educators and teachers have long recognized the connection between physical and mental learning but overall, schools have not kept up with the research that links physical movement with thinking processes.” (page 3)

Much of the work relating physical movement and mental learning has developed through recognition of a need.

Reflexes and Challenges in the Development of Mathematical Skills

“Good numeracy skills are important for being an active member of a modern numerate society. Bad numeracy skills are known to be even more of a handicap than poor literacy skills to getting a job, keeping a job and being promoted within employment. (Brynnar and Parsons, 1997)”. (Butterworth, 2003, page 8).

It is of significance to refer to the research into reflexes and mathematical challenges completed by Taylor *et al.* (2004). Their results indicated both direct and indirect relationships between retention of the Moro, ATNR, STNR, and TLR reflexes with the challenges some individuals have with attention and developing mathematical skills. The

following adapted chart gives a clear picture of their findings. The children with mathematical problems had retained Moro, TLR and ATNR reflexes. (See Appendix 11.)

Hannaford (1995) explains that the retained Moro reflex leads to an overly reactive response to mild stress. Hence it is obvious from this chart why those with mathematical learning difficulties develop a poor self esteem, fear of mathematics and often suffer from stress.

Chinn (2004) believes that there are many, complex reasons why a person can be bad at maths. Some of these are

- Short-term memory
- Mathematics memory -- this is long-term memory for mathematical information.
- Direction
- Visual
- Speed of working
- No attempts at working out the answer to a sum
- Recording and writing up
- Poor recall of basic facts
- Poor reading skills
- Sequencing skills
- Transposes
- Reversals

The neuroscientist Butterworth (2003) has claimed that a percentage of individuals, seem to fail to have a concept of the size of a number.

Butterworth (2003) referring to this concept of number challenge writes,

“between 2 million and 5.8 million people in the UK suffer from a problem that interferes with daily living and academic achievement.” (page 8)

The teacher-researcher notes that many of these conditions related to the poor development of mathematical skills are similar in character to the problems encountered when reflexes are retained. For example poor short term memory, visual perceptual challenges, problems with procedures and mental maths can be seen in individuals with retained TLR. Those suffering with low self esteem or stress can have a retained Moro and or Fear Paralysis Reflex. Vestibular and ATNR retention can be responsible for

directional challenges, reversals, dealing with positive and negative signs and axis in mathematics. Visual and midline problems can come from retained STNR, Ocular Motor, ATNR Reflexes and Vestibular challenges.

Reflexes and Challenges in Developing Literacy Skills

It is relevant to highlight the research by Bender (Goddard 2004, page 49) and Goddard (2004, page 50) that a high proportions of dyslexic children tested positive in retained STNR reflex. It is the researcher-teachers opinion that if Moro, STNR, TLR, ATNR, and Vestibular Reflexes can be integrated then the dyslexia symptoms will possibly lessen and perhaps even disappear.

Applications Using the Educational Kinesiology Perspective in Addressing the Needs of Pupils with Learning Impairments

MENARD- Early Years Class Teacher

Menard (November 2001) describes a study she carried out, with kindergarten classes, to compare academic growth for the first semester in 2 consecutive years. The control group were the 1999-2000 class without Brain Gym activities the experimental group were 2000-2001 class with Brain Gym activities.

- The group who received Brain Gym received less one to one tutoring than the control group.
- The group doing Brain Gym did it at the beginning of each day followed by various Brain Gym activities and or specific balances throughout the day.
- Menard the researcher teacher of this project also did movements and balances her self during the teaching period.

- Some lessons had changed slightly from the first year to the second, but the overall teaching style and content were similar. The only major significant change was the application of Brain Gym exercises.

Menard (November 2001) continues to clarify that all but one student showed improvement with no reteaching. However that student completed the task more quickly. The Brain Gym group outscored the control group in every academic area. This was despite a younger age group, a larger class size and less time with a teacher assistant.

No data was available to indicate student abilities. Informal assessments and observation did not indicate to Menard that one class was stronger than another. However this could be a possibility.

WARDS – Educational Kinesiologist (Brain Gym)

Instructor/Consultant.

Wards (March 2002) describes the changes that occurred in a student's optometrist testing after Educational Kinesiology Balances. Ward (March 2001) explains that Tom was 7 years 5 months old and due to difficulty in settling in to school the family doctor had prescribed a trial of Ritalin. An outside independent psychiatric assessor had carried out a classroom assessment and Tom had been described as being distracted by a variety of people and things and not being able to respond to instructions. The class teacher described Tom as having co-ordination difficulties, problems with socializing skills, staying on task and initiating activities.

Tom had worn glasses for farsightedness since he was 1 year old and had had surgery for a squint. He had been assessed by a behavioural optometrist who had noted that his problems in visual perception would mean he was likely to experience difficulties in academic progress. The optometrist had then referred Tom for an Occupational Therapists assessment.

Wards began working with Tom in February 2001 for 14 one hour Educational Kinesiology sessions. Much of the balancing dealt with unwinding emotional and developmental stressors. Due to the physical difficulties Tom's body was storing up tension and Ward used the movement work and balances to relax that tension. In July 2001 Tom was assessed by the Occupational Therapist who completed the same standardized tests that the behavioural optometrist had done.

Wards (March 2002) writes

“Not only did Tom improve by seventeen months in only nine months in a skill he was behind in, but he also improved by twenty seven months in a skill in which he was already above age level. (page 14)

At the time of writing Wards (March 2002) states that Tom still has a way to go to secure fine motor coordination for handwriting. However he is a much happier pupil, succeeding in school. The occupational therapy report indicated that no more consultation with medical personnel was necessary.

HONNEGAR- Class Teacher year 1

Honeggar (March 2004) conducted a small pilot study with a first grade class in Michigan. It evaluated the effects of Brain Gym upon the writing abilities of students in a first grade classroom. There was an overall positive effect on their learning.

Honegger recounts that the Brain Gym class teacher commented that the kids struggling with memory had continual success when using the picture of the X (Dennison, 1994). When the kids get fidgety they can settle again after a couple of Brain Gym exercises. It also felt pleasant to begin the day with Brain Gym. The children themselves were excited about using the activities.

Honegger (2004) writes

“The Brain Gym movements had a significantly positive effect on students writing ability. To my surprise, Brain Gym made the greatest significant impact on the areas where more cognition was involved (total words spelt correctly and correct motor sequences), rather than on the areas that involved more motor movement (total letters written and total words written). Most importantly, this increase occurred with only a minimal use of the Brain Gym movements.” (page 64)

BEIGEL –Teacher and Educational Administrator

German educationalist Beigel works with children in all types of schools who have difficulties in learning and behaviour. For 26 years Beigel worked in special schools as a special needs teacher.

Beigel (August 2003) writes

“During that time I became aware of the connection between learning, behaviour and motion, and all this time the children and I enjoyed learning by moving.”
(page 10)

In the early 1990's Beigel and her colleagues began to offer specific, traditional sensorimotor movement integration programmes in German schools for children experiencing problems in perception, movement, speech, or behaviour.

In 1994, Beigel learnt about Brain Gym and they began to introduce Brain Gym activities into the motor programmes run in the schools. In 1998 Beigel and her colleagues conducted a research project to determine what effect Brain Gym would have on reading.

A school was chosen where movement had not previously been used as an aid to learning. There were 18 children who were having difficulties in developing reading skills. They were divided into 3 groups.

- One group played games such as memory games or construction activities.
- Another group was the sensorimotor integration group and used gymnasium equipment, balls and ropes.
- The third group did only Brain Gym activities.

Beigel (August 2003) recounts that a double blind statistical analysis showed that the Brain Gym group read faster, made fewer mistakes, and achieved better comprehension than the other two groups. A result of a questionnaire sent to parents indicated that the Brain Gym group had improved in self confidence, enjoyment of school work, success in writing, mathematics and reading comprehension.

POTTER- Teacher of Remedial Literacy Skills

At the time Potter (November, 2003) came across Brain Gym she was using a computer based reading programme to teach children withdrawn from class twice a week for remedial reading lessons.

Potter (November, 2003) describes

“It was a good programme, but like many other good programmes I had used over the years, it left me with the haunting feeling that something very simple and very important was missing. Now I sensed that my search for the elusive something had ended, and I was pumped up.” (page 3)

With only the very basic of knowledge and experience of the movements Potter was courageous enough to run a nine week project introducing movements from Brain Gym into her classes. As well as the percentage score improvement, the children withdrawn, returned to class and became more like classroom leaders rather than kids who previously were not participating in beforehand. As a result of this small project Potter moved on to work on a larger project studying the effect of Brain Gym on Reading Achievement for grades 3 to 5. The aim of the project was to see whether academic achievement would improve through daily Brain Gym activities.

There were control and experimental classrooms. The experimental classrooms had teachers who wanted to participate in Brain Gym activities. All teachers using Brain Gym had to attend a formal 6 hour Brain Gym training session. They had to teach specific Brain Gym activities for a minimum of 15 minutes each day, attend a monthly one hour support group and allow students to leave class for specialized individual or small group Brain Gym activities.

Potter (November 2003) writes

“The inclusion of the Brain Gym movements in the classroom proved to be highly successful. With Brain Gym, the overall learning environment becomes a productive place where the separation of mind and body no longer stubbornly persist.” (page 11)

There are a variety of application using non Educational Kinesiology movement programs developed by Occupational therapists, Physiotherapists, Educational Psychologists and Physical Education teachers. For an explanation of some examples of these programs see Appendix 1J.

Synopsis

This chapter has consisted of a review of contemporary research related to the need to use movement as a tool for learning. It began with the history and development of Educational Kinesiology. Reference was made to relevant research which influenced some aspects of the design of Educational Kinesiology (Brain Gym). The review progressed to describe research into the auditory, visual and sensory systems, reflexes, proprioception and the vestibular system. Examples were given of how the immature development of aspects of the central nervous system can affect learning.

In the next section the effect of poorly integrated reflexes was discussed relevant to the challenges in acquiring literacy and mathematical skills. Evidence was then summarized which suggested a break through in learning for those exposed to Educational Kinesiology (Brain Gym).

Conclusion

It must be noted that educators are not specialists of the central nervous system, optometry, physiotherapy, occupational therapy and other sciences researched by the author of this paper. To put psychological events which are complex and precise in to sets

of practical skills which can be adapted in the classroom can only be operative and perfected by application and feedback. Feedback is used to determine variables as to which techniques can be made maximal in their use.

There are no brain scans following application of Educational Kinesiology (Brain Gym) movements in the classroom. It is impossible to know for certain what happens with students with respect to psychological and physiological processes, that allows improvements in function and ability. However, students can provide feedback on changes in body attention and improved ability in certain skills.

Those researchers and teachers, discussed in this chapter, have worked to support students in academic progress, highlighting the possibility of doing activities with students that help them move along the scale of learning.

There have been many innovative ideas fed into the education system since it was first established. With the development of Educational Kinesiology (Brain Gym) the need for movement has been approached from knowledge of the central nervous system as reported in the discussion. However, the value of structured lessons based on Educational Kinesiology (Brain Gym) exercises will depend as much on the classroom educators as it does the creation of the exercises.

Maybe one of the great difficulties for getting Educational Kinesiology (Brain Gym) operative in schools lies in the perception of what is needed to allow its success.

“Science progresses not by convincing the adherents of old theories that they are wrong but by allowing enough time to pass so that a new generation can arise unencumbered by the old errors” (Plank in Levinson in Goddard, 2004, p xii)

Chapter Two

The Design of the Research into Using Movement to Aid the Acquisition of Mathematical and Literacy Skills

This chapter provides a background to the type of study undertaken. Information about the research methods used and the researcher-teacher's approach to incorporating movement into teaching literature and mathematics is presented.

Aim of Chapter Two

The aims of this chapter are to

- i. Describe the issues proposed for the research.
- ii. Describe the institutions involved in the research followed by a description of the pupils and teachers, whose learning and teaching, were monitored and who participated in the research.
- iii. Explain the research methodology and tools used in the research.
- iv. Discussion of the limitations of this research.
- v. To describe the process of gathering and interpreting information about the pupils and teachers and parents.

Overall Research Issue

The researcher-teacher is aiming to explain to educators the concept that specialized movements can be a tool to aid literacy and mathematics learning, managing stress and maintaining self esteem; encouraging teachers to confidently use movement with pupils.

Specific Questions to be Tackled

The aim of this research is to investigate the use of movement to aid learning when there are specific difficulties in acquiring literacy and mathematical skills within the typical classroom practice?

When posing the following questions they are done so with the full understanding that there is an already recognized and accepted specific difficulty in the pupil's learning.

- 1) How effective was the school in being able to teach
 - i. Literacy successfully to the child?
 - ii. Mathematics successfully to the child?
- 2) How can teachers, who are responsible for helping pupils with literacy or mathematical skills, benefit from the use of movement as an enhancement of natural learning?
- 3) What are the optimal methods of developing literacy and mathematics teaching for those pupils who struggle to acquire them in the typical classroom?

Description of Institutions and Traditions used in the Research

The research was carried out in a bilingual area education uses both Welsh and English as a form of communication and teaching.

Pupils were enrolled in the following schools.

- i. Primary schools educating children from year 1 to year 6.
- ii. Secondary schools educating children from year 7 to year 12.

Teachers involved in this research were teaching in the same schools the researcher had been asked to teach the pupils either directly from a dyslexia unit, directly from a local education authority or privately by the parents of the child.

In the primary and secondary schools the children were all taught predominantly through the medium of Welsh except of course for English lessons. The researcher taught through whatever language the child and parent chose.

The Educational Kinesiology Trust

The Educational Kinesiology Trust in the U.K. monitors the professional standards of Educational Kinesiology (Brain Gym) in the United Kingdom. It is the only recognized Educational Kinesiology (Brain Gym) institution in the United Kingdom and follows the professional procedures set by the International Educational Kinesiology Foundation. Presently it is responsible for the training and registration of Brain Gym instructors and consultants in Scotland, Wales, Ireland and England. Also the Trust is responsible for monitoring the continual professional development of Brain Gym instructors and consultants.

The researcher teacher has been trained to teach the 4 day accredited Brain Gym (Educational Kinesiology) course by the above Trust. The researcher teacher is a registered, licensed Educational Kinesiologist, Brain Gym consultant and Brain Gym instructor. (See Appendix 2A for details of the four day Brain Gym course and see Appendix 2B for a description of several Brain Gym movements.)

Description of Pupils Involved in the Research.

Pupil A

This child was in year 2 when the researcher began to teach her. Her father was not able to read and her brother, who was in year 6, had severe difficulties with literacy. The brother had recently been offered help by a dyslexia specialist but had refused to cooperate with the teacher and help had to be abandoned. Hence pupil A's teacher had decided to resort to obtaining specialized help for this child as soon as possible in her education. Pupil A's teacher had been requesting help from a specialist teacher from the beginning of year 1. The class teacher had cooperation from the child's parents and from the head of school. The child's parents had also come to school to explain to the Educational Psychologist the father's difficulty in reading. For the first 12 months the

researcher used only a structured multisensory phonic program. Educational Kinesiology (Brain Gym) movements were not possible in the small space located for lessons. After 18 months the researcher asked permission to have one session each month in the child's home. The mother was present and a full Educational Kinesiology (Brain Gym) consultancy session was utilized each time. The mother was able to learn some of the movements and work with these with the child during the week.

Pupil B

When Pupil B was in Year 3 teachers expressed concern about the child's interruptive class behaviour. The parents had asked the school for a psychological assessment which indicated dyslexia tendencies. However the child's reading age was of an acceptable standard so no extra help from a specialist was permitted via the school.

The child was only able to record a very small portion of mathematics during a lesson in class and the researcher's job was to work with, and help the child complete the work that should have been done in class.

The father of this child had been assessed as having dyslexic and dyspraxic tendencies. The father had pursued a successful profession and also been able to study academically at different stages in his life. He admitted however, that he always found recording information, note taking and letter writing extremely difficult.

The child communicated in Welsh with one parent and in English with the other parent. Each parent also read in their particular language to and with the child. They had done this from early in the child's schooling as they realized that the child had been struggling to keep to the reading progress expected of him by the classroom teacher. The child now read well enough to cope with all the reading in class. The parents explained that they would be keeping the reading program going for many years to come. The child actually loved reading.

The mother arranged for the researcher to help the child who was in Year 5 to complete mathematic tasks. The child seemed capable of doing the mathematics set by the school but was unable to record the answers in the time given in school.

Once the researcher explained the philosophy behind Educational Kinesiology (Brain Gym) the parents asked the researcher to use movements and specific Educational Kinesiology techniques with the child in expectation that these would help brain integration and natural, effective learning.

Pupil C

This child was in year 2. The parent had approached the dyslexia unit and asked for a psychological assessment as she was concerned about the child's interests and ability to read. The child also had an older brother who had been assessed as having dyslexia tendencies. The psychological assessments stated that the child had some dyslexia tendencies. The mother had asked for specialized one-to-one literacy tuition for the child, which was carried out during the school day and on the school premises.

Pupil D

This child was in year 8 when the researcher-teacher began to help her with mathematics. She could not remember number facts and had to use her fingers for any counting. The pupil had had continuous extra mathematical help during the years at primary school and during year 9.

Description of the Teachers Involved in the Research

In a period of 12 months, the researcher-teacher taught the four day accredited Educational Kinesiology (Brain Gym) course to ten professionals, nine of whom were teachers. The course members were

- a professional musician
- a teacher who was working with the elderly as a movement therapist
- a counsellor working with mothers and their young children
- two are teachers in special needs schools
- a primary school teacher,
- an art therapist also working one to one with children who have a specific learning difficulty and adults in rehabilitation post mental illness
- three teachers who work one to one with children who have specific learning difficulties

Analysis of the Pupils Involved in the Research

The four pupils who participated in this study were similar in the following ways

- Problems with developing literacy and or mathematical skills were obvious from their early years in school.
- They had siblings and or parents who had had difficulties in acquiring literacy skills.
- They were all aware of their difficulties but were eager to overcome them and participate in school life.
- They all enjoyed working with the Brain Gym movements as part of the structured phonic or mathematic lesson.
- All sets of parents were aware of the problems faced by the children in obtaining literacy or mathematic skills

These four pupils differed in that

- There is a large variation in how each of the children were helped by their particular school to have the problems recognized and hence appropriate teaching and help given.
- One family could help professionally with school work, and homework. However the other three families could do little in this area despite being concerned about their child's difficulties and working through the normal educational channels to obtain specialized help for their child.
- The three children had different problem areas which caused their literacy or mathematic difficulties. For example one had more of a visual challenge, another co-ordination challenges, the third had a much milder challenge with learning to read and write legibly and the fourth had severe difficulties in most areas of the curriculum.

Any child assigned to the researcher by a dyslexia unit, education authority or private request of a parent was assessed for learning problems and taught by the researcher-teacher. The researcher-teacher agreed to teach all children presented to her for specialized help.

While aiming to achieve the highest positive professional standards the researcher's teaching and decisions in the action research have a natural variance, depending on personal day to day functioning. The environment, classroom, school, interruptions to lessons from the unexpected, mental and emotional state of the pupil, pupil's contemporaries, their classroom teacher or their parent can effect the success of any teaching program.

The researcher- teacher was always there to instantly monitor and cope with the unexpected. At times there was no space available to teach the child or do movement activities. The pupil can present in a state of distress due to an emotional upset. The class teacher may be stressed and not able to achieve a certain teaching standard or style. The researcher was there to deal with successes in the present which could develop the pupil's

self esteem and confidence. Alternatively, the researcher was on hand to ensure that failed situations are neutralized to maintain the pupil's spirit and enjoyment of learning.

Analysis of the Teachers Involved in the Research

The teachers who participated in this study are similar in the following ways

- They all worked with children who had specific difficulties in some way with their education.
- They were all eager to develop new methods to use with and help their pupils obtain literacy and mathematical skills.
- They all enjoyed including the movement aspect into their lessons.

Methodology and Planning Process of Action Research

Due to the subjective nature of the research the researcher-teacher implemented an Action Research project. Action research could be defined as a professional understanding and coming to terms with a particular teaching - learning situation; being able to relate to relevant research and inquiry, and then implementing appropriate action to change, with the aim to improve what is presently happening.

“The core idea of action research is that there should be an intimate relationship between inquiry and practical or political activities.”

(Hammersley, 2004, page 165).

To begin with, this involves gaining understanding, reflecting on, and challenging how the teacher is in the present moment. Once problem areas are located and assessed, then research methods to improve and enhance present practice can be studied. Haggerty (2003) suggests using theoretical insights from literature, teacher's personal theories, textual factors and personal and shared values, to develop a plan of action. The teacher -

researcher is actively engaged in the research, monitoring the present situation, developing personally, and being exposed to different ideas and methods. It is a continuous development, not necessarily with a specific truth as an answer, but different methods can be implemented on the job, with the intention that these will enhance the present teaching-learning situation.

Once the action has been taken, it can be reviewed and questioned in the same way that it was before implementation: hence the process is evolving. It goes back to the beginning by redesigning and rediscovering itself. Information is constantly being collected, recorded and analyzed, to deal with the results and consequences of the action being taken.

Descombe (2003) describes the advantages of action research. Firstly, it addresses the problems and promptly feeds results back into practice. There is continuous professional self-development for the teacher practitioner. The development happens in the workplace when the practitioners are participating in both the action and the research.

This particular action research involves one to one specialized teaching to students who have severe difficulties in acquiring literacy or mathematical skills. Other professionals such as the class teacher, special needs coordinator, head of school, head of department, educational psychologist, parents or medical personnel, may also of their own choosing or interest, be involved in the action research.

Reports, minutes of meetings, assessment from teachers or the educational psychologist, national test results, pupil profiles, reports of interviews, the child's work, educational learning plans and targets for the pupil are studied, discussed and analyzed by all those involved and interested in the child's education, welfare and development.

Once thorough and detailed knowledge of the pupil is acquired, an action plan is designed. This action plan will be meaningful to the pupil, parents and professionals involved in teaching and monitoring the pupil's progress. Relevant activities and

teaching will be absorbed into daily routine and be a natural part of the child's curriculum.

Every student and teacher is different. Hence the methods used are flexible to cater for the enormous variety in teaching and learning that manifests itself throughout the day in school. The planning for the pupil can be altered immediately if the researcher senses that it is appropriate to do so. As noted by McIntyre (2000):

“All the time, ongoing evaluations cause amendments, perhaps a shifting strategy, or taking more time, or working with more children, or perhaps redefining the research questioned its self.... But one of the greatest strengths of action research is being able to choose a relevant, timely topic, and another is a facility to react to the context and the findings as they unfold.... It means that as the investigation develops, and other things become significant, there is room to react to surprises and find out even more interesting things.” (page 7)

Why Action Research was Chosen

Action research was chosen for this study as a result of the requests made by the education authority, and parents of children, experiencing severe difficulty in developing literacy or mathematics skills. It was implied that the request for help would be one-to-one support, at least once a week, for a minimum of one academic year. The requests for help were also seen as exploratory help. For example, once a specialized teacher began to help the pupil, it was found that the school, and or, parents also then began to request help from the specialist teacher. This was to enable all the individuals, working with the child, to be able to do so effectively. Hence the specialist teacher was always giving continuous further advice to those involved in teaching the child. The action research occurred as a result of this need for continuous monitoring, teaching and advising.

Pupils' Perceived Difficulties

All pupils involved in the research were having difficulties with beginning literacy or mathematics skills, and often behavioural or communication problems were associated with these difficulties. The children had not been able to develop either reading skills, writing skills, expressive language skills or mathematics skills. Hence they were not able to develop in other areas of the curriculum due to the severity of the particular learning challenge.

The requests to work with children were for either:

- I. One to one structured multisensory literacy or mathematics lessons.
- II. Assessment by the researcher-educational kinesiologist as to whether appropriate Brain Gym movements should be integrated into the pupil's daily activities.
- III. One-to-one multisensory structured phonics or mathematics lessons combined with Brain Gym.
- IV. On going advice and support to the parent, teaching multisensory structured literacy or mathematics lessons to the child and using Educational Kinesiology to enable the child to learn in a "whole-brain" manner.

The requests to work with teachers were for either:

- I. Enquiries about the 4 day accredited Brain Gym course
- II. Information about using Brain Gym with a pupil in a 1 to 1 literacy or mathematic lesson.
- III. Wanting advice about how to help a child who was not coping in developing literacy or mathematics in school.

Preparation for the Research

The research was explained to the parents of pupils and oral permission to include students in the research was obtained from the individual parents. In the case of teachers

the research was explained to teachers and permission granted from each individual teachers

Each particular literacy, mathematics, behaviour or communication problem was to be addressed. This began with an attempt to understand each pupil's unique learning environment and the significance of the particular pupil-parent, teacher-parent relationship. To engage in this preparation, observation was made in class, personally teaching the pupil, observing other teachers teaching the pupil, as well as discussion with the parents and other professionals involved with the child's education. To gain information and perception from other sources, the pupil's profile, school reports, and annual reviews, were scrutinized along with assessments made by educational psychologists, occupational therapists, physiotherapist, speech therapists, opticians and ophthalmetrists. Where possible minutes of meetings related to the child's education were read. Other information was sought through diaries and samples of pupils work.

Action

Knowledge gained from the preparation was then applied to specific educational research and teaching practices. Devised methods were implemented to develop and further the child's learning skills. As these proceeded, analysis accompanied the process in order to make both teaching and learning as effective as possible. The work was actively monitored, developed, and added to in the attempt to enhance the present pupil's learning environment.

Analysis

As indicated by Bell (1999), action research as the method gives confidence and support to theories, since they can be validated through practice. It is an ongoing process with

continual evaluation into the future of the students and their progress. On the other hand, it is unwieldy, due to the great amount of data to be gathered from professionals and others supporting the pupil on which to form a premise. This coordination must fit into a narrow period of time in the life of the pupil's learning. It is like taking a snapshot and then making viable comparisons to work with, within the child's learning environment.

Methodological Limitations

Hammersley (2004) discusses that action research is a contradiction in terms. The aim of action researchers is to bring about change rather than producing relevant knowledge about the present education situation. Hammersley suggests that

“many action researchers would resist the categorization of their work while they want research to serve action of some kind, they also want to transform the conventional ways in which action has previously been carried out.” (page 175)

The direction of this research project “Moving Learning Along” would not be to categorize, rather to strongly embrace the role of gaining valuable knowledge and recognizing models for transformation of practices.

Some Practical Problems

It is possible that a bias exists as to the pupils and teachers chosen by the researcher. Why were these pupils chosen and not other pupils taught by the researcher teacher?

The pupils selected for this research have all been pupils whom the researcher has been asked to teach within the education authority, or privately by parent request. These pupils have not been selected especially for the project. They have been presented to the researcher in an ad hoc way. Professional decisions regarding the children's education have had to be made instantly, at times, without the chance to discuss the situation with

others working in the same field. Data has been collected whenever it was available. For some students, data was readily available and for others it was not possible to collect as much. Sometimes there were professional reports and at other times files were empty. Parents and other professionals have misplaced letters, reports, children's work and schoolbooks. Hence there was a large variation in the knowledge gained about each child by the researcher.

The action research in this study has involved the monitoring of four pupils A, B, C, and D, two teachers integrating Brain Gym into their lessons and a group of teachers studying the 4 day Brain Gym course taught by the researcher teacher. In considering the nature of some physical problems arising in this research, a long time span of action is often required before arriving at the final desired outcome for the pupils. The researcher at times has not had a sufficient length of time to finish developing the skills of some of the pupils and teachers. This is typical of action research. It is an ongoing progress, which continues after the research has come to an end. It is a form of ongoing teaching and learning research.

It has been the intention in this research to ensure that the learning environment and the possibility of obtaining literacy and mathematical skills become fairer for all those pupils who experience difficulty in developing them. For example, by introducing movement to help a pupil's eye focus for near point tasks such as reading, the practical situation is being altered. Professionals then realize that the pupil begins to read more easily. Hence new insight and knowledge is gained. Referring to Hammersley's (2004) "contradiction and unstable" argument, maybe the new knowledge comes later on, after the observation of the action taken.

An example of providing a fairer environment is a psychologist's report, requesting that a child be exempted from mental mathematics or English spelling tests due to dyslexia or dyscalculia challenges. This is altering the political situation, as these tests are part of the national assessment testing. It is making the situation fairer for the pupil who has a disability in the area. The child is no longer feeling humiliated as was the case when the

tests were imposed. The child's spirit for learning is maintained. These are not necessarily contradictory or unstable. It is a humane approach to education.

Once school staff begin to notice and understand that treating this type of pupil in a different way may produce a better result, then new learning for the teachers involved can occur. The new learning can come after the observation of the pupil's changed behaviour. This comes as a result of the action taken to encourage the child's development to continue.

Methodological problems are pursued by Kock (2002) where he describes three threats to action research. The first is that while the researcher can predict changes to the environment of the research, at other times there could be completely unexpected changes. Secondly, there could be a difficulty in applying the research in contexts different from those in which it was generated. Thirdly, the personal involvement of the researcher is likely to result in subjective interpretation, which could be incorrect.

It is the case that this teacher - researcher had to cope with and accept unexpected change. This is the nature of the research, which involves classroom environments and interaction between people. An example was when the quiet room, where the child was given the weekly phonics lesson, was suddenly also occupied by a school administrator, photocopier and endless people coming and going throughout the every lesson. There was no other space at all in the school. About six months later after making little progress the researcher arranged to transfer the lesson to the child's home where it would be quiet. The mother could also come to observe and pick up skills to help the child. In this environment it was also possible to have a Brain Gym session and work with relevant movement to encourage the child to learn in a more whole brain, natural manner. The mother was able to become more involved, more specialized Educational Kinesiology could be used, and the child began to progress in a way that had not happened before.

One of the disadvantages of action research is that it applies primarily to the context in which it is happening. Therefore generalizations to other situations should be treated

with caution. A classroom teacher will continually be using personal interpretation to change teaching practice for the betterment of the pupils. This is accepted action in every school and classroom. However, it is also accepted that what is being done in one classroom in Cardiff will not be able to be duplicated in other classrooms throughout Wales. The results in this study will be difficult to apply in different contexts; just as the action in the Cardiff school would not necessarily apply to other schools.

In considering the above discussion the researcher-teacher decided that qualitative research is the most appropriate. Descombe (2003) provides some cautionary warnings regarding the validity of action research. Variables and controls cannot usually be considered, as the research is part of the activity rather than running parallel to it. There are ethical considerations and ownership constraints. In Descombe's words

“It is clearly geared to resolving problems which confront people in their routine, everyday (work) activity, and these people therefore have a vested interest in the findings. They cannot be detached or impartial in accord with the classic image of science” (page 82)

To preserve confidentiality, some observations, results, professional reports, pupil's work, and parents' opinions had to be refined or omitted. This restricted certain recommendations and the sharing of some of the successes and weaknesses of the research observations. In addition the personal involvement of this researcher in gaining Educational Kinesiology qualifications could suggest a perceived outcome of this research project.

Descombe (2003) also emphasizes that action research can be an extra stress for the researcher teacher until the effectiveness and benefits are acknowledged. This was relevant to the present research. For example, attempting to teach using different methods to the usual teaching was slow. Introducing innovative movement was risky. Other teaching professionals and parents wanted to see benefits in external testing results before new methods were believed and accepted. It was as if fully standardized, undisputed scientific research had to be in place to show that “Movement” worked, before schools

were prepared to use it.

Haggerty and Postlethwaite (2003) were involved in a school project where action research served well as the research methodology. Their reasoning is that action research encourages reflection and analyses in schools, which tend to be locked into a rigid day-to-day program. Administrators and teachers rarely have the chance to stand back and think seriously about what they are doing. School staff tend to be trapped into a daily rhythm that provides little hope of systematic reflection. For these two researchers, action research enables teachers to be able to explore the context of the particular work situation and environment and bring about changes in aspects of this work. It gives teachers the chance to talk about theories, gain new understanding, new practice and confirmation of existing good practices.

The researcher has on occasions observed the following. There has been a need for specialized help for a child who is not developing literacy or mathematics skills. The staff kept admitting that there was a need for specialized help, but had difficulty in understanding how to provide appropriate help themselves. At this stage it is critical that staff can take an over view of what positive support and reassurance they can immediately start to give to the child, rather than waiting until the help comes from an outside specialist. Instead the staff tend to be locked into the phonics, rote tables, “write it out again, stay in and finish the writing, and next time you will do it quicker” syndrome. An action research project can help to unlock this syndrome and move the learning along.

Processing and Analysing Data

Permission to use the teaching of the pupil, by the researcher, was obtained from the parents of each child. Likewise individual permission was granted by each of the teachers involved the research. The researcher, over a period of six years, systematically gathered, processed and analysed the data. The data was gathered as efficiently as possible as the

teaching proceeded, during review meeting, interviews, courses, workshops and Educational Kinesiology sessions.

Identifying a Problem

Pre interceptive data was gathered in the following ways to gauge the effectiveness of the school teaching the child literacy or mathematics.

What interventions had been implemented and how effective were they?.

Data was gathered in the following ways to gauge the school's effectiveness in teaching the child literacy and mathematics.

Monitoring Literacy

- Literacy levels were evaluated by
- Reading Age
- Spelling Age
- Comprehension Age
- Writing Sample
- Educational Psychologist Report
- Study of samples of literacy work from the pupil's class work
- Conversation with the pupil's parents
- Information from the class teacher
- Information from the teaching support assistants
- Information from the pupil
- Speech Therapist Report
- Occupational Therapist Report
- Physiotherapist Report

Monitoring Mathematics

- Maths Age
- Reading Age
- Dyscalculia Screener
- Writing Sample
- Educational Psychologist Report
- Study of samples of mathematics work from
The pupil's class work
- Conversation with the pupil's parents
- Information from the class teacher
- Information from the teaching support assistants
- Information from the pupil
- Speech Therapist Report
- Physiotherapist Report
- Occupational Therapist Report

Planning an Interventive Multisensory Phonics Lesson or a Structured Mathematics Program

Having established the situation where the child was not developing literacy or mathematical skills as expected in the typical classroom, planning was needed to implement a specialized literacy or mathematics program. This could involve all or some of the following

- One to one specialized and trained literacy or mathematics teacher

- Help and guidance for the classroom teacher responsible for teaching literacy or mathematics to the pupil.
- Help and guidance for learning support assistants working with the child
- Alternative procedures to copying implemented for the child.
- Photocopiable sheets available for the child which contains large, bold print.
- Reviewing the seating position of the child in the classroom. Can the child see and hear effectively in the classroom.
- Help and advice to parents on how to best help the child learn
- IEP's.

Implementing the Specialized Literacy or Mathematics Intervention

The intervention would be implemented in as many areas, listed above, as possible.

The methods proposed in monitoring the literacy intervention were

- Specialist teacher report of each lesson.
- Assessment of the child's weekly work in class.
- Assessment of the child's termly work work with the specialized teacher.
- Yearly standardized tests in
 - i. Reading
 - ii. Comprehension
 - iii. Spelling
 - iv. Mathematics
- Review Meetings with parents, Educational Psychologist and other professionals involved in assessing and teaching the child.
- Assessment of the child's ability to socialize and form relationships with other contemporaries in school.

The Need for an Interceptive Specialized Brain Gym Movement Program to Support and Aid the Learning of Literacy or Mathematics

Having established the fact that the child was not developing literacy or mathematical skills planning was needed to implement a movement based literacy or mathematics program.

- One to one lessons for the pupil with a specialized Educational Kinesiologist and trained literacy and mathematics teacher.
- Help and guidance in the use of Brain Gym movements for the classroom teacher responsible for teaching literacy or mathematics to the pupil.
- Help and guidance in using Brain Gym movements for learning support assistants working with the child
- Alternative procedures for encouraging the correct movements for the child to be able to successfully use cursive script.
- Photocopiable sheets available for the child which contains large, bold print.
- Reviewing the seating position of the child in the classroom. Can the child see and hear effectively in the classroom?
- Encouragement and advice to parents on how best to help the child.
- Inclusion of movement in IEPs.

Implementing the Specialized Brain Gym Program Intervention

The intervention would be implemented in as many areas, listed above, as possible.

The methods proposed in monitoring the literacy intervention were

- Specialist teacher report of each lesson.
- Assessment of the child's weekly work in class.
- Assessment of the child's termly work with the specialized teacher.

- Yearly standardized tests in
 - i. Reading
 - ii. Comprehension
 - iii. Spelling
 - iv. Mathematics

- Review Meetings with parents, Educational Psychologist and other professionals involved in assessing and teaching the child.
- Assessment of the child's ability to socialize and form relationships with other contemporaries in school.

Evaluating the Outcome of the Pupils

- The data collected was analysed on a lesson to lesson basis; problems were encountered and identified. Solutions were implemented to help the students move on with learning of mathematics or literacy in the next lesson or session of teaching.

- Termly evaluation, designing of the termly teaching objectives, IEP's and the evaluation of the methods used during the term were reviewed methodically.

- Yearly evaluation, annual reviews and other reports were collected, studied and specialized action taken problems which are encountered and which hinder the realization of the teaching objectives were analysed and acted upon.

- Actions critical to the success or otherwise of the intervention program were noted.
- What steps are needed to solve or minimize the problems encountered were noted and action taken.

The teacher-researcher was thus being involved in simultaneously identifying problems and proving strategies to solve them; also identifying areas of good practice and monitoring them. This type of evaluation then allowed the teacher to plan effectively for the next cycle of planning, implementing and evaluation in the project.

Synopsis

Each pupil had been assessed by an Educational Psychologist and was recognized as having specific types of learning difficulties in mathematics, literacy or both. To ascertain whether it is the “movement component” or some such “one on one” relationship with the teacher that has made the improvement it may have been useful to apply the same treatment to students taken randomly from the same class but with no observed learning problems. However, this was not possible within the physical limitations of this research.

There may be a danger in the subjective bias of a researcher-teacher. In this case it is conceivable that she has a pre-disposition towards outcomes in the method. For example, experience gained from anecdotal work with methods of movement learned from implementation of Educational Kinesiology, prior to this research, can colour observation. It could be the case that more independent observation needs to be added to the researcher’s judgement.

It should be noted that the ideas of the research began to develop before the pupils, teachers, and at times, the researcher-teacher were initially aware that they would be taking part in a research project. Therefore, some pertinent information may not have been noted. If parents had known earlier they may have been more careful in helping with school work and movement activities at home. For example, helping with activities such as reading.

Knowing that the child was being studied as part of a research project may have prompted teachers to observe, prepare, integrate movement and attend courses to become more aware of how to help the child with a specific learning difficulty. The seeds of the research germinated as the researcher teacher, while teaching the pupils and teachers developed a deeper understanding of the pupils' challenges to learn. The researcher-teacher also noticed improvements in the individual pupils and the interest which teachers showed in wanting to know how to help the child and integrate movement into lessons.

The nature of movement in learning and the measurement of "how much movement is to be applied", were not presented in traditional ways. There was no structure identified which could be used by others to perform duplicate experiments. Therefore it is difficult for results to be other than random. In retrospect some structure could have been presented as the research developed since by then the researcher could anticipate her incoming pupils. For example the researcher could always assume that there was a possibility that she would want to include every pupil that she taught in her research. This could have been explained and permission could have been obtained to include the pupil in the research even before the researcher even began to teach the pupil. A preliminary meeting could have been arranged with the parents who discussed the child's educational development from their perspective.

Because the study is about people, in situ, it was necessary to adopt a qualitative approach using Action Research techniques. The four stages of Identifying a Problem, Planning an Intervention, Implementing it and Evaluating the Outcome will assist the

researcher-teacher in developing movement to assist the specialized teaching of literacy and mathematics. The means of collecting and analysing the data was explained. Some of the shortcomings and bias in the research have been explained.

Firstly data from pre-intervention is to be used as a basis of the Action Research. This enables the teacher-researcher to plan the intervention. The results of more formal testing will occur later on. The researcher will then tentatively compare data from the pre-intervention and implementation stages.

The monitoring and assessment of the Four Day Brain Gym course and Brain Gym workshops has been done qualitatively via the use of questions and evaluation sheets. The long term monitoring of the success in teaching Brain Gym to teachers and parents is not possible in this research. It is another research project that could be a follow on from this paper.

Conclusion

In this research the place of “Movement” in new practice has been investigated using the action research methodology. Presently, in most schools, neither movement nor specialized Educational Kinesiology is accepted as a valuable and standard practice in encouraging the development of literacy, numeracy, or communication skills. An implication of this research is that teachers, who are trained to use specialized movement in teaching, have an extra dimension to their teaching toolkit.

The resonance of the “Movement” can be the additional medium that is needed to help children learn basic academic and communication skills. Using action research methodology the researcher hopes to present a persuasive case showing that it could be a method, which enables the development of practices to ensure that the children’s gain is maximal.

Chapter Three

Teaching Teachers to use Educational Kinesiology (Brain Gym)

Aim of the Chapter

The aim of this chapter is to explain aspects of, combined with reasons for teaching Educational Kinesiology (Brain Gym). It records the experiences of the researcher-teacher in teaching the accredited foundation Educational Kinesiology (Brain Gym) course to teachers and professionals. (For a summary of the course see Appendix 3A.)

“Children who are unable to retrieve and integrate what they know do not perform at the level of their true potential. And despite our culture’s widely held belief that “learning is in our heads,” neurophysiological and educational research have demonstrated that movement supports the development of the neurological connections necessary for effective learning.”

(Potter, 2003, page 11)

Introduction

The Four Day Brain Gym course is a basic start to understanding the discipline of Educational Kinesiology. Dennison (Freeman, 1998) developed Brain Gym movements for use with learning-challenged students. To Dennison the pupils he was responsible for teaching were intelligent, motivated youngsters who simply did not know how to focus on school work. Specific Brain Gym activities were developed to help with each specific challenge such as encoding, decoding, comprehension or organization.

Major Features of the Brain Gym Course

Firstly the course teaches a readiness for learning activity called PACE. This consists of four Brain Gym activities:

- Drinking water
- Brain Buttons
- Cross Crawl
- Hook Ups

PACE is an acronym of Positive, Active, Clear and Energetic. It is described by Freeman (1998, page 189) as

“four qualities that we demonstrate when we are moving and learning at our best rhythms...and help the individual to prepare for new activities by settling into a comfortable learning pace” (Freeman, 1998, page 189)

The second feature and a reason for Educational Kinesiology being effective as a teaching-learning tool is the Five Step Balance Process. Stating an attainment, goal, aim or whatever requires the learner to access the frontal lobes. For some learners this can be a process that does not come naturally and needs careful developing. The Five Step Balance Process assists the teacher in identifying and establishing appropriate goals with the student. It is vital that the three aspects of intelligence: feeling, thinking and doing, are being developed. When the learner decides on a goal it encourages the integration of physical, mental and emotional aspects of the learner's body-mind system. The teacher is taught to observe physical posture and body language of the pupil and understand how these correlate to brain organization. Participants are taught to use this method and gain proficiency over four days.

The case studies all involve using and practicing this Five Step Balance Process until it becomes a natural aspect of teaching. The researcher-teacher uses this aspect of

Educational Kinesiology with teaching on a daily basis. It was used regularly with case studies A,B,C and D.

Thirdly, natural vision and how the eyes behave is emphasised in Educational Kinesiology. The Four Day Brain Gym course gives an introduction to encouraging effective use of the visual midline, with the two eyes working together. Emphasis is on

“underlying structural, muscular and electromagnetic function related to deeply ingrained habits of eye-usage and body posture.” (Freeman, 1998, page 190).

Encouraging effective eye function, encouraging both ears and the auditory system, the co-operation of the vestibular and proprioceptive systems the course shows teachers how to integrate sensory modularities, co-ordination and balance.

The fourth aspect of the course is a process called repatterning. This is to ensure that the body-brain system knows when to choose ‘automatic reflexive movement’ or when to choose ‘stop and think movement’. The latter is necessary when processing new information whereas the former is required when accessing learning information which has already been acquired. Under stress the individual will possibly lose the ability to choose these modes reliably. Repatterning can be used to integrate both systems to operate effectively and naturally, hence ensuring a more efficient learning modality.

Hindshaw states (1997)

“Repatterning achieves neurological integration between the vestibular system, the gross motor movements of the cerebellum and the basal ganglia, as well as equal activation of the left and right hemispheres of the neocortex-particularly the sensory cortex of the parietal and motor cortex of the frontal lobes.” (page 34).

Fifthly, the course teaches the 26 Brain Gym movements. The learning of these is intertwined into the four major features, of the course, described above. Kodiak (2005) describes Educational Kinesiology (Brain Gym) as synthesizing

“the most complex brain research with the simplest kind of movement. The practice of Edu-K makes it possible to cut through impossibly tangled developmental undergrowth, simply by combining a clear intention with neurologically specific movement. Neural pathways of habit, trauma, and compensatory development are rerouted into more efficient and developmentally appropriate ones.” (page 6)

Finally the course provides the participant with teaching techniques and skills to ensure that they can enable learners to learn in an effective natural manner keeping stress to a minimum or avoiding it altogether. Miles (2004) emphasises the problems encountered by dyslexic learners. It is not just the dyslexic symptoms but also his stressful situations encountered in the world of learning for such individuals. These can range from physical recording problems to self esteem and ease of skills in aspects of communication, organisation, comprehension and so on. With Educational Kinesiology (Brain Gym) as Freeman (1998) quotes

“As different parts of the brain are stimulated through new movement and sensory experiences, the body relaxes, the child becomes better organized to deal with gravity, and internal organization often improvesLearning can be a joyful, stress-free process in which small, often subtle, daily advances can add up to considerable changes in the overall abilities of the students.” (page 17)

In a period of 12 months, the researcher-teacher taught the four day accredited Educational Kinesiology (Brain Gym) course to ten professionals, nine of whom were teachers. The course members were

- a professional musician
- a teacher who was working with the elderly as a movement therapist
- a counsellor working with mothers and their young children
- two are teachers in special needs schools
- a primary school teacher
- an art therapist also working one to one with children who have a specific learning difficulty and adults in rehabilitation post mental illness
- three teachers who work one to one with children who have specific learning difficulties

Monitoring the Course Members use of Educational Kinesiology (Brain Gym)

An evaluation was compiled interactively with the group of teachers on the 4th day of the course and on subsequent practice days. The following questions were asked

How have you incorporated it into your work?

What has been comfortable?

What has been difficult?

How confident are you?

What changes have you noticed in individual's since you began Brain Gym?

Ideas for overcoming logistics.

Recommendations.

(See Appendix 3B for detailed summary of these answers.)

Brockelhurst (2005), who received one of the '2005 Teachings through Movement' awards, had previously regarded herself as a movement specialist as she had taught physical education for 24 years.

"I had no idea of the connection between movement, the brain and learning. ...In experiencing Brain Gym for the first time, I witnessed the extent to which movement enhances learning.-and especially reading. For me, brain integration and reading had been the missing pieces in the puzzle." page 10.

Researcher-Teacher's Evaluation

Once the individual has completed the four days of attendance of the course then the next step is to proceed with the case study requirements. Practice days are held regularly. These provide support for those working towards completion of case studies.

- Eight course members have so far completed the Four Day Brain Gym course attendance.
- Four members wanted to master the skill of using the 26 movements and understanding the theory behind the development of Brain Gym. They were all classroom teachers and wanted to be able to implement the movements at any time during the school day. They do not intend to master the Five Step Balance Process nor complete the case studies. This limits the extent to which Brain gym will be effective with their pupils.
- Four members are working towards completing the case studies. These involve using the 26 movements and completing 12 of the Five Step Balance processes. (See Appendix 4F). Once this task is complete the teacher/counsellor has the expertise to use the Five Step Process Balance and work with pupils at a deeper neurological level.
- Discipline and time management are needed to master the Five Step Balance Process. This is the backbone of the four day accredited Brain Gym course.

By completing the case studies the teacher begins to master this process and can be confident in using the work with pupils, students or clients of all ages and dispositions.

(See Appendix 3C for comments from course members regarding their experience using Brain Gym)

Continual Professional Development

The course members fall roughly into three groups. The first are those who do not complete the four days. These members are invited to attend a future course to complete the missed days. The second group is comprised of those who complete the four day course. The final group is those who complete the 12 case studies. These teachers are then able to balance, individuals, whole class, small groups, themselves and other staff members. This third group is able to work with individuals, at a deeper neurological level than the other two groups.

Synopsis

The extent of professional development for these ten individuals varies enormously. One teacher completed eight hours of attendance while four course participants who completed the 32 hour course attendance and are working toward completing the 12 case studies. The latter's professional development training would have exceeded 100 hours or more. The researcher-teacher has observed that those who have completed the 12 case studies include movement automatically in their teaching regime throughout lessons.

Conclusion and Recommendations

It is important that those individuals who have the need for Brain Gym have access to it via the school or educational establishment. To have this situation the researcher-teacher recommends:

- At least one teacher in each school is trained on the four day course and completes the 12 case studies. This would enable the Five Step Balance Process and the 26 Movements to be used effectively with pupils and staff members.
- As learning problems can be the result of missed early stages of reflexive movement the earlier the children are exposed to Brain Gym the better. Hence it would be sensible to train early year's teachers and special needs teachers as a priority.
- All learning support assistants have at least one full day of Brain Gym training.
- Any specialist teachers who work in small groups, or one to one with a pupil, would benefit from the four day accredited course.
- Education authorities consider the possibility of employing an Educational Kinesiologist to work within schools in a particular area. This is recommended by Taylor (1998).

Chapter 4

Case Study of Pupil D

Aim of Chapter 4

The aim of this case study is to show how the Educational Kinesiology (Brain Gym) discipline helped Pupil D to develop an understanding of numeracy. Progress began to occur within a year which compares remarkable with the many years of specialized mathematics tuition, within a caring school environment, which Pupil D had previously received.

Introduction to Pupil D

Pupil D had been a happy talkative child but had experienced developmental problems from her early years onwards. She evolved little language by the age three, and from three years six months received speech therapy until beginning school at age four years and six months. On starting school she could not speak using full sentences. Her parents had been supportive and Pupil D had been encouraged to enjoy extra curricular activities such as Youth Club and Sunday School. She had always had a group of friends to play with although she tended to gravitate to children who were younger than her. Pupil D had not wanted to do any writing activities at home with her mother but loved having stories read to her, cooking, helping her father with animals on the farm and spending time with her grandparents.

Primary School

Due to excellent support from the school staff and her parents, Pupil D progressed with language during the first years in school. From Year 0 to Year 2 Pupil D was given specialised help with language, literacy and mathematics. This involved learning basic vocabulary, sentence patterns, role play in conversations, learning letters and blending. In mathematics it involved counting, 1 to 1 correspondence which the pupil found very difficult and early number bonds. (See Appendix 4A for WISC III psychological assessment and reading tests administered in Year 3.)

During Year 3 and Year 4 Pupil D was given one hour weekly of specialised mathematics instruction to help develop numeracy skills. In Year 5 and Year 6 she was given two hours weekly of specialised mathematics instruction.(See Appendix 4B for reading tests administered in Year 5.)

Despite the care and specialized mathematics instruction, Pupil D still had little concept of numeracy. Her teachers were always concerned about her difficulty in developing numeracy skills.

The targets set from Year 3 to Year 6 always contained the statements similar to

- to develop the concept of number,
- to develop the concept of number bonds to 10,
- to develop pattern recognition,
- to develop coordination
- to develop short term memory.

Secondary School

During Year 7 Pupil D received two hours of specialised literacy and mathematics instruction.

Involvement of the Researcher-Teacher

Pupil D was in Year 8 when the researcher was asked to teach her. The researcher-teacher observed that Pupil D's posture was affected by the Tendon Guard Reflex. She stood in a stooped forward position, with rounded shoulders. One of the first priorities of the researcher-teacher was to work with specialist movements from the Educational Kinesiology (Brain Gym) discipline to aid the release of the Tendon Guard Reflex. (See Appendix 4C) Pupil D would only answer yes or no to any conversation instigated by the researcher. The NFER Dyscalculia Screener (Butterworth,2003) was administered to pupil D and she was diagnosed as dyscalculic. This implies that she did not understand quantity. (See Appendix 4D page 1 to page 4.)

At all times Pupil D wanted to work with just her right hand. It was quite an effort to get her to successfully pick up anything with her left hand. Any arithmetic work entailed counting on her fingers. The researcher's understanding is that if a pupil is using fingers for counting then the Palmer Reflex is active. Before the child can progress with mathematics independently then physical activities need to be implemented to enable the Palmer Reflex to integrate. (See Appendix 4E)

The researcher worked with the pupil for one hour on a weekly basis. Learning through movement is an important aspect of school life. At the beginning of each lesson an Educational Kinesiology (Brain Gym) program was implemented. Once every half term a full Five- Step Balance procedure was worked through. (See Appendix 4F.) All the other lessons began with PACE followed by several appropriate movements from the Brain Gym selection. The mathematics lesson was then structured on the program developed by

Yeo (2003). The basis of this was using the visual integration of the X shape to represent the five dot program on a dice. (See Appendix 4G)

It was noted that Pupil D was unable at all times to place the patterns of numbers in a straight line. Her straight lines were in fact spirals. Investigating this further the researcher noted that Pupil D could not sketch the outline of a table, draw a triangle etc. Pupil D could draw over the researcher's Active 8 but could not draw this pattern herself from visual memory, nor could she copy it or other simple patterns. Pupil D could form the left side loop of the Active 8 but could not cross the midline and form the right hand loop. This helped to explain why the cursive script had been difficult for Pupil D to develop in primary school. (See Appendix 4H)

At the beginning, Educational Kinesiology (Brain Gym) movements were a challenge for Pupil D to learn to do with ease. It was difficult for her to be able to do the Cross Crawl or hold her hands in such a manner that the fingertips could touch lightly in Hook Ups. As the year progressed they became easier and she could remember how to do them correctly and confidently.

The researcher-teacher encouraged and helped Pupil D to set targets and goals to be used in the Educational Kinesiology (Brain Gym) Five- Step Processes.

Examples of Pupil D's goals were

- I am doing my History homework with ease and speed. For this goal the researcher used a Whole Body Balance using Dennison Laterality Repatterning.
- I am running fast when I need to in games. The researcher used a Whole Body Balance using Dennison Laterality Repatterning and a Seeing Balance.
- I like getting up in the morning. A Positive Attitude balance was used for this goal.

Annual Review Year 8

At the age of 13 years 4 months Pupil D's posture was now far more upright and she appeared to walk around the school with more confidence. There was no longer any sign of the Tendon guard Reflex. However the one handed activity still dominated every activity in the mathematics lessons. The parents were concerned that at times Pupil D did not want to attend school. Also at home after school she would be happy to just sit and relax rather than being active.

Progress in mathematics was happening as Pupil D was now able to remember and comprehend number facts to 10 and understand the concept of number to 20. However it was the researcher's opinion that attempting subtraction through 10 had not been appropriate or effective. The researcher was now of the opinion that it was best to avoid this concept for the present. Pupil D did not understand the concept of money and the researcher felt that this was still too advanced to introduce. Her parents were concerned that Pupil D be able to understand money, as it is such an important life skill.

Transition from Year 8 to Year 9

The challenge of developing Pupil D's perception and inability to form Active 8's (See Appendix 4H) needed to be addressed. For the remainder of Year 8 and for the first half term in Year 9 the researcher specifically worked on integrating the Tonic Labyrinth Reflex and Asymmetric Tonic Neck Reflex with Educational Kinesiology (Brain Gym) using specialized activities developed by Kinesiologist O'Hara. (See Appendix 4I) These activities have especially been developed as an extension to some of the Brain Gym movements and to encourage the integration of the midline reflexes of the body and visual midline. To begin with Pupil D could not perform these activities properly but as

they were practiced eye and hand movements became more co-ordinated. However it was impossible for her eyes to track upwards when a bean bag was thrown a little way above her head. The researcher -teacher had requested that some aspects of Educational Kinesiology (Brain Gym) to be used at home. It had to be accepted that this just could not materialize at this time.

Year 9

Yeo's structured mathematics program based of the X shape from the dice 5 was systematically taught along side the Educational Kinesiology (Brain Gym) activities.

Pupil D's parents positively and consistently encouraged her to be responsible for counting membership moneys at Youth Club and in Sunday School. She was also asked to handle the money when purchasing from the local village shop. At the beginning of the term the researcher-teacher observed that Pupil D was no longer using her fingers for counting or retrieving number facts to 10. The researcher-teacher extended these number facts as patterns through to 100 but without introducing sums which involved crossing the 10's. This avoided using borrowing and carrying concepts.

The researcher would have liked Pupil D to practice the number pattern games, which were used in specialized, lessons at home. Her parents explained that it was difficult enough to get her to go to school without being involved in playing short maths memory games with her at home as well.

Halfway through the first term in Year 9 the researcher observed that Pupil D began to be more confident with number patterns and money. Brain Gym activities were interspersed with every lesson and once each half term a 5 Step Balance was completed.

The researcher-teacher encouraged and helped Pupil D to set targets and goals to be used in the Educational Kinesiology (Brain Gym) Five- Step Processes.

In one of the 5 Step Balance procedures Pupil D specifically asked the researcher to teach her how to write quickly with cursive script.

Examples of Pupil D's goals were

- I am writing with cursive script. This time an XSPAN Balance(Dennison, 1997) was used.
- I am writing and thinking quickly. The Complete Wonder Wheel Balance (Dennison, 1997) was used to integrate this goal.
- I am tidying my bedroom, folding my clothes and putting them away each morning.

Annual Review Year 9

When Pupil D was 13 years 11 months the Researcher administered the NFER dyscalculia Screener during the second term in Year 9 and noted that the Pupil no longer fell into the category of being Dyscalculia. She now had a concept of number. (See Appendix 4J)

The Physical Education teacher report a significant improvement in Pupil D's co-ordination, ball handling ability, team work and enjoyment of ball games since the end of Year 7.

The researcher-teacher has observed that Pupil D will now laugh at jokes and her face and eyes show more expression. However, she does not engage in conversation other than answering yes or no to questions asked by the researcher.

As Pupil D could now understand aspects of money the researcher decided to use a NEXT retail catalogue as a form of developing confidence with money as a life skill.

Synopsis

Despite the intensive specialised mathematics help and care and consistent parental support that Pupil D had received during the first eight years of school she was still not able

- to cope with numeracy
- understand quantity as defined by the NFER Screener
- handle money as would be needed is a life skill.

Once Pupil D was able to experience the specialised Educational Kinesiology (Brain Gym) movements and 5 Step Processes along with numeracy program based on the X dice 5 concept she was able to begin to understand quantity, remember number facts, begin to understand patterns and the concept of money. All of this happened within four terms of the researcher-teacher being able to work once a week for an hour with Pupil D. This compares remarkably with the many hours of specialised care and specialized mathematics teaching that Pupil D had experienced during her first seven years of schooling.

As Ward (2003) discusses, it appears that the Educational Kinesiology (Brain Gym) movements enable learning challenges to be corrected. These challenges could be stress and trauma associated with school, the subject, teacher, or fellow pupils or any aspect of Pupil D's life. The fact that Pupil D has been able to progress with numeracy plus the bonus of improvements in games and sport highlights the importance of working first with movement. The movement has helped to optimize the various aspects of Pupil D's development. Pupil D has seen a positive advancement through developing some simple Educational Kinesiology (Brain Gym) movements.

If pupil D had had the opportunity to learn via Educational Kinesiology techniques in Early Primary Education years would this have made a difference and enabled her to progress more easily with numeracy?

Would the earlier availability of Educational Kinesiology 5 Step process from Brain Gym, Vision Gym and Creative Vision (See Appendix 4L) encouraged more right visual perception and more appropriate use of the left side of the body?

Pupil D's parents compiled a list of learning priorities for the following year, Year 10, specialized Mathematics lessons. (See Appendix 4K)

Conclusion and Recommendations

Use will be extended of the X dice 5 pattern to patterns of 10, 15, 20 to add and subtract through 10's. (See Appendix 4G).

This same X dice 5 pattern will be used to develop the concept of multiplying and using tables based of 5 times tables.

Once mastered the the X 5 pattern can be developed further. This assists the pupil to understand the quantities less than five, their relationship to each other and also the relationship between add, subtract, multiply and divide.

Ealey (2005) states that when an individual's WISC III scores fall below average it is important to choose activities relevant to that individual being taught or helped. Teachers, parents and other professionals need to teach the pupil aspects of literacy and numeracy via those particular interests. Pupil D had always expressed her interest in clothes from the NEXT retailer and her enjoyment of cooking.

Making use of the pupil's interest in NEXT clothes and catalogues will be used to reinforce the concept of money, budgeting and manipulating arithmetical problems using addition, approximation and estimation. Recipes and their quantities will be used to

develop numeracy further. The use of $\frac{1}{2}$, $\frac{1}{4}$, doubling, trebling and costing can be taught through recipes.

The researcher- teacher is concerned that Pupil D does not seem able to access effectively the right spatial visual perceptive area. Also the researcher –teacher notices that with many types of whole body movement Pupil D only uses the limbs, especially the arms, hands and fingers only on her right side. Pupil D makes virtually no use of the limbs on the left side of the body for specific tasks. For example, when picking up a book from the floor only the right hand will be used. The left hand is not brought in to help the right hand with the task. Also when playing cards at the desk Pupil D will only pick up cards with the right hand. The left is not brought in to help. Pupil D's mother reports that when ironing Pupil D cannot fold the garment. Pupil D also seems to be unable to keep her room clean by hanging clothes in the wardrobe or placing them in a drawer. Educational Kinesiology Balances (Vision Gym and Creative Vision disciplines), with goals to encourage the left side of the body and the right visual - perceptive area to be more active, will be used. (See Appendix 4L)

“One of the main reasons why children fail in school is that their nervous systems are not working at a complex enough level for the tasks they're being asked to achieve. We can never take for granted the miraculous process of learning movement, in which children identify their various body parts, determine what these can do, and learn to choreograph them with consciousness, according to prior plan.” (Ward, August 2003, page 12)

To encourage Pupil D to choreograph both sides of her body and the right visual-perceptual senses Educational Kinesiology movements from Brain Gym, Vision Gym and Creative Vision and the 5 Step Processes of Balances will continue.

The researcher-teacher's aim and hopes are that further neurological integration will occur enabling Pupil D to progress further with knowledge in and confidence of numeracy

Chapter Five

Case Study of Pupil A

Aim of Chapter 5

The aim of this case study is to describe the challenge faced by Pupil A in developing literacy skills. Due to a lack of space in the school it has not been possible to implement Educational Kinesiology (Brain Gym) movements as has been possible with the other case studies. This hampered the researcher-teacher's ability to use a combination of movement and phonic methods in the teaching practice.

The case study is written sequentially as time passes from when the researcher-teacher began to teach the pupil until the end of the research period with Pupil A. Information about the pupil, teaching methods used, assessments, psychological reports are detailed in order as time progresses and the information became available to the researcher-teacher. Detailed Appendices are included with tables of results and relevant reference material.

Introduction to Pupil A

The Year 1 teacher was anxious about pupil A's progress. Her brother had severe literacy challenges. The brother began to receive specialized help for literacy in Year 5. However he reacted against this help and it had to be withdrawn. Hence the classroom teacher was hoping the help would be available for pupil A earlier on in her schooling. It was known that the child's father could not read or write very well.

The teacher encouraged Pupil A to use of the computer as a means of recording words. Pupil A would copy the words that other children were writing, on to a word document

which could then be printed. The classroom assistant wanted help with techniques and ideas to use with the child in class. Both the class teacher and the teaching assistant were concerned about Pupil A's future and how she would manage to cope throughout her future schooling. They also wondered what they could do to support the parents in helping their child.

Pupil A's speech was clear with perfect alliteration and a wide diverse vocabulary. The pupil was a confident conversationalist willing to discuss a variety of issues and ask the researcher-teacher appropriate questions. She was courteous, well mannered and friendly.

The school had requested an Educational Psychologist's assessment. At the time of assessment by the Educational Psychologist Pupil A's chronological age was 6 years and 5 months.

The psychologist recommended that Pupil A receive one hour, per week, of specialized literacy support. The researcher-teacher commenced teaching the pupil, in school, at the beginning of Year 2.

Summary of the Educational Psychologist's Findings

Pupil A

- is a capable child
- has specific learning difficulties
- has difficulty copying patterns visually and orally
- reverses and distorts many letters and digits
- will often say "I can't" and is conscious of her difficulties

Targets set by the Educational Psychologist

- to know the sounds of the alphabet
- to be able to write the letters of the alphabet
- To form simple sentences.

Information from the Child's Parents at the End of Year 1

Pupil A's parents were very concerned about her inability to cope with literacy and her poor self esteem due to this. They were grateful that she would be receiving help from a specialized teacher. The father explained that he had been unable to write in school. It was such a relief when he taught himself how to write cheques. The father ran his own successful business.

Structured Multisensory Phonics Program Implemented by the Researcher-Teacher. Pupil A was Beginning Year 2.

- use a multisensory phonic literacy program
- teach vowels and then consonants
- record new letter sounds in the pupil's phonic book
- Read simple books with one or two words to a page.
- dictation involving simple sentences from "O Gam I Gam" p17 .For example "Mae gan Mam ham".
- Simple vocabulary exercises from "Camu'Mlaen" by Evans and Vaughan
- Make use of card games designed around the multisensory phonics lesson
- Leave any games from the specialized lesson with the school to use in class or at home with the parents.
- Make use of the computer in the classroom when appropriate.

(See Appendix 5A for details of these structured lessons)

Challenges Faced by the Researcher-Teacher

After several lessons, the researcher-teacher realized that she was facing a challenge. The simple lessons to look at a letter and say the sound associated with it did not work. Pupil

A could not read and remember a letter or remember the sound that went with it. To think of reading words was just out of the question. Pupil A could not record the shape of the word. She had poor co-ordination and had no idea which way the letters turned.

The school received a weekly plan from the researcher-specialist teacher to reinforce the one to one work with pupil A. However, as there were 30 children in the class between 3 and 7 years of age Pupil A could only receive a very short amount of individual help in the class.

Within several months, the researcher-teacher suggested that the school and parents ask for a full Educational Psychological assessment as Pupil A faced a chronic challenge in developing literacy skills. At the time of the assessment, the child's age was 7 Years and 8 months.

Summary of the Educational Psychologist Findings

- Confuses letter orientation d/b, l/f/t, u/n, m/n
- Struggles to blend the sounds of letters into words
- Knows about her difficulties. This has made her anxious and is undermining her confidence and motivation.
- Pupil A has specific learning difficulties not general difficulties

(See Appendix 5B for results of reading and spelling assessments.)

Recommendations and Targets Set by the Educational Psychologist

- Learn and recognize letters and digits
- Develop literacy skills

- Develop mathematical skills
- Develop self confidence and independence
- Develop keyboard skills to gain confidence in presenting other aspects of school work.
- Despite the well structured support from the researcher-specialist teacher a Statutory Assessment perhaps needs to be considered to:
 - a. Increase the specialist support to 2 lessons per week
 - b. Provide adult support in class for 2 hours each day to help develop recording and keyboard skills.

Brain Gym Intervention Program

On returning to school in Year 3 Pupil A had lost the ability to recognize the sounds and shapes of the letters of the alphabet. This was disappointing for the teachers and Pupil A felt devastated. The child's specialist lessons had been increased from 1 hour per week to two hours per week. The researcher –specialist teacher had to begin again with the child as if the child had never had any type of literacy lesson before. All aspects of the Multisensory Structured Phonics program were implemented. The researcher-specialist teacher also asked for a formal meeting throughout the year with Pupil A's class teacher and class support assistant.

Planning the First Brain Gym Intervention.

Due to the compactness of the school building there was no free room or space in which to teach the child other than a corner in the classroom or the school store room-staffroom where children and teachers passed through, answered the phone and used the photocopier. This was also a small room.

It was not at all possible to stand up and teach Brain Gym movements. Hence the only possible Brain Gym movements which could be implemented were those which could be done at the desk namely:

- Alphabet 8's to provide a structure for forming each individual letter of the alphabet.
- Active 8's to encourage eye-hand co-ordination, passing across the midline and encouraging the use of both visual fields.
- Double Doodles to encourage the use of both sides of the body without having to cross the midline.
- Dennison's (2003) method of mimicking cursive script and using rhombus, inclined at 60 degrees for individual letters and letter space between words.

Report from Meeting with Class Teacher and Class Learning Support During Term 1 in Year 3.

- Encourage and help Pupil A to form letters using Alphabet 8's.
- Teach the vowels again then the consonants.
- Record work on the computer to encourage key board skills.
- Concentrate on work from p15 to 17 of "O Gam I Gam".
- Cut out words from sentences, rearrange them and then re read them and glue them into the class or phonic book.
- SNAP games with letters and words from P15 to 17 of "O Gam I Gam".
- It was decided to meet again in 6 weeks.

Report from Meeting with Class Teacher and Class Learning Support Assistant at the Beginning of Term 2 in Year 3.

- Pupil A has high intelligence, understanding all aspects of class work and expresses and explains herself well orally.
- It is impossible for Pupil A to record any work legibly.
- The one to one individualized researcher-specialist teacher support gives her confidence.
- Due to the high number of pupils in the class plus the extra pupils in the afternoon it is impossible to give Pupil A any individual attention in the classroom.
- There is a tendency for Pupil A to take her frustration out on other pupils.
- Now remembers the sound and shape of most lower case letters of the alphabet.
- Cannot read many words well
- If she reads a sentence correctly it is because she has learnt it off by heart.
- Concentrate on getting her to know the 3 letter words on page 15 of “O Gam I Gam”
- Encourage cursive script based on Alphabet 8’s.

(See Appendix 5C for details of the Structured Multisensory Phonic program implemented with Pupil A during Year 3)

Planning the Second Brain Gym Intervention

Due to the researcher-teacher’s frustration at how challenging it had become to teach Pupil A, the researcher- teacher asked for permission to go to the Pupil’s home once per month and work with Brain Gym balances. It had been impossible to implement a systematic Brain Gym program as there was no available space in the school. The advantage was that there was enough space at home and also the child’s mother was

present to learn and understand the Brain Gym exercises. Pupil A's mother had been interested and supportive of the use of Brain Gym.

- The program would be aimed at encouraging the two eyes to work together effectively for reading.
- Both eyes focusing together at book reading distance.
- Hand eye co-ordination for writing cursive script.
- Whole body co-ordination to encourage Whole Brain Learning.

(See Appendix 5D for details of the Five- Step Process Balances.)

Observations

- Pupil A became confident in recognizing all the smaller case letters of the alphabet.
- The rhombus grid paper helped to space the letters and leave a space between the words.
- Pupil A had difficulty in leaving spaces between words. It was as if she did not know where words started and ended. Was she physically able to see the words?

Examples of Pupil A's writing during this period can be found in Appendix 5E. Luckily for Pupil A her oral skills were good and she survived in class with these good oral skills. The teaching staff were always sensitive to this and bought out her skills this way. In this 12 month period reading had not improved, comprehension had improved by 1 year and spelling by more than 2 years.

(See Appendix 5F for results of the reading assessment.)

There was now some small improvement in Pupil A's literacy skills but in comparison with her peers Pupil A was disabled when it came to developing literacy and being able

to participate in the classroom. The parents and school requested an assessment by an Educational Psychologist. Pupil A's age at the time of assessment was 8 Years and 8 Months.

Summary of the Educational Psychologist's Report

- Marked difference in her Verbal and Intelligence Quotient.
- Weakness in cognition for dealing with Verbal Information/Language Skills.
- Some compensatory strength in dealing with visual information.
- Low ACIDF profile on WISCIII.
- t/f and b/d/p confusion.
- Little progress over 2 years even with access to two hours of specialized support help plus support from school and home.
- Right hand and left eye dominance.
- Fine motor control/co-ordination is not a strength.

Teaching Methods used During Year 4

On returning to school after the summer holidays Pupil A was able to recognize and remember the letter sound combinations and some words. The researcher-teacher proceeded with a Structured Multisensory Phonic program based on "O Gam i Gam". (See Appendix 5I for a brief summary of the program implemented.)

Whenever possible Educational Kinesiology (Brain Gym) movements such as "Double Doodles", "Alphabet 8's", "Active 8's" were used. Two of the 5 Step Process Balances were implemented during the year. (See Appendix 5D for further details.)

During Term 2 and 3 Pupil began to record some aspects of the class lessons. The teacher was always sensitive to her needs and made the use of her acting ability and oral/verbal skills.

The parents and school requested a further Educational Psychologists assessment which was carried out at age 9 years and 2 months. (See Appendix 5G for results of this assessment.)

In the 6 months since the previous test the pupil's reading had improved by 1 year 3 months, comprehension by 3 months and spelling by 1 year. For examples of the pupil's handwriting during this period see appendix 5G page 3 to page 5.

Summary of the Educational Psychologist's Report

Pupil A is on the whole functioning a little lower than the average level of her peers. The results reinforce that she has specific learning difficulties. Her strengths are with visual short term memory and she has severe problems with sequencing. New concepts and skills should be introduced and reinforced with visual clues. The sequencing problem affects her understanding of the sequence of letters in words.

The Educational Psychologist has suggested that Pupil A be assessed by an Occupational Therapist and has subsequently referred her for this assessment.

Report from the Optician

During Term 3 of Year 4, following a discussion with Pupil A's parents, they forwarded the researcher-teacher a report by the optician. It explained that Pupil A had a squint in the right eye which is referred to as a lazy eye. This means that she cannot read large letters at either close or far distance with this right eye. However the other eye sees well. According to the optician as long as she is wearing her glasses she can see to read. The weakness in the right eye should not cause problems as the strength of the left should

make up for this squint in the right eye. The optician continued to explain that the only other problem was that Pupil A has a lack of depth perception as she could not use the two eyes together.

It is interesting to refer to Brown (2004) explaining that Educational Kinesiology (Brain Gym) activities can often significantly make a difference to the way a pupil processes visual information.

“Skills such as eye teaming (the cooperative use of both eyes), tracking, and focus improve naturally when we do Brain Gym movements and balances. These results in easier reading and processing of all kinds, and sometimes remarkable shifts in eye function as well” (Brown, page 10, 2004)

Synopsis

It is easy to see with this case study how quickly the years slip by with neither the dedicated school staff nor the researcher-teacher being able to obtain the current information of the diagnosis of “WHY” the pupil is having such chronic literacy problems.

To the researcher-teacher, this case study has elements of frustration as one cannot use the Educational Kinesiology (Brain Gym) movements to their potential, due to lack of space available in the school building.

Even though the parents want to, they have not the skills to be able to help the child with the literacy challenges she faces. Despite this there is some progress shown by the last reading and spelling assessment and the pupil can now do some recording in classroom environment independently.

Recommendations

- Ensure that the Occupational Therapy assessment is undertaken as soon as possible.
- There was no structured Welsh reading scheme, suitable and appropriate for Pupil A. Ensure that this type of necessary resource is developed.
- Organize as priority 2 Educational Kinesiology (Brain Gym) clinics per month as a matter of urgency.
- Continue with the Multisensory Structured Phonic program based on “O Gam i Gam”.
- Work towards Educational Kinesiology (Vision Gym) movements and balances as a direct response to the information from the optician.

Conclusion

The researcher-teacher has found this teaching assignment a challenge. The balance between Educational Kinesiology (Brain Gym) and Structured Multisensory Phonics cannot be met due to lack of available space in the school building. The assignment is also frustrating as it appears to take many years to diagnose where the learning challenge is originating from. In the meantime, the pupil is passing through primary school and starting to worry about how she will cope and survive in secondary school.

Chapter Six

Case Study of Pupil C

Aim of Chapter 6

The aim of this case study is to show how the combination of Educational Kinesiology (Brain Gym) and Structured Multisensory Phonics Program worked effectively and efficiently to develop the pupil's literacy skills.

It was written sequentially as time passes from when the researcher-teacher began to teach the pupil until the end of the research period with Pupil C.

Information about the pupil, teaching methods used, assessments, psychological reports are detailed in order as time progresses and the information became available to the researcher-teacher. Detailed Appendices are included with tables of results and relevant reference material.

Introduction to Pupil C

Pupil C was having a challenge learning to read and write. Pupil C had an older brother who had had difficulty in acquiring literacy skills. Her older brother had attended several different secondary schools and had completed Year 12 but still found reading slow and painful. Pupil C's father conversed with her in Welsh and her mother used a medium of English and Welsh. She conversed with her brother through the medium of English.

Pupil C's parents felt that in spite of her apparent verbal skills she was struggling with basic literacy tasks. She was reversing letters, handwriting was slow and letters poorly formed. Pupil C found it difficult to concentrate and could not focus or give attention to a

task for very long. Pupil C's school had recently implemented an individual educational programme and she did receive some extra support in class.

Pupil C was 7 years 0 months when the parent asked the researcher-teacher to work with the pupil. It was agreed that a program which combined Educational Kinesiology (Brain Gym) and Mutisensory Structured Phonics would be implemented to support the pupil's development of literacy skills. The researcher-teacher worked 1 to 1 with the pupil once per week in school. An Educational Kinesiology (Brain Gym) clinic was held at approximately 3 monthly intervals with a parent present.

The parents had organized for a Psychological Assessment. The test was conducted through the medium of English. At the time of the assessment, the pupil's chronological age was 6 years and 10 months. (See Appendix 6A for results of the WISCIII and WORD Basic Reading assessment.)

Summary of the Educational Psychologist's Findings

Pupil C had a high range of abilities with stronger verbal skills over performance. Her Mathematical skills were reasonable but reading, spelling and writing were below average. Her pen grip was strained with erratic letter production at a slow speed.

The child also faced problems with left to right, sequencing, coding, reversals and both short term auditory and visual sequential memory. These together with familial factors, indicate a moderate dyslexic condition. This affected the pupils reading, writing and spelling skills. There were further problems with concentration, and attention to task.

Challenges Faced by the Researcher-Teacher

One of the main challenges of the researcher-teacher was in obtaining a consistent, dependable and reliable liaison between the parents and working privately, for one hour

each week, during school hours with the pupil. Despite the care and concern from home it was a challenge to have a consistent commitment from the parents. The parents tended to flood the researcher- teacher with emails because of concern about many aspects of their child's education in school or have no communication at all for months on end.

One of the recommendations from the psychological assessment was that Pupil C had extra support in school with literacy development. While the school gave permission for the teacher-researcher to teach Pupil C for one hour, once per week, there was no interest shown in professional dialogue between them and the researcher-teacher. Towards the end of 12 months a meeting was organized with the school, researcher-teacher and the parents. The researcher-teacher felt that the meeting was not run very professionally. It took 2 years before the researcher-teacher felt that there was an active mutual professional respect between Pupil C's parents, the school and the researcher-teacher.

Structured Multisensory Phonic Program Implemented by the Researcher-Teacher. Pupil C was Beginning the 2nd Term in Year 2

- Use of a multisensory phonic literacy program.
- Recognition of vowel letters and their corresponding sounds.
- Developing the pupil's phonic book.
- Read simple books with one or two short lines to a page.
- Dictation involving simple sentences from "O Gam I Gam" p17 .For example "Mae gan Mam ham".
- Simple vocabulary exercises from "Camu'Mlaen" by Evans and Vaughan.
- Make use of card games designed around the Structured Multisensory Phonics lesson.
- Leave any games from the specialized lesson with the school to use in class or at home with the parents.

- Implement basic Educational Kinesiology (Brain Gym) movements such as Double Doodles, Active 8's and Alphabet 8's.

(See Appendix 6B for examples of the pupil's written work during these structured lessons.)

Educational Kinesiology (Brain Gym) Intervention Program

The researcher –teacher was eager to help overcome the continual wriggling that occurred when Pupil C was supposed to be sitting still in lessons. It was likely that this was a reflexive action as a result of Reflexes being active. (See Chapter 1 for information about reflexes.) The parents and Pupil C were taught specialized movement activities to help encourage the integration of these reflexes. Also, the specialized Educational Kinesiology (Brain Gym) balances encouraged Pupil C's whole body co-ordination to work in such a way to aid academic learning to become natural and efficient.

In school, the researcher-teacher and Pupil C worked in a small office. There was room to move with an outlook across fields. Hence it was possible to begin each structured phonics lesson with PACE and one movement from each of the 3 Dimensions in Educational Kinesiology dimensions. (Dennison, 1997)

Also, when an appropriate Educational Kinesiology, 5 Step Process Balance, was requested by the pupil, it could be carried out before the commencement of the Structured Multisensory Phonics program. As Pupil C became familiar with the movements she began to suggest which movements she would like to do.

The parents were fully supportive of the Movement (Educational Kinesiology) and Structured Multisensory Phonic Literacy support program carried out by the researcher-teacher. At times they used the movements at home, but there was a limitation to what could be reinforced at home with regard to literacy skills.

As the months went by Pupil C became less fidgety in the chair during lessons. By the end of Year 2 she was sitting quite still throughout each lesson. The researcher-teacher assessed Pupil C's reading and spelling in Welsh towards the end of Year 2. (See Appendix 6C for the results.) The pupil's reading, comprehension and spelling levels were one year below her chronological age.

Structured Multisensory Program Implemented by the Researcher-Teacher. Pupil C was at the Beginning of Year 3.

Chronological age of the Pupil was 7 years and 9 months.

- Double letters from the Welsh alphabet
- Read the series "Speic", "Storiau 'r Sospan Fawr", and stories that go with "O Gam i Gam", "Llyfrau Powics", "Llyrau Sionc"
- Dictation from "O Gam I Gam" by E.Griffiths.
- Word games such as Stile reading and matching words with pictures and corresponding words, SNAP,CURO DAU, NEWID.
- Dictation using the structured phonic program from P65 to P 90 from "O Gam I Gam" by E. Griffiths.
- Use of Brain Gym movements in every lesson to aid eye hand co-ordination and automatic access across the visual midline.
- Active 8's and alphabet 8's as a pre activity to mastering cursive script.

Pupil C's Progress.

As the year progressed, the pupil worked systematically through the Multisensory structured Phonic Literacy Program. Pupil C's spelling and handwriting improved and the pupil began to use cursive script. Examples of the pupil's handwriting during this period can be found in Appendix 6D.

Also at about this time the school began to be more willing to work with the teacher-researcher and asked the researcher-teacher to assess Pupil C's Literacy and Mathematical skills. In the 12 month period Pupil C's reading age had improved by 12 months, reading and understanding by 1 year and 6 months and spelling by 1 year and 3 months. (See Appendix 6F)

Results of the nfer NELSON Dyscalculia Screener (Butterworth, 2003) can be found in Appendix 6G. This report indicated that Pupil C was performing badly in arithmetic but she was not categorized as dyscalculic. This screener also suggested ways in which the school could approach mathematics with Pupil C to ensure that her confidence increased in the subject.

Structured Multisensory Phonic Program Implemented by the Researcher-Teacher. Pupil C was at the Beginning of Year 4.

- Understanding and working with the dictionary.
- Writing daily entries into a diary.
- Welsh Consonant digraphs and vowel digraphs.
- Development of cursive script using "double doodles", "active 8's" and "alphabet 8's".
- Punctuation.

- Reading from “Llyfr Mawr I Blant” gan Williams and Thomas.
- Reading using series “Cyfres Straeon Cymru”, “Llyfrau Lloerig”.
- Comprehension “Cyfres Clic”.
- Word games such as Stile, Snap, Newid.

Pupil C’s Progress

Pupil C became very adept at using Educational Kinesiology Movements. Examples of the pupil’s handwriting during this time can be found in Appendix 6H.

During the winter term of Year 4 the Educational Psychologist assessed Pupil C after a request from the school and parents. (See Appendix 6I for the assessment details.)

In the 5 month period the pupil’s reading skills had improved 9 months, comprehension had improved 12 months and spelling 1 year and 3 months.

Pupil C’s number skills were reasonable as they fell into the 47th centile.

The Educational Psychologist emphasised the need to give attention to Pupil C’s literacy skills in English.

Summary of the Educational Psychologist’s Findings

Pupil C functions generally in the average ability range of her peers have many of the patterns associated with dyslexia. For example, sequencing and short term memory.

Despite showing signs of these characteristics they are not preventing Pupil C developing literacy skills. (with the exception of English spelling). The pupil also uses strategies well to help her cope with her learning.

It is important that Pupil C’s educators are aware of her dyslexia when teaching her new skills and concepts. Reinforcement will be necessary to ensure Pupil C’s mastery of new skills and concepts.

Synopsis

Pupil C progressed well throughout the two and a half year period in which the research-teacher was involved. While it did not exist at the beginning, excellent team work developed between the school, researcher-teacher and the parents. At most times “all hands were on deck” to enable Pupil C’s education to progress as naturally and efficiently as possible.

By reference to Appendices 6B, 6D, and 6H one can see how the printing developed into cursive script and how the pupil managed to master vowels, double letters, vowel digraphs, longer words plus more complicated sentences.

One also observes in Appendix 6D that the pupil has not yet mastered the double “nn” and the Welsh vowel digraph “wy”. As Pupil C continues to work with Educational Kinesiology (Brain Gym) then the visual memory for these spellings will probably also develop.

The child now copes well in class with all written and reading work through the medium of Welsh.

Recommendations

As stated by the Educational Psychologist, it is now important to concentrate on helping Pupil C to develop literacy in English. It is possible that these skills will develop quickly if a similar combination of movement and phonic program that has been used for Welsh is implemented in English.

- Concentrate on developing English skills.

- Teach Pupil C to use the 5 Step Balance Process to balance herself and friends.
- Use the movements on a daily basis before concentrated learning sessions.
- Continue with 5 Step Process Balances every 2 months or when they are needed.
- Review the progress in Welsh literacy in 6 months time to ensure that it is developing as expected, without the intervention program.

Conclusion

To the researcher-teacher this was an ideal teaching assignment. The intervention intention was to help the pupil develop literacy skills. As far as the researcher-teacher was concerned, the balance between Educational Kinesiology (Brain Gym) activities and the traditional structured phonics lesson could be met.

Through the Educational Kinesiology 5 Step Process Balance (see Appendix 4F) stress issues, faced by Pupil C, could be addressed if the pupil so desired, for example by getting the horse or dog to obey commands, dealing and coping with friends' arguments and helping members of the family to eat healthily. At the same time these balances addressed subtle brain-body co-ordination issues.

The pupil was introduced to the movement activities at a very young age (6 years). She has developed a genuine like of the Educational Kinesiology (Brain Gym) movements and is happy to do them herself when she feels the need. The pupil is now involved actively in the movement processes which will be of aid as she turns to guidance in the development of literacy skills in English.

Chapter Seven

Case Study of Pupil B

Aim of Chapter 7

The aim of this study is to show how the Educational Kinesiology (Brain Gym) discipline helped Pupil B to develop academically and progress through Year 4 to Year 9 despite severe learning challenges. The case study is written sequentially from when the researcher-teacher was first asked to advise and help Pupil B's parents. Information about the pupil, teaching methods used, assessments, psychological reports and examples of the pupil's work are detailed in order as time progresses and the information became available.

Specialized recording techniques were introduced from Year 5 onwards. Pupil B and his parents embraced the use of Educational Kinesiology (Brain Gym) and its techniques were woven into Pupil B's life and study. The child understood from Year 4 onwards how important specific movement techniques can be to encourage neural integration which in turn helps academic learning to be natural and efficient. This knowledge encouraged Pupil B to pursue karate, street hockey, basketball, archery, swimming, kayaking and hill walking as leisure activities.

Introduction to Pupil B

As a small child Pupil B had enjoyed games and play activity prior to commencing school. Pupil B had always been a happy and healthy child although he had suffered a severe ear infection at the age of two and a half. It is interesting to note that Pupil B's

father was dyslexic but this was not diagnosed until he was 50. The father then subsequently completed a university degree.

Primary School

Year 0 to Year 6

Pupils B's parents became concerned about his reading during Year 0. In Year 2 they were reassured by the SENCO that he was not dyslexic due to his general knowledge and ability to cope with the class curriculum, plus his enjoyment of school. The child spoke Welsh with one parent and English with the other. Each parent spent time reading to and with the child in their respective languages. Each parent spoke their respective first language to the child. Hence the child was brought up in a bilingual environment.

In Year 2 the child complained bitterly about not being included as one of the main characters in the Christmas pantomime. Pupil B found it boring and frustrating being forced to sit for 2 hours, each day, and watch those who were taking part, practise. See Appendix 7A for the school's report for Year 0 to Year 2. There were no indications of any underlying learning difficulty.

At a parent teacher evening in Year 3 the class teacher complained about the child's disruptive behaviour. The child was often made to stay inside during play times to complete writing exercises that the rest of the class had finished. Examples of the child's writing during Year 3 can be found in Appendix 7B.

The parents eventually asked the school to arrange for a Psychological Assessment which was given at the end of Year 3. (See Appendix 7C). The school was unable to source any specialized help for the child as the discrepancy between the child's actual age and reading age was less than 2 years and 6 months. Specialized teaching methods needed to be drawn from the skills of the school staff and the pupil's parents.

During Year 4 it became obvious to the parents that the child, compared to his peers, was having trouble playing sports such as football and doing gymnastics well enough for the standard expected by the games teacher. On the afternoons when the school had timetabled swimming lessons the child would come home from school with his hair dripping, wearing no underwear, no socks and without his shoes tied. He was reprimanded by the games teacher for being the last to change and get to the bus which took the children back to school. Despite this the child enjoyed going to school and had friends to play with both in and out of school. He enjoyed the company of other children

Two months into Year 4 the parents contacted the researcher teacher and asked her whether she would be able to help the child at a professional level. Within the first month of Year 5 the class teacher asked to see the child's parents as she was so concerned about the lack of work the child completed in class.

Recording Mathematics

The researcher teacher worked with particular Educational Kinesiology (Brain Gym) techniques and also helped the child to record the mathematics which was set in class. This at times involved showing and encouraging the parents to help with the recording of mathematics and also how to integrate appropriate aspects of the Educational Kinesiology (Brain Gym) balances into the child's daily educational processes. (See Appendix 7P)

According to the Year 5 teacher Pupil B seemed unable to copy any work from the white board or from a text book into his own exercise book. If he did try to do this, then it took a long time and this explained why he could not complete the exercises in the given class time. The researcher noticed that Pupil B understood the maths but was not able to record it. If pupil B was forced to copy from the text book to the exercise book as it took a painstakingly long time. Orally Pupil B was able to answer and explain all aspects of Year 5 mathematics.

Enlarged photo copies of the exercises, set in school, were made by the researcher-teacher and the child filled in the answers and completed all mathematics work in this way. The parents organized that copies were made and glued into the child's maths book prior to the teaching in school. This way the child could complete tasks at the same time as the rest of the class. It was the researcher teacher's opinion that the child understood the concepts of the mathematics but had trouble recording the mathematics. (See Appendix 7D)

In Year 6, the researcher teacher continued to help the child on a weekly basis. Approximately once every month the researcher-teacher worked with the child and one of its parents in an Educational Kinesiology (Brain Gym) clinic session (See Appendix 7P) balancing the child for specific goals using the Five Step Process. (See Appendix 4F) Movement work and different approaches to helping the child progress through education were discussed and often implemented via the parents.

Pupil B always co-operated and was happy to work on a daily movement program using techniques suggested by the researcher-teacher. Pupil B had wanted to learn the piano and passed the beginners introductory Grade 1 Music exam. However no amount of practice enabled him to develop the skill of piano playing. He was able to learn to read the music but at times omitted notes or reversed their interpretation. Pupil B enjoyed swimming but had to try and try again for each swimming badge. On some occasions he would be visibly distressed that he had failed a swimming badge when the other pupils passed them so easily.

The child went to karate lessons each week, and often twice a week. The child enjoyed this self defence sport and it was thought it would help his co-ordination. It was not a competitive sport and did not use a ball. Both of these aspects had been the problem with football. In Karate Pupil B progressed at his rate which seemed ideal for this child.

Since the beginning of Year 5 the child had wanted to go to roller blade hockey but was unable to roller skate. His parents had spent many hours helping him to balance and eventually he was able to begin the sport.

During Year 6 the researcher teacher helped prepare the child for SATS Key Stage 2 external exams. The child had trouble producing table facts quickly, reversed numbers and had trouble setting out arithmetic problems in rows and columns. Mental maths test were ordeals for the child but the researcher helped him to develop techniques to deal with the paper as best as possible. Reference to the low Coding and Digit span tests in the WISC III assessments (See Appendix 7C and 7F) explains why the pupil had so much difficulty with mental maths, spelling and recording.

As the child had severe difficulty recording he was permitted an amanuensis in the SATS exams and achieved respectable grades. The child enjoyed the challenge of the exams and took them in his stride. He achieved respectable grades in all four subjects. (See Appendix 7E.)

The researcher observed that the child often appeared to round his shoulders and stoop forward. This is an observable feature of Tendon Guard Reflex, (See Appendix 4C) which is an indication of stress. The child also stated on several occasions that he really wanted to swear at the games teacher, due to the manner in which he was treated and shouted at and made to feel foolish. The child however still enjoyed the aspect of being in school and the relationship with the other children and school staff.

In Year 6 the parents requested an assessment by the educational psychologist prior to Pupil B commencing secondary school. The parents also arranged an assessment by an Occupational Therapist. The child was diagnosed as dyspraxic and referred to the paediatrician. (See Appendix 7F)

Secondary School

Year 7

As a result of the Dyspraxia diagnosis the child was put on an educational statement at the beginning of Year 7. This meant that there was 10 hours of help with recording information in class and access to the use of a laptop along with typing lessons.

The researcher –teacher continued to work with the child with mathematics. Educational Kinesiology (Brain Gym), and counselling and advising the parents when they asked for guidance. A daily movement program was implemented at home by the parents plus the researcher –teacher balanced the child using the Five- Step Process (See Appendix 7P) every six weeks or so. The researcher-teacher had no direct experience with the school. However the parents had several specially arranged meetings with the school during Year 7. The SENCO was supportive at all times but the decisions of several teachers had to be questioned. Despite a level 5 in the Key Stage 2 SATS exam Pupil B was put into the lowest Science class in Year 7. He soon became very bored. After a request from the parents and support from the educational psychologist Pupil B was moved to the top Science group.

Pupil B also continued to play hockey and attend karate classes and joined in every sports activity possible in school. The school also included Pupil B in the rugby team. This was significant and important to pupil B.

Pupil B coped well with the mathematics topics but had trouble completing arithmetic problems quickly. (See Appendix 7G) Arithmetic and mental maths brought his average mark down. It was now possible for him to complete mathematics homework without his parents sitting with him. Whenever possible, the maths was photocopied so that Pupil B could record on to the sheet as he had done in Year 5 and 6. The parents helped by recording when the writing was a burden to the pupil.

Mental mathematics was a problem. Completing the problem in a short space of time seemed impossible. This had been foreseen by the educational psychology assessment WISC III. (See Appendix 7C and 7F) The pupil would also be stressed as this activity was becoming a failure activity. Under stress and panic his thinking would not be so clear. The maths reports tended to state “needs to learn tables” or “revise”. Sadly, these types of comments show the lack of understanding regarding the pupils learning challenges and coping strategies. (See Appendix 7G)

Pupil B read fluently in both English and Welsh. The child enjoyed reading novels in both languages and enjoyed the excitement and imagination that the stories brought.

In English and Welsh, the classroom assistant was able to help with recording work. At times Pupil B would use a laptop. The mark given for typing stories and comprehension answers was usually less than the mark given for the work recorded by the classroom assistant. The physical co-ordination needed to type drowned the creative, language and logical skills.

Pupil B achieved well in French. He consistently obtained good grades. There is less recording to do in French and more emphasis on the oral aspect, listening and reading. The French teacher seemed to have an intuitive understanding of Pupil B’s learning challenges. The problems associated with recording and quick response appeared to vanish as the teacher taught in a manner which avoided these issues and developed Pupil B’s confidence and enjoyment of learning a foreign language.

During Year 7 Pupil B was suddenly able to remember sequences such as days of the week and months of the year. This had been a challenge. Pupil B had not been able to remember the sequences of days and months in English or Welsh despite his parents and teachers teaching them again and again. Suddenly, Pupil B knew the order of days and months in English, Welsh and French. It is possible that the sequences of moves in the

katas in karate and their continual practice by the pupil contributed to Pupils B's mastery of sequencing which had previously been impossible to master.

Pupil B enjoyed music and was able to have lessons in learning the trumpet rather than the piano. It was difficult, especially timing and rhythm.

Year 8 and Year 9

The researcher-teacher continued to work with the pupil and parents as an advisor, counsellor and educational Kinesiologist (Brain Gym). For all subjects the researcher-teacher insisted that the pupil used exercise books with larger space between the lines. This left more space for co-ordinating handwriting.

English and Welsh

In English and Welsh the classroom assistant recorded for pupil B. At times the pupil recorded using a laptop computer. However, in Year 7 there was a significant difference in the pupil's mark for typed exercises compared to those recorded by the classroom assistant. The physical effort of co-ordinating for typing seemed to rob Pupil B of expressive and creative quality. Also, the spellings were often incorrect and the teachers seemed to take marks away because of this. (See Appendix 7H)

The pupil had the use of the laptop and while this was useful it was not an appropriate method to use when examining the pupil in the subjects of English and Welsh. Typing involves co-ordination. Pupil B is dyspraxic hence typing is also a test of the co-ordination disorder. One needs to be able to spell to type correctly. When typing pupil B makes numerous spelling mistakes. Pupil B has specific learning disorder and hence judging the child's spelling and taking marks off for incorrect spelling is also testing the

disablement. (See appendix 7C and 7F). Hence in English and Welsh when the pupil was examined through typing then he was penalised doubly for disabilities.

The parents became concerned post the Year 7 and 8 English exams when the pupil was given a very low mark for typed English answers. (See Appendix 7H pages 1 to 4). The researcher-teacher and parents had expected Pupil B to have an amanuensis in these exams. The pupil had received an amanuensis for the comprehension paper in Year 8 and received a respectable mark. (See Appendix 7H page 5). However in the typed paper he received only 1 out of 17. A period of negotiation followed and the parents met with SENCO, the English teacher and also wrote to the external SATS examiner. Several months later the pupil sat an English mock paper and was granted an amanuensis. He received a very respectable mark for this exam. (See Appendix 7H pages 6 to 8).

At the end of Key Stage 3 the pupil had an amanuensis in the English SATS exam and obtained Level 7. If the parents had not pursued this case the pupil would have had been placed under a glass ceiling where it was impossible for him to express himself without being penalised for a spelling and co-ordination disorder every time. He would not have ever have been able to break through the glass ceiling which had been imposed on him due to his co-ordinating problems. How would this have effected the pupil's enjoyment of the subject, morale and belief in his own ability to express and create exciting and interesting stories in English?

English and Welsh Handwriting

When time permitted Pupil B was keen to record and write. It took a long time to do this but Pupil B was always keen to persevere. (See Appendix 7I)

Mathematics and Recording

Pupil B indicated that he wanted to record the answers to mathematics tests himself and this was implemented. During term 2 of Year 8 the mathematics teacher suggested moving Pupil B to a lower set for mathematics. The parents had to explain to the mathematics teacher that Pupil B had not been given enough time to record all the answers in many of the mathematics tests. (See Appendix 7J) The teacher then agreed that Pupil B be given enough time in future mathematics tests to complete the paper.

There was a change of teacher in term 3 and the new teacher suggested that Pupil B attempt to record for himself in mathematics lessons. The teacher provided Smart Board paper copies of lessons and exercises for Pupil B. Pupil B gained an immense amount of independence and self esteem due to his own recording. He was now able to record in the mathematics lesson and in the mathematics tests. This process continued throughout Year 9. See Appendix 7O.

Mental Mathematics

Towards the end of Year 8 Pupil B was obtaining low marks for the mental mathematics tests. The researcher-teacher decided to turn this type of exercise into a fun game called “Head Maths”. This turned the idea of mental mathematics tests into a hilarious fun occasion. The parents were also encouraged to play this game with Pupil B. As the Year progressed the pupil’s marks for mental maths improved continuously as Pupil B gained confidence with this aspect of mathematics. What had become a panic was now an enjoyable game. The marks improved as this activity became less stressful. After the SATS Mental Maths test Pupil B declared that this type of test was a very effective way of increasing ones percentage mark.

The researcher-teacher administered the Dyscalculia Screener (NferNelson, Butterworth, 2004, see Appendix 7K) to Pupil B. Pupil B did not score as a dyscalculic pupil.

However the results did pick up the same challenges as previously discussed from the educational psychologist's report. (See Appendix 7c and 7F)

Science

The classroom assistant continued to record for Pupil B. However at home the pupil began to complete science homework by recording independently. Pupil B's spelling in Welsh was much improved and the Science teachers were able to understand Pupil B's self recorded handwritten homework. (See Appendix 7M) Pupil B also stated that he was aiming to record in Physics himself. Pupil B enjoyed Science and was aiming to study the subject at AS and A Level.

French

Pupil B continues to enjoy success in this subject and has chosen it as a GCSE subject. The French teacher was pleased with Pupil B's wide vocabulary, ability and interest in the subject. Pupil B also made good use of audio tapes to reinforce the oral and aural aspect of learning French.

Music

Pupil B continues to persevere and enjoy learning the trumpet. He is working towards Grade 2 trumpet examination.

Key Stage 3 SATS Exams

Pupil B was granted an amanuensis for English, Welsh and Science at SATS Key Sage 3. The pupil was happy to complete the Mathematics exam with his own hand. The pupil approaches any testing or examination as a challenge. He is prepared to revise and work

hard to complete the necessary work for success. According to his parents, he sleeps soundly at night and calmly approaches any testing situation whether it is in school or connected with sport. The child succeeded well at Key Stage 3. (See Appendix 7N)

Synopsis of Handwriting Challenges.

The child had been in school for nearly 7 years and was suffering horrific challenges with handwriting. The parents eventually read about dyspraxia and organized for an assessment by an Occupational Therapist. The pupil was diagnosed as dyspraxic and the vital, academic life saving support was then provided on the transfer to secondary school.

From the beginning of Year 2 it was obvious that the child was having difficulties with handwriting. These difficulties became worse as the child progressed through primary school. (See Appendix 7M) The child's Year 3 and Year 4 teacher told the parents that he could not teach cursive script well enough to the children as he had had handwriting problems himself. Hence as pupil B's teacher he was unable to specifically help the pupil with his severe writing difficulty. Now and again another teacher came and gave handwriting lessons to Pupil B's class. Pupil B received no specific specialized help with handwriting skills during primary schooling.

The child's class work was continually being assessed with his own recorded attempts. In Year 6 the psychologist report stated that the child worked within the average high ability range in comparison with children of the same age. Towards the end of Year 6 the parents paid for a teacher to record some lessons for the pupil. It is interesting to study the child's stories which were recorded for him by the teacher. The pupil's own handwritten stories are hampered by the co-ordination difficulty.

It is interesting to note that the school did not include handwriting skills on any of the Individual Lesson Plans. It seemed to be left up to the pupil to decide what type of writing he was to use.

It is the researcher-teacher's opinion that if there had been a consistent policy, and expertise to implement such a policy, then the chronic handwriting problem which developed would not have become so severe.

After the occupational therapists assessment showed that there were severe motor problems the child was assigned 10 hours of help with recording. Hence in Year 7 the child completed work in class by dictating it to the assistant who recorded for him. At the beginning of Year 8 the pupil asked the researcher teacher to help him write with cursive script.

Use was made of 'Active 8's', 'Double Doodles' and 'Alphabet 8's'. (Dennison, 1997) Important to this development were the five Step Balance balances. Also large spaced line writing paper was used. This resulted in a far more satisfactory attempt at recording for the pupil. During Year 8 and 9 the child became braver and attempted various homework tasks with his own handwriting. This was far more successful than any previous attempts. However it is a time consuming laborious task. However Pupil B has gained some independence and can attempt certain work without depending on a writer to do it.

Pupil B has learnt touch typing which helps the look of presentation. However the motor co-ordination involved in typing detracts from the pupil's ability to be creative. If the answers are recorded by a writer then he always achieves a far higher mark than if they were typed.

Pupil B has successfully become independent in all aspects of mathematics, apart from depending on the teacher to run a printed copy of the "Smart Board" lessons presented to the class. The pupil is given double time to complete mathematics papers. This has been a boost to his self confidence and he is seriously considering studying mathematics At A Level.

The researcher -teacher has suggested that Pupil B practices copying from the board without looking at what he is writing down. The aim is to keep his eyes focused on the board from which he is copying from. A structured spelling program in English was introduced by the researcher-teacher towards the end of Year 3. The parents were asked to help introduce and reinforce part of the program with a daily 10 minute session. Previously phonic programs have not worked particularly well for Pupil B. The Educational Kinesiology (Brain Gym) program is slowly helping and building confidence in the pupil's ability to access visual memory skills.

The Role of Educational Kinesiology (Brain Gym) Balances and Movement Program.

Stress

In Year 5 when the researcher-teacher began to work with the child the Tendon Guard Reflex was obvious. (See Appendix 4C) The child would often stand bent forward with his head drooped and not want to look the other person in the eye. The researcher-teacher incorporated lengthening movements into the Five Step Balance process (See Appendix 7P) to encourage the lengthening of the connective tissue so that the child would develop fine upright posture.

Apparently during Year 1 or year 2 Pupil B began to wet the bed at night. This had never happened before. This apparently went on for 18 months until the parents sought help from an Applied Kinesiologist. Within weeks the child was dry again during the night and able to go to school camp during Year 3. The Spinal Galant Reflex may have been reactivated. This could have caused pressure on the child's bladder. Why did this problem occur at age 6 when it had never been an issue previously? Perhaps the stress of realizing that he could not write, read or spell as his colleagues could caused a "shock and stress" condition in the child's body-mind system which in turn reactivated the Spinal Galant Reflex, causing pressure on the bladder.

Confidence

Pupil B has a confident and methodical approach to exams. He understands how important revision and practice are. Pupil B seems to cope with the poor marks he has received at times for classwork and examinations. For example the English essay in Appendix 7G. Luckily these types of marks have not turned him against the subject or away from the belief and hope of obtaining a good result next time.

Pupil B enjoys reading novels in both English and Welsh and always has a book on the go. He has an interest in WARHAMMER games and reads and studies the manuals and rule books. He also enjoys painting the models that go with these games. This is an indication of an improvement in fine motor skills.

In Year 9 Careers lessons, he has been encouraged to aim high and is presently considering a career in dentistry.

Communication

Pupil B has numerous friends. He is able to keep in contact with friends from primary school as well as new friends from secondary school and contacts from sport and leisure activities. Pupil B organizes to meet up with friends and writes letters to pen friends, grandparents and cousins. Pupil B is keen to train as a leader for the Urdd youth camp movement and gain life saving qualifications to enable him to work in the local sport and leisure centres.

Pupil B sees Educational Kinesiology as a self help system. Through performing and repeating the movements he is aiding and encouraging his own neural integration. It has become a discipline and he knows when to use it to help himself learn. For example in

exams he will look at an X to stimulate his thoughts when feeling weary or in a panic. Pupil B will also have a short break and do some Brain Gym when he feels his concentration is lacking. Presently, he is working on specific movement techniques to stimulate his visual memory for spelling in English.

Educational Kinesiology (Brain Gym) has given Pupil B hope. It is a means in which he can physically help himself. He has an understanding that via Brain Gym movements and the Five-Step Processes he can encourage further neurological integration. It also aids his stress management, encourages goal setting, daily life and long term organizational skills.

Recommendations

- Continue to apply the principles of Educational Kinesiology (Brain Gym) with the same approach that has been used since Year 5.
- Follow a structured approach for Year 11 Mathematics which has been developed by the researcher-teacher. This makes use of the neurological integration of the dice 5 “X” pattern for solving all direct proportion problems such as ratios, scales drawings, similar figures, percentages. This structured maths program concentrates on mastering algebra to the highest standard possible for individual pupils. Also working and setting out answers are recorded with a clear visual midline.

Due to the evidence from the WISC III assessments, (See Appendices 7C and 7F), which indicates slow processing of arithmetic, avoid wasting time practising arithmetic. Encourage the pupil to use a calculator. Concentrate on mastering all the other aspects of the syllabus. In the final exam, omit all arithmetic problems until every other question has been answered. Butterworth (2003, Chapter 6) supports this practice. The results of the Dyscalculia Screener assessment for Pupil B also confirm this. (See Appendix 7L)

- Continue to develop visualization skills for spelling by reading a sentence containing the word in his mind first, before attempting to write and spell it. This was recommended in the WISC III assessment. (See Appendix 7C and 7F.) Use the Educational Kinesiology (Brain Gym) Five Step process to encourage this development.
- Keep a good balance between study and recreation.
- At GCSE Level study the core subjects plus French and Information Technology. This is in accord with the results of the WISC III assessments (See Appendices 7C and 7F) where it was suggested to set less work for Pupil B due to time needed to complete academic tasks.
- Continue to learn the trumpet on an informal basis.

Conclusion

The beginning of Pupil B's education shows that he received the recognizable delays which always accompany students with problems. He received the traditional treatment of those children who do not fit into the 'norm' of the classroom. However, he readily responded to the new direction offered through Kinesiology. This was mirrored in his readiness to co-operate with different approaches in mastering school work. The outcome of his school work was enhanced as he gained confidence in himself and his ability to progress in learning. Pupil B always had co-operation and encouragement from his parents who opened up areas of interest in the broadest sense, most of which reinforced the value of movement in learning.

The study followed him through 5 years of learning with many people participating in the journey. So long as this support is relevant and available to Pupil B, one can expect that his learning will continue to move along.

Chapter Eight

Conclusions

Introduction

The previous chapters outline the findings of an “action-research” study into Educational Kinesiology (Brain Gym). This chapter aims to review the findings of the research and to assess whether the objectives of the project have been achieved.

The chapter will then move on to examine the limitations of the research and will explore avenues to improve such “action research” if a similar research project is undertaken in the future. Finally, tentative recommendations based on the findings of this study will be put forward regarding the future role of Educational Kinesiology (Brain Gym) in the future.

Discussion and summary of the results

Before any judgments can be made of the overall success or otherwise of the “action-research” the success of the individual case studies must be considered.

Pupil A

Progress in literacy has been achieved as noted by the standardised reading comprehension and spelling tests. Pupil A’s teacher states that pupil A can now complete some of the class work independently whereas before she could not. Further she is always keen to read whenever the opportunity arises. The pupil’s parents have commented on pupil A’s surprise at being able to read passages and record some aspects of the

schoolwork by herself. However, Pupil A still faces a challenge with her future education. Whilst there is an improvement, it is not sufficient. The researcher-teacher is frustrated as there is no viable space in the school in which Educational Kinesiology (Brain Gym) can be practised appropriately.

Pupil B

As shown by his progression through school Pupil B has succeeded academically and is now in year 10. He enjoys school and the social life that comes with it. Teachers report that he is a capable pupil and well disciplined in his study. Pupil B is planning to study science and mathematics at A level and is considering a career in the field of science. Success must also be noted in that pupil B acknowledges the importance of using Educational Kinesiology (Brain Gym) and uses the movements personally for study breaks, getting started in the mornings and as a means of managing stressful situations for example examinations and competitive sports matches.

Pupil C

As noted by the standardised literacy tests pupil C's ability to read, record, spell and comprehend has now progressed ahead of her age group. Pupil C's family and teachers comment on her improvement, self-confidence and ability to deal with schoolwork and homework. Pupil C enjoys school and socialising and readily uses Educational Kinesiology (Brain Gym) movement herself whenever she feels the need.

Pupil D

This pupil has progressed successfully from being categorised on the standardised screener as a dyscalculia pupil, to a pupil who is categorised as not dyscalculic. Her sports performance improved exceptionally as stated by the physical education teachers. Pupil D's parents reported progress and confidence in her ability to deal with money, number facts and equivalence relationships.

Four Day Brain Gym Course

The teachers and professionals were thrilled to be able to implement movement into the teaching routines. They stated that they gained confidence in understanding the reasoning behind the movements and the relationship to student learning difficulties. They were pleased to learn how to perform the movements correctly which added to their confidence and ability to use them with pupils. Those who were working with a Five-Step Balance Process noticed the progress that the pupils were making. All these pupils have previously experienced severe challenges in learning to write or read.

From the outcome of these case studies the evidence of success for the pupils seems very clear. The study as an "action-research" approach can be regarded as highly subjective so it is important to now outline limitations with respect to implementation and measurement as the researcher-teacher perceives these.

Limitations of the Research

The majority of the research has collected anecdotal evidence which understandably is not absolute. However some evidence is measurable for example educational psychologists' and occupational therapists' assessments, standardised reading, spelling

and mathematical levels, and the dyscalculia screener. The results collected do not give a complete picture as information will be hidden by families, other individuals and even teaching staff. Results also depend on the behaviour and tolerance of all those involved in the research project.

Anecdotal

Anecdotal studies will be regarded by some to be not as valid as quantitative study. It is clear that in anecdotal studies there is danger of subjective bias in the researcher. It is conceivable that the researcher-teacher could have a predisposition towards outcomes in the method. For example, experience gained from anecdotal work with methods of movement learned from implementation of kinesiology prior to the research, could colour observation. It could be the case that more independent observation needs to be added to the researcher-teacher's judgment.

Within anecdotal studies there is a dependence on the personalities involved in the research. For example, success of communication between the researcher and school staff, the researcher and the pupil, the pupil and the class teacher, the researcher and the pupil's parents and so on. These relationships and personalities can work either positively or negatively towards the results of the study.

Measurement

The way the researcher-teacher measured and recorded success throughout the study was possibly too naive. For example, the nature of "movement in learning" and the measurement of "how much movement is to be applied" were decided in situ by the researcher-teacher. Because of this there was no structure identified which could be used by others to perform duplicate experiments. Therefore, it is difficult for results to be other than random. In retrospect, some structure could have been presented as the

research developed since, by then, the researcher could anticipate the incoming pupils. This is further discussed in recommendations.

Implementation of the Case Studies

It could be argued that the researcher-teacher may not have had sufficient insight into sorting strategies, which could ensure optimum implementation of the research. For example, there may be a need for a more uniform assignment of student's problems to match the level to the teacher's ability in coping with the child.

As discussed earlier, students were not selected for this research. They were not graded against one another in the sample. All were assessed to be having learning problems in literacy or mathematics. To ascertain if it is the "movement" component or some such "one to one" relationship with the research - teacher it may have been useful to apply the same treatment to students, taken randomly from the same class, but with no observed learning problems in literacy or mathematics and see if their learning was also enhanced.

Educational Kinesiology (Brain Gym) was not necessarily seen as an aspect of the curriculum which could reasonably be included into the school day; just as any other activity is integrated into the school day. Therefore it's evaluation by research participants needs to be completed sensitively.

The Four Day Brain Gym course required completion of 12 case studies. While the teachers deemed the course highly successful these studies were not carried through by all the teachers. The reason for this could be time and organisation needed by the teachers. The researcher-teacher was unrealistic in assuming that those attending the course would automatically be able to allocate time and apply organisational principles to complete these studies. Perhaps it is unrealistic for them in their present working environments. This is further discussed under recommendations.

Recommendations

While the researcher can feel confident that the aims of the study carried the success anticipated, there are always areas, found in retrospect that should be improved for further studies.

The strengths of an anecdotal study could be enhanced by building well-accepted structures into the program. For example, the testing of pupils self-esteem before and after application or the use of questionnaires to avoid duplication of the research and gain more knowledge of participants.

In respect of the Four Day Brain Gym course administered the next course will need to help teachers structure a time period to complete the case studies. For example, suggest that the teachers meet periodically to complete case studies in pairs. One teacher would complete a Five- Step Process Balance on the other teacher and vice versa. They would also be a support to each other with problems and discrepancies, which could arise while working through the Five-Step Process Balance.

The researcher-teacher would need to acknowledge the reliance on the individual's success in completing the case studies, which stem from the co-operation within the teacher's school or working environments. This would require the full co-operation and understanding of the heads of schools. Heads need to be flexible and allowing school time, for special needs teachers, to have one-to-one time slots with individual children.

Educational Kinesiology (Brain Gym) could meet a need if handled well by educators. It should be seen as part of a whole tapestry of learning which is still forming, changing and reforming. Such studies are born out of ideas and professional practice.

Long Term Recommendations

In present day education a classroom teacher is asked to teach children with specific difficulties, as though the teacher has the training, time, space, understanding and empathy of the educational administrators. The teacher usually has little of these. Furthermore, whatever the task involved it is in addition to the twenty plus students who are likely to be in classrooms in traditional education.

Few of these expectations are ever realistic. Usually at the very most the pupil will be given a special needs teacher. Special needs, what does that cover?

Before beginning construction of special needs courses, the rights of pupils could be acknowledged and our communities could look at education for all students instead of channelling finances and basing our curriculum standards on those who acquire literacy and mathematical skills with ease. For future studies such as this one, to be progressive in moving learning along, it is crucial to acknowledge the needs and rights which are special to these children.

Conclusions

In an anecdotal approach, the researcher is free to move out of the structure when striving for positive outcomes for the child. The key project is seen to be moving forward with the child and not to be troubled by barriers such as financial restrictions barring programs and development.

Working with educationally troubled children in an endeavour to reach satisfying and successful outcomes, one follows an often obscure and an unchartered route. To begin such a research it required a “leap of faith” to take the route.

However, there is a more enchanting approach to take, like the Queen's attitudes in "Alice Through the Looking Glass" (Carrol, 1978) when Alice declares

"There's no use trying," she said "one can't believe impossible things." "I dare say you haven't had much practise," said the Queen..... "Why, sometimes I believed as many as six impossible things before breakfast."

(page 155)

It was with a similar buoyancy of belief and much practise in the unbelievable that these efforts into research began. It is has been one more step taken towards moving learning along.

Appendix 1A “Origins of Brain Gym”

Adapted from Taylor 1998

Glen Domain & Carl Delacato
Two reading specialist : Domain challenged the accepted age of teaching reading, he advocated starting between 18 months – 2 yrs. Delacato attributed reading failure to a lack of neurological organisation.

Dr Paul Maclean
Development of the triune brain theory. Recognised 3 levels of brain functioning, the Reptilian, Mammalian and Neo-Cortex.

Herman Epstein
Work on the developmental stages of formal reasoning

Tai Chi
Movement meditation.

Dr Samuel Herr Vision training and
Dr Getman Optometry

Newell Gephart
Use of movement patterns with the slow learner.

Ritchard Tyler Chiropractorry and
Budd Gibbs Sports kinesiology .

Shiatsu
A massage technique.

Jean Ayer
Discovered a link between touch-sensitivity and learning disorders. She simulated the sensory system by activating the touch receptors especially on the arm, legs and back.

Rudolph Steiner
Worked on teaching children to learn through the process of eurhythmia, i.e. anchoring learning with rhythm and coordinated movement.

Howard Gardner
Developed the theory of multiple intelligences. He recognised 7 basic types:- logistical and mathematical, linguistic, visual/spatial, bodily kinesthetic musical , interpersonal and intrapersonal intelligence

Jean Piaget
Recognised 4 stages of cognitive development , sensorimotor, preoperational, concrete and operational.

Deepak Chopra
Work on stimulating the brain to keep it in a state of healthy functioning order.

Yoga
Exercises designed to strengthen and lengthened muscles and improve breathing.

Rudolph Laban
Works on dance and movement therapy, in relation to the natural flow of the body through movement.

Brain Gym

John Grindler & Ritchard Bandler
The co-founder of the Neuro-Linguistic Programming Technique, developed the art of noticing.

Maria Montessori
A sensory motor approach based on the sequenced exploration of didactic materials which are in line with the child's natural capabilities-self directed learning.

Dr George Goodheart
Work on the validity of music checking, linked his findings to the oriental medical practices of using meridians. Founders of Touch For Health Foundation.

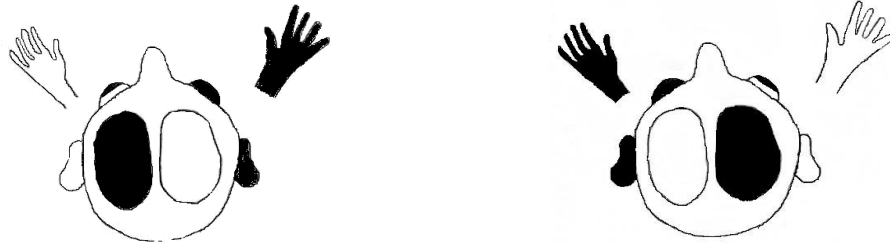
Moshe Feldenkrais
Work on awareness through movement and Functional integration.

Rudulolf Deikers
Interpretations and developments of Alfred Adler's positive, holistic approach of honouring And respecting people.

Appendix 1B “Brain Profile Dominance Patterns”

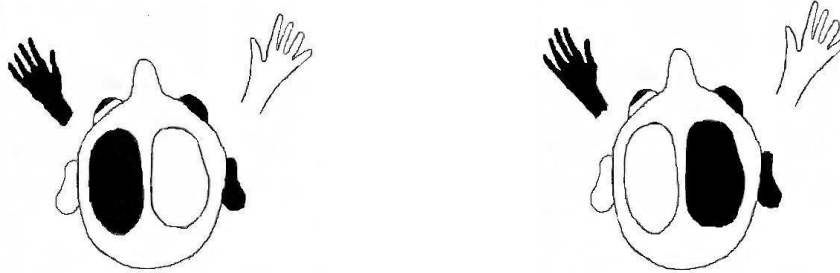
Uniform Dominance

The dominant eye ear and hand are on the opposite side to the dominant brain hemisphere. Educational Kinesiology sees this as the optimum learning state because both the dominant and recessive brain hemisphere have full sensory access.



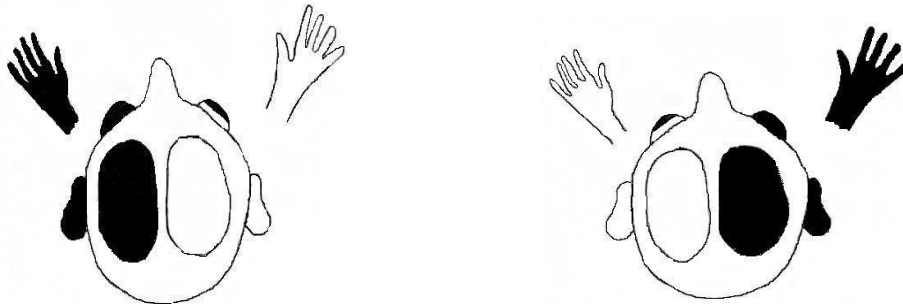
Cross or Mixed Dominance

The dominant eye ear and hand are not all on the opposite side to the dominant hemisphere. Partial sensory access is believed to result in learning difficulties.



Blocked or Mixed Dominance

The dominant eye ear and hand are on the same side of the body as the dominant hemisphere. When under stress all sensory access is considered to be blocked.



(Adapted from Taylor1998, Basson and de Jagear 1994)

Appendix 1B (page 2)

Uniform Dominance

Note that the dominant eye, ear and hand are on the opposite side to the dominant brain hemisphere. Children with this profile tend to learn well. According to Taylor (1998, page 53) there is full integration with full sensory input and the learner can cross the midline effectively, decode language, remember and visualise.

Crossed Dominance

The dominant eye, ear and hand are all opposite to the dominant hemisphere.

Edwards (Taylor, 1998, page 55)

“Over 50% of the learning disabled population is crossed or mixed dominance.”

Blocked dominance

This is when the dominant eye, ear and hand are all on the same side as the dominant hemisphere.

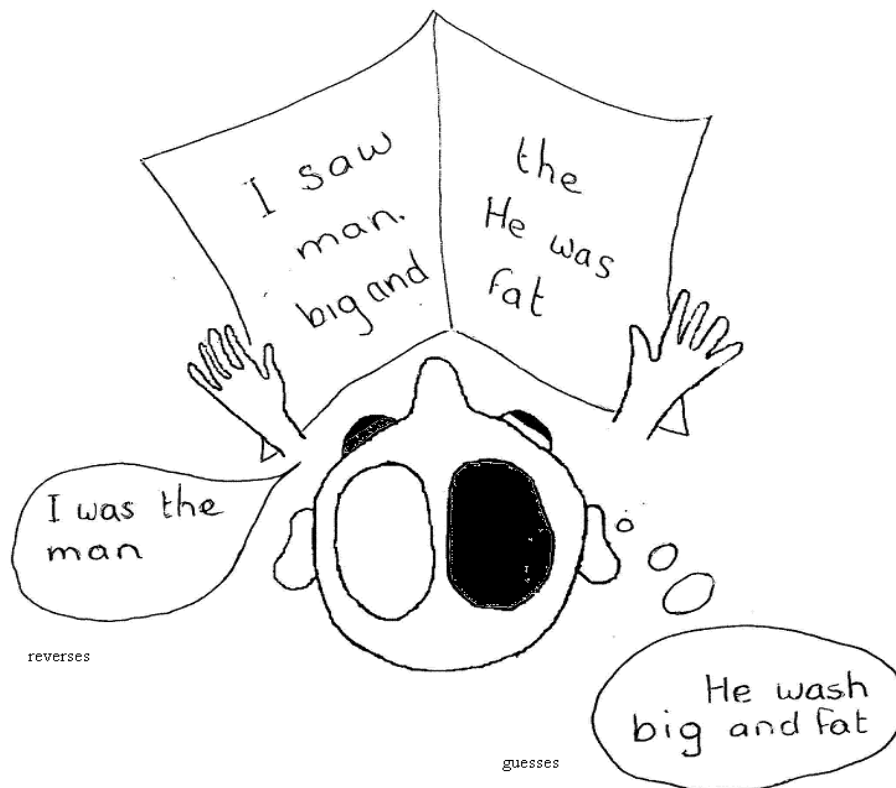
Hannaford (Taylor, 1998) states that these pupils have difficulty dealing with sensory input. They withdraw and become frustrated, may become volatile in the classroom or emotionally handicapped.

“Educational Kinesiology maintains that children with learning problems either have a mixed or bloc [ked dominance profile. However, it must be emphasised that this remains as yet in the realm of speculation and not substantiated by empirical research” (Taylor,1998, page 55)

Appendix 1B (page 3)

“Implications Of Visual Learning Blocks”

Switched Off Right Eye Switched on Left Eye



The left eye dominant visual learner works out of the right brain hemisphere. The natural tracking pattern is from right to left. Problems arise when visual information has to be transferred across the visual midline and can result in mirror imaging and or letter reversals.

Learn to read using sight words because they struggle to decode words phonetically.

Rely heavily on visual memory and engage in word calling or inspired guessing when presented with new words or concepts.

Uses context clues to aid understanding.

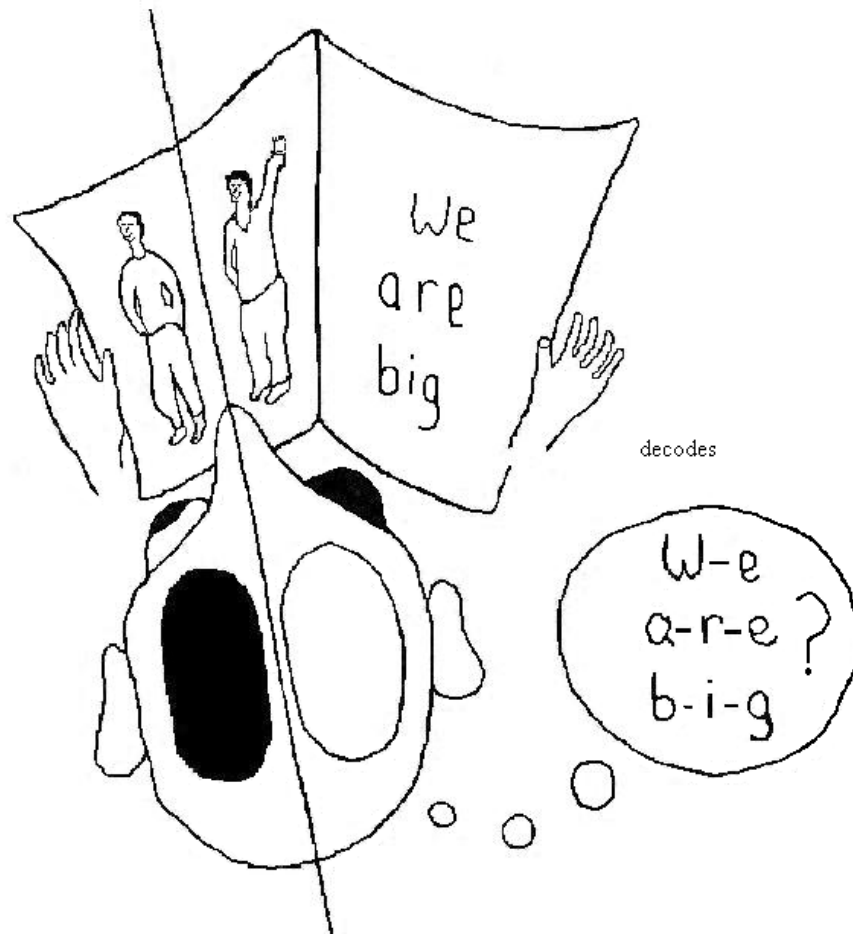
The visual learner is far-sighted makes use of intuition and foresight. Tends to see the bigger picture and can become overwhelmed by the emotions evoked.

Left eye dominant learners are attracted by colour, shapes and large movements and can appear inattentive when they close their eyes in order to create an internal visual picture.

Adapted from Taylor (1998), Dennison (1981), Hannaford (1995), Edwards (1997)

Appendix 1B (page 4)

Switched Off Left Eye Switched On Right Eye



Although the dominant right eye naturally tracks left to right, the learner will endeavour to position the head slightly to the left in order to maximize the visual input into the left hemisphere of the brain. Words are analysed logically and decoded according to phonetic rules.

Problems arise when trying to decipher sight words that do not follow prescribed guidelines.

Right eye dominant visual learners tend to make more errors to the left of the page. Learning experiences are shaped by the dominant analytical eye.

Learners are near sighted, become engrossed in detail, their work is orderly and neat. They can have problems seeing things in context or putting things back together.

They focus intensely and often lose sight of the big picture.

Benefit from hindsight.

Adapted from Taylor (1998), Dennison (1981), Hannaford (1995), Edwards (1997).

Appendix 1C

“Background to the Development of Structured Literacy Lessons”

According to Cooke (1993) most children will at some stage in their schooling be presented with literacy lessons related to letters, sounds and spelling. These lessons and this style of teaching, which are aimed at enabling children to acquire literacy skills, are not appropriate for children, with specific literacy learning challenges. Cooke (1993) continues to explain that these individuals require more detailed understanding of the sounds of letters, look of letters, and structure of words.

Perhaps also such pupils will have difficulty with fine and or gross motor skills and have difficulty forming the letters when writing. It is possible that some of these children will have difficulty focusing on a 2 dimensional page and hence not see clearly enough to read or form the print.

“Some boys whilst being capable sportsmen, able to focus well in three dimensional spaces are unable to focus for near point work, such as reading, in two dimensional surfaces until they are 9 to 10 years old.” Dennison (2004, Kirchzarten, Germany, Creative Vision Course).

Special Needs researcher Sousa (2001) states

“However many children begin school with a weak phonological base. Teachers must then assess where students lie on the phonological continuum and select appropriate strategies to move them towards phoneme awareness.” (page 100)

A collection of the types of problems mentioned above has lead to the need for a structured, methodical, literacy programme. This is required to overcome the physical challenges faced by these children in developing a competency with literacy skills.

An experienced infant teacher Lloyd (1992) quotes

“Most children read well. However, there were always a group of children who had problems remembering words and who could not cope with reading or writing satisfactorily. These children did not pick up letter sounds or relate them to words. It was therefore decided to teach the letter sounds first, to see if early letter knowledge would help them. This proved to be much more successful for the children as a whole, and the group who had problems became much smaller.”

(page 2)

It needs to be noted that the improved method reduced, but did not eliminate, the number of children not coping with the reading or writing.

When a child starts to experience failure the child’s self esteem begins to crumble, and behaviour problems often begin to have an effect. If immediate recovery action is not implemented then access to the wider school curriculum and education process begins to be hampered.

In 1917 Glaswegian Eye surgeon Hinshelwood (Miles, 1999) explained how important it was to recognize the individuals who had a type of word blindness and found it difficult to learn to read and write. Hinshelwood (Miles, 1999) writes

“a congenital defect occurring in children with otherwise normal and undamaged brains characterised by a difficulty in learning to read so great that it is manifestly due to a pathological condition, and where attempts to teach the children by the ordinary methods have completely failed.” (page 5)

Prior to this he had notes on how important it was to recognize the social consequences for such children. Hinshelwood (Miles, 1999) wrote

“Otherwise they may be harshly treated as imbeciles, and either neglected or punished for a defect for which they are in no way responsible.” (page 5)

Another pioneer in the area of reading and acquiring literacy impairment was Orton and according to Miles (1999) was the one who helped educationalists aware of the existence of developmental dyslexia. In referring to Hindshelwood and Orton Miles (1999) write

“Both believed that such children could be helped by suitable teaching; both regarded the ‘look and say’ method as unhelpful and both advocated a multisensory phonic approach in its place.” (page 7)

In Orton’s time Miles (1989) explains it was thought that the learner, experiencing difficulty, needed to start analytically with the smaller units such as letters and then move on to the larger units of letters such as words. Orton also advocated the multisensory approach. However it is now noted that many of these individuals having difficulties in acquiring literacy find it very difficult to work at this level and find dealing with larger units like syllable or whole words is more successful. Hence the development of onset and rime programmes for such students. The “Whole Brain Reading Programme me (Dennison) is also a result of learners recognising and being able to work more easily with entire words rather than individual phonemes, or letters.

As Miles (1992) comments Orton has been the source of many of the phonic and multisensory programmes which have been used to help dyslexic individuals.

“Many researchers since Orton have confirmed that intelligent children who nevertheless have extreme difficulty in learning to read and spell have specific problems of a phonological kind, including those of ‘working memory’ and can make good progress with concentrated teaching that stresses phonological awareness.” (page 2)

Literacy teacher Brand (1984) addresses the multifunction of the senses in learning. She explains that

“Too much emphasis has been placed on learning to spell through visual methods. The ears and the mouth have been forgotten and the power of the hand ignored... If a child, or an adult, hears a sequence of sounds, sees them visually represented, feels the sequence in his mouth and reproduces the symbols with his hand, his awareness of the basis of written language is awakened....No one sense is left to flounder and the fear of the printed word which so often besets adult illiterates and failing teenagers is removed.” (page 3)

Miles (Ellis and Davidson, 2000) referring to the highly structured multisensory teaching of spelling writes

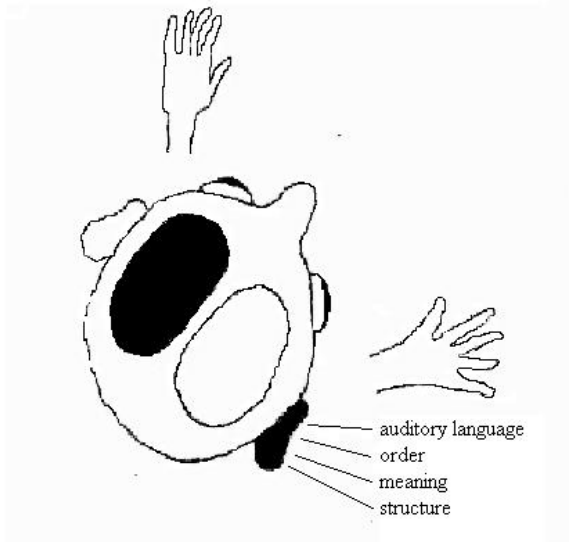
“There is, in fact, wide agreement among teachers in the English-speaking world that a programme of this kind is the most appropriate and effective one for dyslexic individuals of all ages who are struggling to become literate.” (page 5)

Speech therapist and dyslexia researcher Hornsby (Ellis and Davidson, 2000) referring to the same spelling programme me quotes

“With this scheme, the 20 percent who have always found difficulty with reading, writing, spelling- sometimes mathematics- will have the opportunity to learn more easily. It is only by targeting the 20 percent that true literacy across the range at risk can be achieved. (page 5)

Appendix 1D

“Integrated Hearing and Listening”



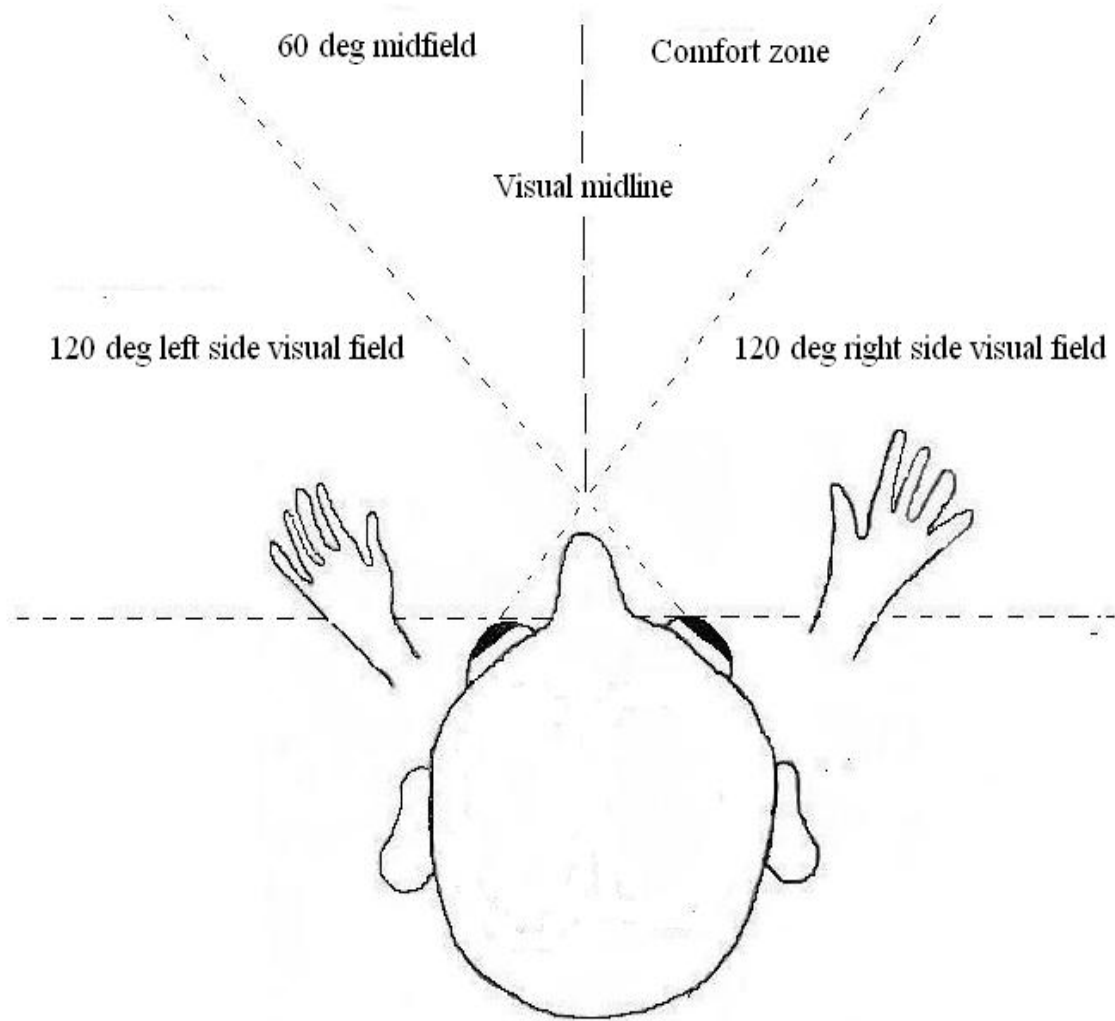
When the left hemisphere is stimulated the head turns to the right. The learner is listening with the language brain ear.

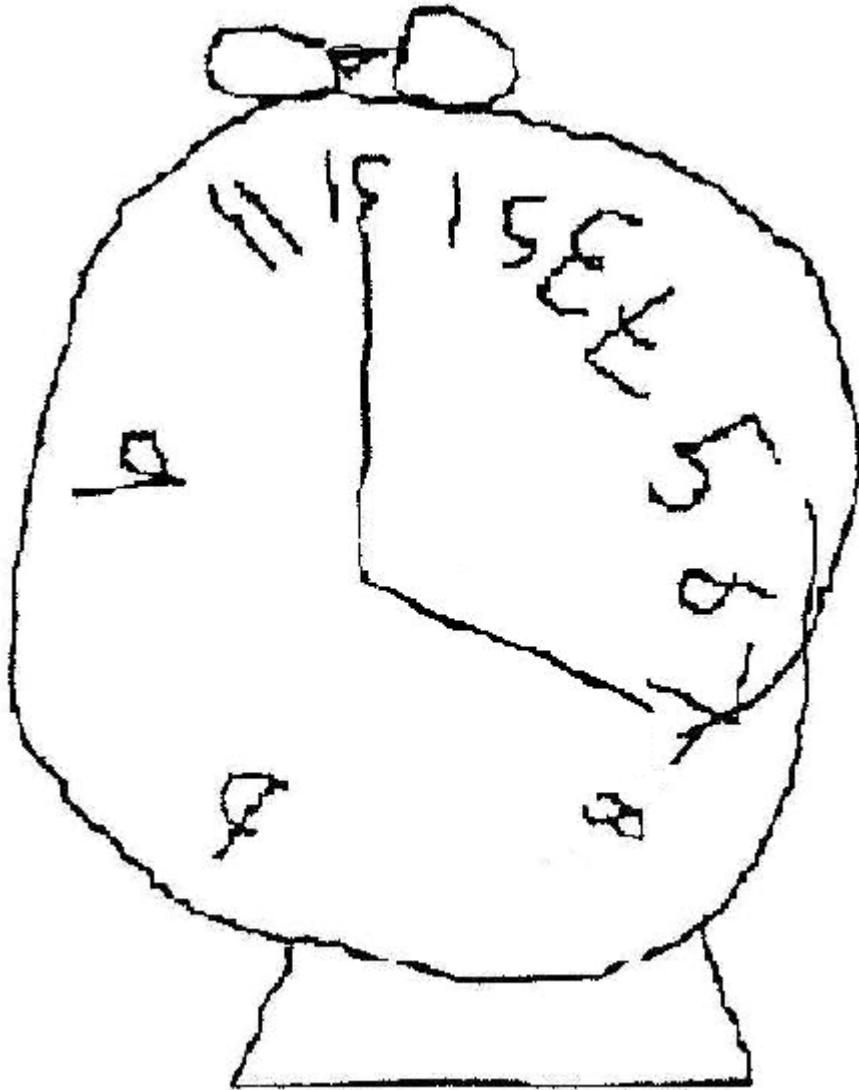
When the right hemisphere is stimulated the Head turns to the left. The learner is using Gestalt area brain ear. Concentration is not On language content but rather the emotive energy of sound.



When bilateral integrated learning occurs the listener can appreciate the creative quality of sound , the rhythm, tempo and beat , while at the same time being able to analyse the words of the song for meaning. Edu-k recommends thinking caps to focus attention on ears, tune out extanious noise and stimulate the speech and language system.

Adapted from Taylor (1998), Dennison (1981) and Edwards (1997)



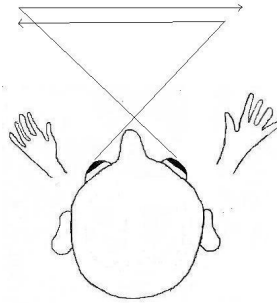


Left sided neglect and reversed figures in the drawing of a clock by a dyslexic child with unstable binocular control.

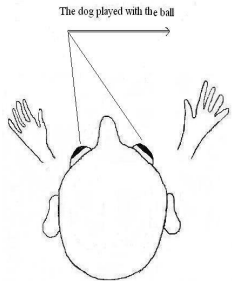
Adapted from Stein (in Fawcett and Nicholson 1994)

Appendix 1F

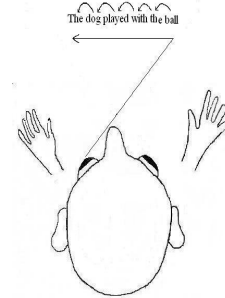
“Eye Dominance and Needs”



The right eye tracks most easily from left to right. The left eye tracks most tracks most easily from right to left, against the flow of our written language

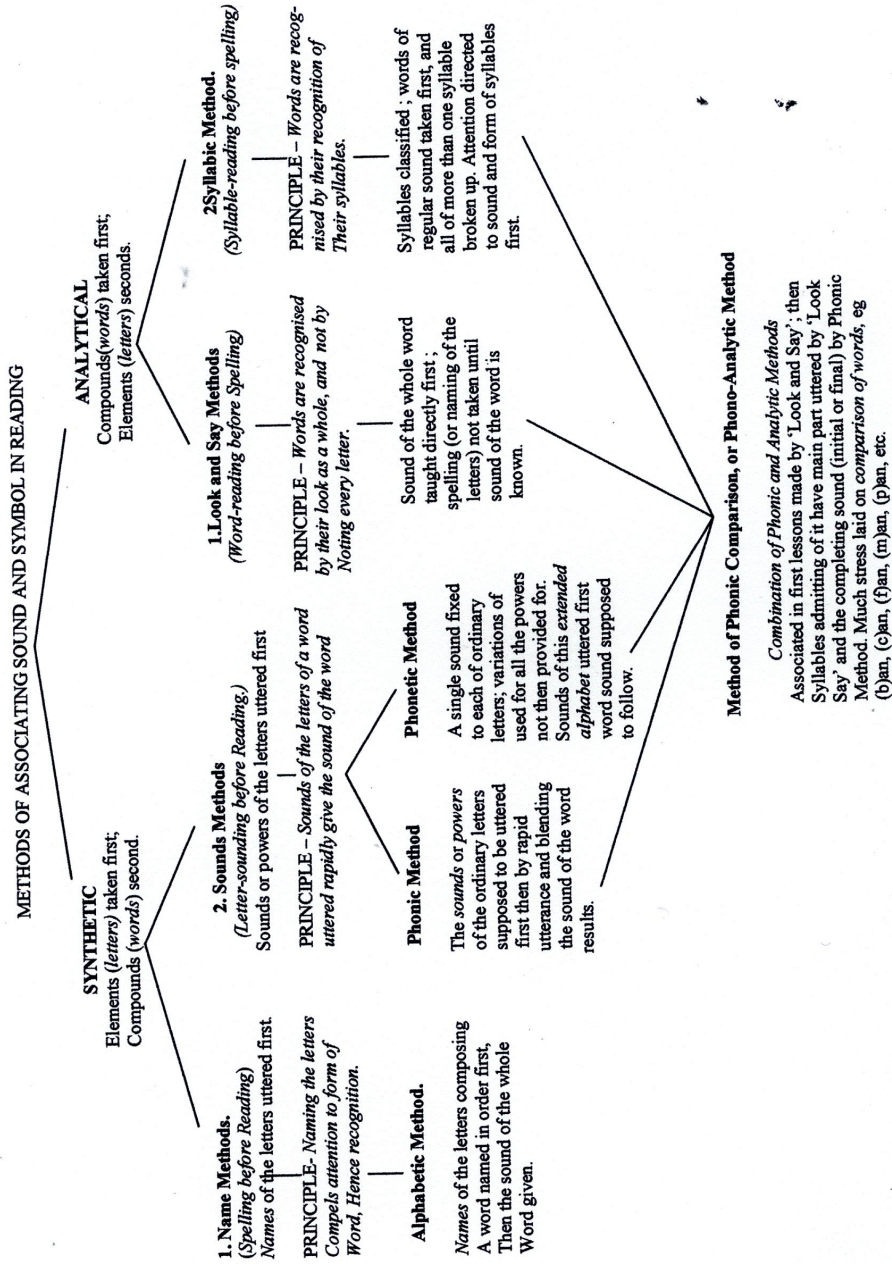


The left eye prefers to track right to left, focusing first of from the end of each word or sentence. With no help from the right eye, reading takes much effort.



With the right eye helping, left to right

Adapted from Brown 2004, Brain Gym Journal July 2004



Adapted from Landon (1898) The Principles and Practice of Teaching and Class Management.

Appendix 1H

“Vision-An Educational Kinesiology Perspective”.

“Vision is the art of seeing things invisible.”

Jonathon Swift (Dennison, 1997)

Dennison observed that students often realized spontaneous vision improvements from the basic Brain Gym® movements. It is Dennison’s opinion that when the left and right brain hemispheres work together in harmony, the eyes follow along naturally. Dennison (1993) recounts

“Moreover, students reported increased ability to visualize, improved drawing co-ordination, increased awareness and enjoyment in colour and dimension, waking dream images, and new visions of themselves and their potential.”

(page 11)

Seeing with the Whole Brain

According to Dennison (1993) for the person whose vision is fully integrated, light and shadow play an endless game of rearranging shape and colour. Many thoughts are classified and organized by visual association. Both actual experience and various learning, as gained from reading, become internalized through the ability to create a multisensory reality in the mind.

Gestalt Vision

Dennison (1993) states that this is what is referred to as the “big picture”, “automatic” vision. It is more to do with the far distance, movement and the big picture. This system is captivated by colour, tone, shape and mood. It seeks emotive contact and does not need to analyse.

Analytic Vision

This is viewed by Dennison (1993) as the vision focusing on detail and monitored by the language/analytical brain hemisphere. Reading, writing, maths, linear, and sequential activities are the preferred modes of processing. The system works well with the hand for near point tasks such as copying, cutting, pasting or analyzing form. The system is intrigued by lines, symmetry, systems, and static objects.

Visual Acuity

This refers to the Analytical vision and those of the left brain. There is much more to vision than simply acuity. It is this researcher’s opinion that it is acuity that tends to be emphasised in school and academic work.

Hemispheric conflict in vision.

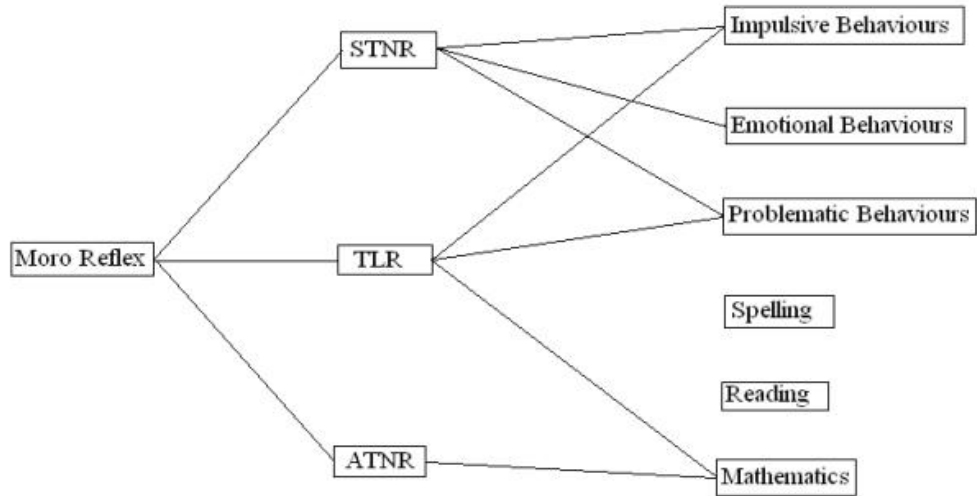
The person in this state is experiencing a one sided mode of processing and not accessing binocular vision skills. The conflict is readily apparent between “near2 and “far” activities, between movement and solidarity, or between light and shadow. One way to

avoid the stress is to shut down one hemisphere, and the corresponding eye, as much as possible.

Hemispheric visual harmony

There is a pathway from each eye to each brain hemisphere, so that ideally each eye benefits from the best that each hemisphere has to offer. Whole brain vision, then, can only be fully achieved through hemispheric integration. For this integration each eye must receive both gestalt and analytic input.

Appendix 11 “Reflexes Maths and Behaviour”



Adapted from Taylor (2004)

BEAM: Balance Education and Movement developed by Physiotherapists Finlayson and Rickard.

BEAM was developed to address the problem of large waiting lists of children with co-ordination difficulties. The 8 week programme has now been implemented into reception classes in many schools in Kent but was first trialled amongst interested schools in Maidstone, Kent in 1999. It was developed and implemented by Finlayson and Rickard (Kent, 1999) due to the fact that between 1993 and 1998 the referrals of children to physiotherapists had increased dramatically as the media provided the public with knowledge of Developmental Coordination Disorder.

The programme of gross motor skills is to help the development of the child's core stability and effective, efficient functioning in the classroom. Since the introduction of the BEAM programme into schools there has been a reduction in the children being referred, from participating schools, to the Health Authority, for Developmental Co-ordination Disorder assessment.

In the trial programme Findlayson and Rickard (2002) write

“School staff were enthusiastic about improvements noted in the children. Comments included: ‘co-ordination of all improved, noticeable difference in PE lessons’, much better understanding and joining in, this has been improved in class’, (the children are) switched on to getting ready’. (page 10)

Both Findlayson and Rickard are recommending that the BEAM programme, as a screener, for primary schools to use with school entry level for all pupils. From this

programme, the PE teacher implementing it would be able to observe those pupils, not coping as well with the movements. Hence this teacher would be able to identify those children likely to need specialized help for any co-ordination disorder. These children could then, immediately be referred to a physiotherapist for further care so they were not hampered in access to the full curriculum.

Portwood- Educational Psychologist

Portwood's research (Portwood1999) suggests that in the majority of cases dyspraxia is the result of neurological immaturity in the cortex of the brain. The other cause mainly being related to nutrition (Portwood, Educational Kinesiology Conference, Bath 2004). The British dyspraxia Association defines dyspraxia as an impairment or immaturity of the organization of movement. Portwood writes

“Parts of the brain are not sufficiently mature to allow the child to follow the path from action to response without the transmission between the nerve cells breaking down or becoming unacceptably lengthy processes” (page 17)

Portwood (1999) in 1993, helped co-ordinate a research project in movement therapy for children showing signs of dyspraxia related learning difficulties in a small primary school. The children all took part in an intervention programme which had activities especially designed to develop neural pathways which in turn would hopefully improve cognitive ability and co ordination. The programme ran for 3 months followed by a 3 month consolidation period and then the programme again for 3 months.

Examples of the activities implemented involved skipping, crawling, and bean bag throwing to specific targets, specific line walking, and ball playing, specific activities with a skateboard. The programme occurred during lunch hour and was supported by school staff and pupil peers. Everyone involved enjoyed the programme. Before and after handwriting examples were used to measure improvement. (See Appendix A).

Portwood (1999) writes

“The most effective interventions with children aged 6 and over have involved access to structured exercise programmes.” (page 119)

Resulting from these projects Portwood has designed a comprehensive programme which can be used with primary and secondary age pupils. It comes with a baseline assessment programme, which highlights strengths and weaknesses in the child’s coordination, and can be used by teachers, assistant and parents. The child’s weaker aspects should be addressed in the programme.

Glendenning – Occupational Therapist

Glendenning writes

“Links have been suggested between postural stability and the development of organised motor skills and behaviours necessary for learning.” (page 1)

Glendenning (2000) refers to Henderson, Williams, Shoemaker and Kalverboer when explaining that the movement problems associated with being dyspraxic cause a never ending downward spiral in self confidence and school learning achievement.

Glendenning reflects

“Children with movement problems are more introverted, anxious and judge themselves to be less competent physically and socially.” (page 2)

Glendenning (2000) emphasises the connection between poor learning achievement and motor skills and addressed this problem by developing a movement programme to be

administered over 10 weeks, to learning disabled pupils. Physiotherapists administered the programme which addressed the following:

- Postural control
- Muscle tone
- Stability
- Visual-motor control

The treatment given to the pupils had

- A neuron-postural element
- Visual-motor elements
- Vestibular components
- Proprioceptive components

It was the aim of the intervention movement programme to improve

- Postural alignment, control and stability, and associated muscle tone
- Whole body weight shift
- Visual- motor function.

Positive improvements were seen in the children's

- Posture
- Writing and drawing
- Socialisation, self esteem and self confidence

Cartlidge

A physical education teacher developed and ran self esteem clubs after school due to his awareness of the effect of clumsiness on self-esteem and behaviour. The equipment was available in the schools and the schools' gymnasium was used for the clubs.

Ripley (2001) explains that participants can learn the physical skills in a non judgemental manner with peers having similar challenges. The clubs began in 1987 in South East England and have developed with the support of Special Educational Needs Organizers, Occupational Therapy Service support and parent involvement.

“Description of the 4 day accredited Brain gym (Educational Kinesiology) course taught by the researcher teacher”.

Day 1

- Movements and knowledge to facilitate readiness for learning
- Movements to relieve and manage stress in both the learner and helper/educator
- Developing the skill of noticing.
- Movements to encourage neural integration for effective, efficient reading and listening skills.
- Re-educating the body and mind system and learning how the body needs to move for natural learning to occur.
- Understanding the role of the corpus collosum and the need for left and right brain hemisphere integration.
- 5 point balance and confidence in its use in the classroom, in one to one teaching and personally for the educator.
- Case studies and relevant assignment work
- Movements to aid effective seeing and listening skills are taught. Brain buttons, space and earth buttons, thinking caps, cross crawl, hook ups, positive points.

Day 2

- Movements to encourage neural integration for effective writing skills.
- Movements to encourage effective writing are taught. Alphabet 8's, double doodles, energy yawn.
- Repatterning- this is a system of specific movements for integrating logic and reflex thinking into a functioning whole. The body and mind is encouraged to integrate and function in an integrated mode. For example a successful reader can comprehend and express ideas from the passage being read. It is not uncommon to have a reader who can pronounce the words articulately but cannot express or interpret the contents of the passage.
- Understanding the relevance of High and Low gear.
- Confidence to use the 5 point balance system to encourage effective seeing, listening and reading skills
- Case studies and relevant assignment work.

Day 3

- Movements to encourage effective communication.
- Tendon guard reflex.
- Neural links from the back to front of the brain and vice-versa.
- Need for the learner to be able to comprehend and express ideas during reading, writing and listening activities.
- Movements for centering are taught -owl, arm activation, foot flex, calf pump, gravity glider, and grounder.
- Movements to encourage effective organization.
- The need to be able to focus on a task, goal, activity.
- Proprioception, muscle-neurological connection.

- 3 dimensional model of the brain and learning.
- Kinesiology muscle testing technique using deltoid, latimmus dorsi, and supaspinatus muscles.
- 5 step balance procedure using 3 dimensional x span balance

Day 4

- Further midline movements are taught which contribute to integration of primitive and postural reflexes and the integration of both hemispheres.
- Movements taught are neck rolls, belly breathing, cross crawl sit ups, rocker and energizer.
- 3 dimensional Repatterning which is a procedure of specific movements for integrating logic and reflex thinking into a functioning 3 whole. The body and mind is encouraged to integrate and function in an integrated mode in 3 dimensions.
- 5 step balance process using 3 dimensional Repatterning.
- Case studies for accreditation and assignments.
- Organization of follow-up practice sessions.
- Working professionally with Brain Gym within your work environment.

Appendix 3B

“Teachers’ Assessment of the Four Day brain Gym course”

How have you incorporated it into your work?

Start the day with PACE

Start afternoon activities with PACE

Class based PACE activities whenever needed during the day. For example after an interruption to the class

Lazy 8's in many different ways. For example, using different mediums.

Lazy 8's to introduce literacy-particularly handwriting

Double doodles with disabled adults

Start Physical Education lessons with PACE

Brain Buttons for numeracy activities

Hook Ups to calm children

Thinking Caps to help children remember

Increase water drinking - it has been introduced into the daily routine

Using it personally at the start of the day before leaving for work

Sharing it with my own children

Informing colleagues about educational Kinesiology. Sending a letter to parents about Brain Gym and its merits and uses.

Developing writing skills by using Alphabet 8's, Double Doodles and the Writing balance before any writing sessions in class.

The members of the musician's trio do Brain Gym movements before rehearsing and performing.

Brain Gym movements are calming to do prior to performing

When stress levels prevail during the performance then Brain Gym movements are a first priority.

What has been comfortable?

Observing the pupils and clients

Performing "PACE" slowly enables the class to stay in control

The movements are easy and enjoyable to do.

The movements are simple to teach and explain.

Brain Gym is an excellent way to begin each learning or practice session.

The realization that Brain Gym is healthy for teachers and gives them refreshing breaks

It provides an excellent means of providing tactile experience

Helps individuals to loose muscles and to focus at the start of lessons.

Pupils in Key Stage 3 and 4 enjoy using the movements and balances.

What has been difficult?

When one pupil in the group does not go along with the group

Finding the correct movement

Timetable constraints

Dealing with the moods of children and their willingness to do the Brain Gym

Doubt about it and keeping focus

Attitude of others, especially sceptics within educational establishments

Remembering to use it

Wondering what other staff members think when they see us doing Brain Gym

Ability to explain it and wanting to be able to share it with other teachers and assistants involved in the same classroom teaching

How confident are you?

Lazy 8's always up on the board.

A bag of Brain Gym tricks are always available for children to use

Need more confidence to do the 5 Step balances

Want to share the Brain Gym practice with other colleagues, friends and family.

The need to be reassured that one is doing the movements correctly

What changes have you noticed in individual's since you began Brain Gym?

Remarkable change in attitude of individual pupils.

Calmness

Individuals are more relaxed

Better posture and body language

Different way to attempt handwriting and creative writing

Better co-ordination

More control of themselves for activities e.g. writing

Hope is given to enable clear and logical thinking.

Ideas for overcoming logistics

Self Confidence

Sharing the knowledge with other staff

Understanding the in-depth knowledge

Pictures as reminders and explanations on the walls and equipment

Wall Paper with x's and lazy 8 signs

Gaining confidence with one balance before moving on to the next

Setting aside a special area to do Brain Gym movements and balances

Time to complete the case studies and complete the accredited 4 day course

Recommendations

Brain Gym before swimming lessons

Keep records of and samples of work before and after Brain Gym to show colleagues and parents

Becoming familiar and completing the case studies

Playing and helping with Brain Gym which enables learning

Play with it on friends and family.

Balance staff members and colleagues

Develop double doodle art

Balance myself

Become familiar with the handbook

“Individual Teacher Reports of using Brain Gym”

Teacher working 1 to 1 with pupils who have specific learning disabilities in Key Stage 1 to 4

Before I completed the 4 day course I used brain Gym activities during handwriting lessons. These were

- alphabet 8's
- lazy 8's
- drinking water
- PACE

These movements helped the children to succeed with handwriting skills which had previously been a challenge. As a result of the course I feel more confident in the understanding of the movements and more confident in explaining them to other members of staff in school. I know when and why to use the movements now. As I work through the course work balances in the coming months I will be using the 5 Step Balance procedures as often as I possibly can with the pupils. It is an educational adventure which I can also use personally in many facets of life.

Art Therapist and Teacher working 1 to 1 with pupils who have specific learning disabilities in Key Stage 2 to 4

I have carried out Brain gym activities with large classes of moderate to severely handicapped adults. The Double Doodle work, where by the students draw pictures using two pens (one in each hand) has been enlightening. The pictures drawn gave great insight into the difficulties that these people have with co-ordination. Many of this group was

unaware of their own body image. Now I am able to make a program more suited to their needs. Reconditioning these students to accept drinking water, and practicing PACE seemed to calm them significantly, and the level of sound in the room has become far more appropriate and contented-sounding.

After being quite disturbed that I was changing the routine, they have now accepted that we spend the first 20 minutes of the session doing certain exercises. The music tapes were a positive idea, as it helped them to participate as a whole group.

Appendix 4A

“WISC III Psychological Assessment Pupil D”

Chronological Age: 8y 3m

Verbal Sub Tests	Ability Range
Information	Low Average
Similarities	Average
Arithmetic	Well Below Average
Vocabulary	Low Average
Digit Span	Well Below Average
Comprehension	Below Average
Performance Sub Tests	
Picture Completion	Well Below Average
Coding	Well Below Average
Picture Arrangement	Below Average
Block Design	Well Below Average
Object Assembly	Well Below Average

Welsh Reading Test Profion Glannau Mennai

Reading age – correctness	8y 6m
Reading Age-Understanding	7y 9m
Spelling Age	7y 0m

Wechsler Objective Reading Dimension (WORD)

Basic reading Age Equivalence	6y 6m
Spelling Age Equivalence	6y 9m
Reading Comprehension Age Equivalence	< 6y

Appendix 4B

“Welsh Reading Test Profion Glannau Menai”

Chronological Age 10 years 2 months

Reading age – correctness	10y 0m
Reading Age-Understanding	9y 0m
Spelling Age	13y 9m

Wechsler Objective Reading Dimension (WORD)

Basic reading Age Equivalence	8y 6m
Spelling Age Equivalence	7y 0m
Reading Comprehension Age Equivalence	Not given

“Tendon Guard Reflex”

Dennison (2002) explains that under threat the psychological response to danger reflex comes into operation; the connective tissue over the back of the body shrinks, shortening the tendons in the back of the body and interferes with the individuals balance and sense of spatial awareness.

“When placed in new situations where there is too much information, the organism will respond by withdrawing or holding back.....if this has become a habit it can be difficult to release without training. When this reflex is active the person responds by withdrawing or holding back” (Dennison, 1994, p16)

Dennison (2002) explains that the muscles and tendons shortened by this Brain Stem Reflex need to be taught to relax to reset the proprioception to give the individual better access to the whole body brain system.

“The front portion of the brain, especially the frontal lobes, is involved in comprehension, motor control and rational behaviour necessary for participation in social situations.”
(Dennison, 1994, p16).

The researcher-teacher observed that the Tendon Guard Reflex was active in Pupil D and was restricting Pupil D’s ability to learn and cope with understanding numeracy,

Appendix 4D

“Dyscalculia definition specific to the nferNELSON Dyscalculia Screener developed by Butterworth (2003)”.

Butterworth (2003, p34) explains that a dyscalculic candidate lacks the understanding of numerosity; fails to understand that there is a quantity attached to a name given to a number. The individual would also have difficulty accepting that a group could be a non visible item. For example audible sounds, abstract ideas or tactile things. A dyscalculic is unable to recognize small collections of 2, 3 or 4 objects. This lack of numerosity understanding cripples an individual when dealing with arithmetical calculations

In interviews with teachers Butterworth (2003) was told that remembering number bonds to 10 was overwhelmingly cited as the worst problem that pupils struggling with maths were up against.

Yeo and Butterworth (2004) summarize the problems facing dyscalculics:

- Have a poor intuitive number sense.
- Retain a ones based concept of number often using fingers to answer questions.
- Cannot see easily the patterns in numbers. For Example $8=4+4$.
- Quickly forget facts and procedures which they learnt previously.
- Do not enjoy maths lessons and use avoidance tactics.
- Suffer from anxiety and fear of maths.
- Low self esteem and lose of confidence.

Yeo (2004) in reference to Butterworth and Dehaene’s research states

“the key areas for understanding and working with numbers is situated in the parietal lobes of the brain- a non language area of the brainbrain imaging research also points to the importance of the parietal lobes for intuitive, visual spatial, and non-verbal ways of representing numbers. It should be noted that the broader functions of the parietal lobes include visual-spatial processing, visually guided hand-eye co-ordination, finger control and attention orientation (Deheane et al., 1990)).” (Yeo, 2003, page 22)

Once the researcher teacher became aware of the connection in the parietal lobe of controlling finger movement and mathematics it made sense to question whether the Palmer Reflex (Refer to appendix 4E) had been integrated in the individuals being assessed as dyscalculic.

The nferNELSON dyscalculia Screener test 3 aspects

1. Dot Enumeration.

This compares dots with numerals and pupils need to be able to estimate the numerical value of the dots appearing on the screener.

2. Number Comparison.

The pupil larger of two numbers and must recognize and understand luminosity.

3. Arithmetic.

Addition sums are given to young children and multiplication to the older pupils.

When Pupil D completed the nferNELSON Dyscalculia Screener at 12 years months she counted the dots by touching each one on the screen. In the Arithmetic test she used her fingers for all calculations.

When the screener was administered at 13 years months Pupil D did not touch the screen or use her fingers once.

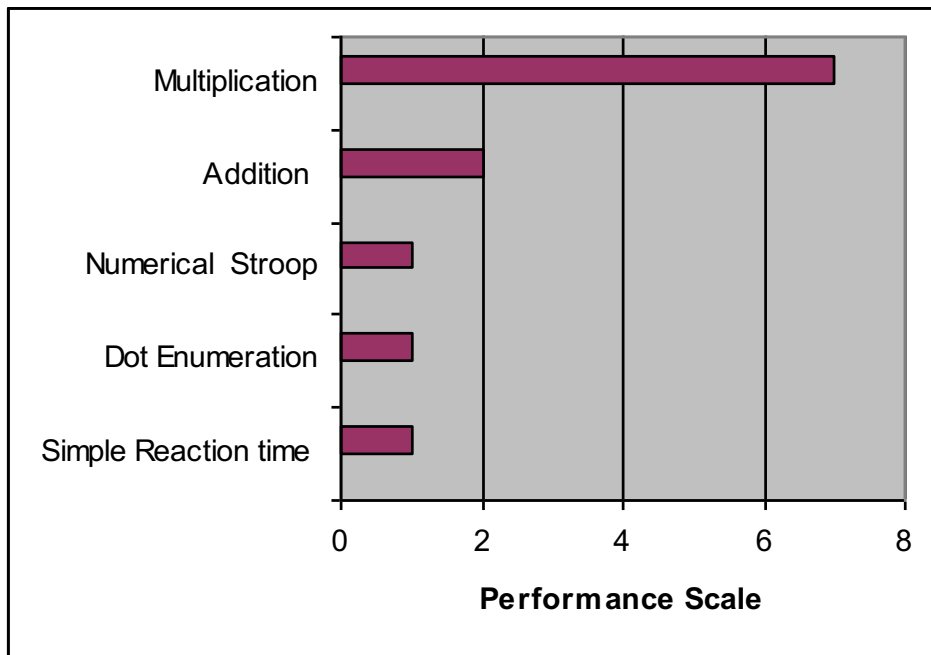
The researcher teacher has not used the other Standardized Mathematics Assessment because as Butterworth (2003, p) states there are many reasons why pupils can perform badly in arithmetic or mathematics tests. It could be illness, poor teaching, not enough time or too much time to enable the use of fingers, pupil attitude, or inappropriate teaching,

“However, there seems to be a group of pupils (and indeed adults) whose poor attainment in arithmetic cannot be ascribed to these problems. They seem to have been born with a deficit that makes acquiring numeracy skills particularly difficult...We have therefore developed the Dyscalculia Screener which provides a quick and reliable way of identifying dyscalculia, and to separate it from the other causes of poor numeracy attainment.” (Butterworth, 2003, P9).

Appendix 4 D (page 4)

“Dyscalculia Screener Pupil D Year 8”

Chronological Age 12years 6 months



The pupil has low performance in the two capacity tests and has guessed the answers of the achievement tests. This pattern of results is evidence of dyscalculia. Please refer to chapter 6 of the manual.

Adapted from Butterworth 2003

Appendix 4E

"PALMAR REFLEX"

Could it be that the pupils who need to use their fingers to count and calculate have a retained Palmar Reflex? Is using their fingers a natural way of helping the reflex to integrate

Yeo (2001) emphasises that if pupils are using their fingers to count in maths then they will not move on and develop mathematically any further. Dennison (1999, pi6)) also explains that retained reflexes demand first priority on the neural pathways when individuals have not successfully matured through them

Butterworth (1999) explores this issue when he poses the following question.

"Could it be that the representation of numerosities that we form in our brain has something to do with the representations we form of our fingers? Does the connection between fingers, space, and numbers explain why numbers are in the parietal lobe? " (page 219)

Butterworth (1999) reminds the reader of just how many hours children play with their fingers and play counting games with their fingers in their early years. It is therefore not surprising that meanings and values stick to these fingers. The teacher-researcher suggests that maybe Butterworth's research is providing evidence of the repetitive finger movements necessary to integrate the Palmar Reflex into the individual's central nervous system.

Hence the researcher-teacher introduction of one finger at a time Lazy 8's from the Brain Gym movements, Bracelets, Rings, from the Vision Gym movements, Wool 8's developed by Kinesiologist O'Hara, Hand Massage, Hand Gait Points, Wrist 8's as suggested by Hocking (1997).

Appendix 4F “The 5 Step Process”

Step 1:

Goal: This brings the individual's thinking to the frontal cortex area of the brain. It encourages the individual to decide what he or she wants to be able to do for themselves.

Step 2:

Pre Activity: A straightforward activity which mimics the action needed for the goal. This step enables the individual to understand and feel with muscles and memory his or her present memory and capabilities of the goal in Step 1.

Step 3:

Learning Menu: These are specific movements selected from the Educational Kinesiology (Brain Gym) discipline. The selection of these movements will vary depending on the individual's intrinsic needs related to the goal.

Step 4:

Post Activity: The activity from Step 2 is repeated and the individual notices the changes which have taken place. These will most likely be in the form of more automatic action, less stress and positive attitude to the carrying out of the goal in Step 1.

Step 5:

Anchoring: This makes an intentional association with the kinaesthetic muscle movement experience and the specific new learning associated with the goal in Step 1. The goal is read by the individual and perhaps a specific Brain Gym movement is suggested as a daily activity for several days.

Yeo (2004) developed an effective structured program to help the strugglers in mathematics. Intrinsic to this method of Yeo's is a pattern of 5 such as one sees on a playing dice.

"I do not know why these patterns work but by developing and experimenting I have found that these are the patterns pupils remember and can use to move on with their understanding of mathematics." (Yeo, October, 2002, Helping the Dyscalculic Pupil)

Educational Kinesiologists understand the importance of the **X** shape in relation to neurological stimulation.

"The X is the brain-organization pattern for crossing the lateral midline. Ideally, through completion in infancy of a series of one-sided and cross-lateral developmental steps, the left hemisphere moves the right side of the body and the right hemisphere moves the left. The whole brain learns through movement to work cooperatively, making both sides available for both receptive and expressive processes. The X is also a reminder of the Lazy 8, activating both eyes for binocular vision."

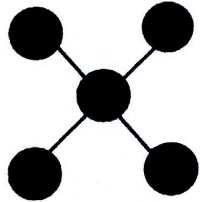
(Dennison, 1994, p15)

The researcher-teacher inspired by the basic 5 dice pattern used by Yeo uses basically the same patterns and Yeo's methods but superimposes the X shape for every number. To visually perceive the X is a powerful Educational Kinesiology tool encouraging the students to

"use both visual fields and to co-ordinate left-right body movements"
(Dennison, 1994, P15)

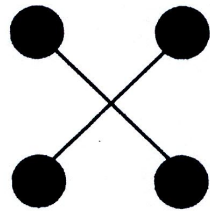
It is this X pattern which the researcher-teacher believes has helped Pupil D to remember the number patterns and become more numerate.

Appendix 4G (page 2)

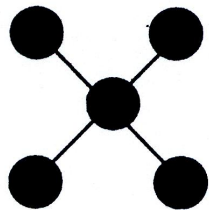


5

The pattern 4 is formed by removing the center dot. The pupil also is taught to remember the number bond $4+1=5$, $5-1=4$, $5-4=1$

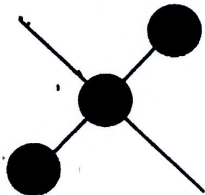


4



5

The pattern is formed by removing the 2 corner dots. The pupi also remembers $5-2=3$, $5-3=2$, $3+2=5$



3

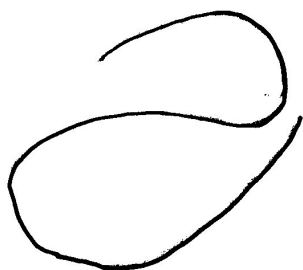
Appendix 4H

“Active 8’s”

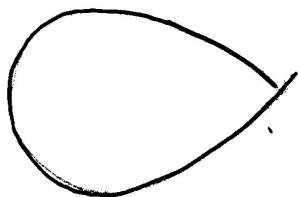
Pupil B is unable to form an Active 8 from visual memory.

As time progresses the formation is improving.

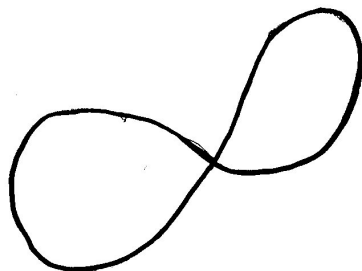
These examples help to explain why it has been impossible for the child to write with cursive script.



12 years 7 months



12 years 7 months



13 years 2 months

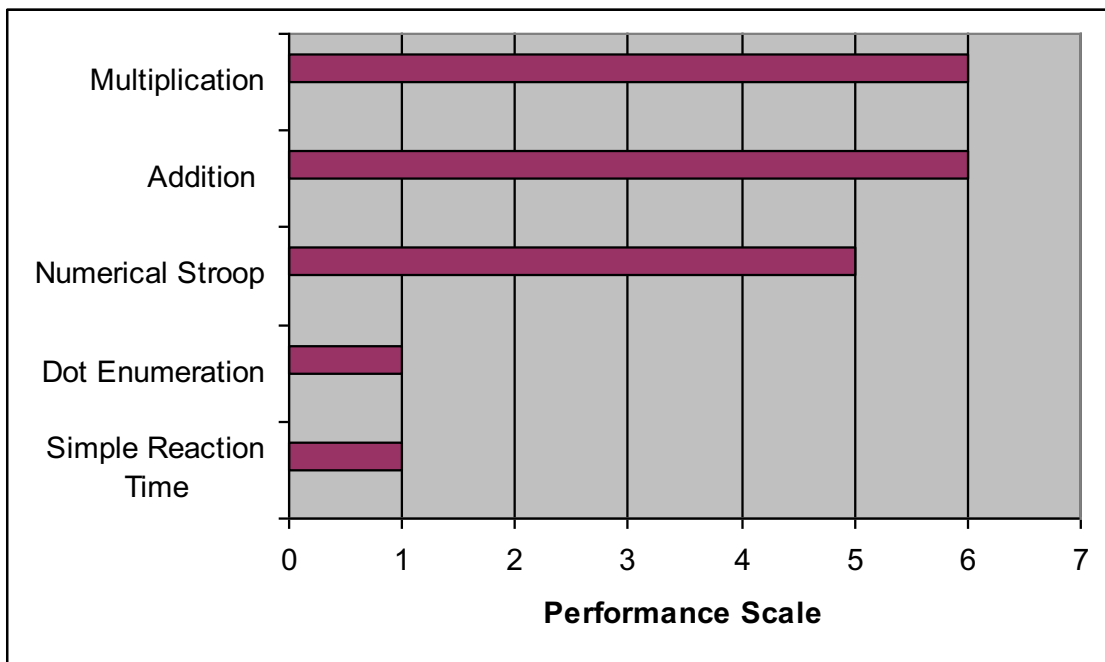
Appendix 4I “Movement with O’Hara”

O’Hara is a musician and Kinesiologist. He has designed a specialized program of movements and games for individuals to assist the progress and integration of the reflexes.

“Thereby helping behaviour, academic and intellectual development, along with posture, gross and fine motor co-ordination, vision and hand-eye co-ordination. All in all handwriting, reading, concentration and learning in general are assisted through these activities.” (O’Hara, 2004, page 6)

Appendix 4J “Dyscalculia Screener Pupil D Year 9”

Chronological Age 13 years 0 months



The pupil performs appropriately for their age-group in the capacity and achievement tests and is therefore unlikely to have dyscalculia.

Adapted from Butterworth 2003

Appendix 4K

“Parents Request for future Lessons Year 10”

- To understand money in practical terms
 1. to be able to count money up to £20
 2. to be able to give , and know how much change she should be given
 3. to be able to do simple problems involving money e.g. bills; 5 pairs of shoes at £20 will cost £100
 4. estimating using money

- to have some idea of the value of large numbers
- to be able to measure and weigh in practical terms e.g. grams and kilograms, metres and centimetres, litres and millilitres.
- To be able to recognize simple shapes and be able to copy them correctly.

Appendix 4L “Creative Vision and Vision Gym”

Creative Vision is the use of Edu-Kinesthetics to improve visual information processing and perception which may be blocked by the survival mechanism. It is a tool for the release of visual/postural compensations and re-establishment of whole brain processing.

Appendix 5A “Structured Phonic Program”

Year 2

Week 1

- Unable to read any word from “Crystan” by Mair Hughes.
- Unable to write the letters vowels.
- Pupil A did not to know the sounds of the letters.
- The teacher-researcher had to start again and replan for the second week.

Month 1

- Pupil A learnt the shapes and sounds of the vowels using wooden letter shapes from the “) Gam I Gam “ set.
- Unable to write the vowel letter shapes. They are reversed or distorted.
- Physically the child has to use great effort to get the pencil to move and then moves so quickly to form any sort of shape.

Month 2

- Emphasised “a” and “e”
- Taught with the wooden letter set the letters b,c,g,h,f
- Continually revised all the vowels
- Worksheets containing the 3 letter words in the form of consonant “a” consonant plus consonant “e” consonant
- Read from simple sh in Camu ‘Mlaen but pupil A could not read this sheet at all.
- SNAP games were made using the letters and words from the lesson. These were lent to the school for reinforcement work between the specialized lessons.
- It was also possible for these letter and word reinforcement games to be played at home.

Month 3

- Emphasised “i” and “o”
- Taught with the wooden letter set the letters ch, ff, gg, ng, h, j, l

- Continually revised all the vowels plus b,c,g,h,f
- Recorded new letters in the phonics book but the researcher-teacher had to do the recording. When the child did the writing the letters were incorrectly formed. The child could not remember how to form them. She had little pencil control.
- Worksheets containing the 3 letter words in the form of consonant “i” consonant plus consonant “o” consonant
- SNAP games were made using the letters and words from the lesson. These were lent to the school for reinforcement work between the specialized lessons.
- It was also possible for these letter and word reinforcement games to be played at home.

Months 4

- Emphasised “y”
- Taught with the wooden letter set the letter b
- Continually revised all the vowels plus b,c,g,h,f,h,j,l,ch,ff, gg, ng
- Recorded new letters into a word document. This was printed and glued into pupil A’s phonic book
- Worksheets containing “y”
- SNAP games were made using the letters and words from the lesson. These were lent to the school for reinforcement work between the specialized lessons.
- For Example ysgol, ystol, yma dyma, yna dyna .
- Stories with a tape were set to do weekly at home with her parents

Months 5

- Emphasised “w”
- A large cut out of the letter “w” was made with shiny glittering cardboard, glitter glue and felt
- Continually revised all the vowels plus b,c,g,h,f,h,j,l,ch,ff, gg, ng
- Recorded new letters into a word document. This was printed and glued into pupil A’s phonic book using the cut out, glitter method introduced in this month. It was hoped that this tactile experience would help pupil A remember the shapes of the letters.
- Words containing the letters consonant “w” consonant were recorded by the teacher-researcher in the pupils phonic book

- SNAP games were made using the letters and words from the lesson. These were lent to the school for reinforcement work between the specialized lessons.
- For Example wy, cwn, sws, cwt, bws
- Stories with a tape were set to do weekly at home with her parents
- Words were recorded on to a word document by the pupil and printed and glued into the pupil's phonic book.
- A game using 2 syllables was introduced to encourage the child to see whole syllable rather than just letters.

Months 6, 7 and 8

- Alphabet 8's were introduced to help with the letter formations
- Taught upper case letters from the beginning of o Gam I Game g T Ted
- large cut out of the letters were made with shiny glittering cardboard, glitter glue and felt
- Continually revised all the letters of the alphabet
- Recorded new letters into a word document. This was printed and glued into pupil A's phonic book using the cut out, glitter method introduced in this month. It was hoped that this tactile experience would help pupil A remember the shapes of the letters.
- Simple sentences from p17 o Gam I Gam were cut out, reformed and glued into pupils A's phonic book
- SNAP games were made using the letters and words from the lesson. These were lent to the school for reinforcement work between the specialized lessons.
- Stories with a tape were set to do weekly at home with her parents
- Words were recorded on to a word document by the pupil and printed and glued into the pupil's phonic book.
- A game using 2 syllables was introduced to encourage the child to see whole syllable rather than just letters.

Appendix 5B “Welsh Reading Test”

Prawf Glannau Menai Chronological Age 7 Years and 8 Months

Reading Age	5years 3months
Comprehension	5years 9months
Spelling	Less than 4years 6months

Appendix 5C “Pupil A Year 3”

Term 1

- The School and parents of Pupil A were given information about Educational Kinesiology (Brain Gym)
- Double Doodles, Active 8’s and Alphabet 8’s were used when appropriate with the child
- Reading was not possible
- The vowel sounds and letters were re taught to the child followed by the consonants
- SNAP games were played continuously with the child to reinforce letter recognition and saying and hearing the sound.
- Letters were cut out of stiff, glossy cardboard and glued into Pupil A’s phonic book.
- Rhymes and alliteration were used from “O Gam I Gam”
- Pupil A began to remember many of the letters of the alphabet and it was possible to play SNAP other games with 3 letter words to encourage recognition of whole words and “Look and Say”
- Sentences from p15 and 17 of “O Gam I Gam” were cut out, shuffled about and then rearranged and glued into Pupil A’s phonic book. Pupil A then read these sentences back.
- The researcher-specialist gained hope that Pupil A was beginning to recognize some words.

Term 2

- reinforce double letters
- Teach capital letter
- Syllable and 3 letter word recognition
- Encourage whole word reading from p15 to P30 of “O Gam I Gam” by Elisabeth Griffith
- Use rhymes and alliteration from “O Gam I Gam”
- Continuous use of Alphabet 8’s, Active 8’s and Double Doodles.
- Teach the hand and eye movements for cursive script based on Dennison’s (2003) method of bridging between Active 8’s.
- Make use of the Rhombus sheets inclined at 60 degrees to mimics cursive script.
- Using cursive script dictations using the letters and words she could read and spell.

Term 3

- Introduce the reading series “Dyma Ni”
- Teach capital letters
- Teach keyboard games and develop keyboard skills
- Use rhombus grids inclined at 60 degrees

Appendix 5D “Five Step Process Balances”

Brain Gym Balance 1: Term 2 Year 3

Goal: I am reading naturally.

Pre Activity: We discussed reading and how the Brain Gym movements are aiming to help the eyes work together and focus on words so that Anna can read naturally. Pupil A showed me the types of books she would like to read.

Learning Menu: Repatterning.

Post Activities: Pupil A immediately read through the book Dyma Ni . She was also willing to write some words in cursive script.

Conclusion: Mother was very interested in the entire set of activities and helped and supported me throughout the session.

Brain Gym Balance 2: Term 2 Year 3

Goal: To read “Yr Hen Gar”

Pre Activity: Looked and discussed the words, from the story, which had been written on large cards. The shape of the words was discussed.

Learning Menu Activities: PACE, Positive Points, Earth/Space buttons, Alphabet 8’s.

Post Activity: Pupil A was able to recognize all the words on the cards and could distinguish between the letter b and d. Pupil A was confidently able to write, dad, mam, and nain in cursive script.

Conclusion; Pupil A’s mother took great interest and learnt the Alphabet 8’s to use at home with Pupil A.

Brain Gym Balance 3: Term 3 Year 3

Goal: I know the sight words on the cards in the game SNAP.

Pre Activity: Pupil A read the whole words e.g. “croesi” rather than individual letters. “c” “r” “o” “e” “s” “i”.

Learning Menu: earth, space and balance buttons, elephant, owl, thinking caps, double doodles, active 8’s, alphabet 8’s.

Post Activity: Re did the reading of sight words as whole words not individual letters. More words were read than in the pre activity. Pupil A was willing to read from an unseen book and knew some of the words straight away.

Conclusion: Pupil A’s mother to help and encourage her do movement elephant during the week.

Brain Gym Balance 4:

Term 3 Year 3

Goal: I am swimming on the surface of the water, raising my head and breathing every time I do a stroke.

PreActivity: She acted out swimming in the pool and showing what was going wrong.eg filling her mouth up with water, choking and sinking.

Learning Menu: 3 dimensional repatterning

Post Activity: Demonstrated her swimming motions. This time they were well coordinated and smooth.

Conclusion: I taught the mother how to play with double doodle art and she will do these activities with the pupil over the summer holidays.

Brain Gym Balance 5:

Term 1 Year 4

Goal: I am able to read the sentences Miss has written for me.

Pre Activity: Pupil A dictated a sentence to me and then read it back. Pupil A read page 1 of "Ar ol y Parti"

Learning Menu: Creative Vision movements and "Bean Bag" activities to help TNR

Post Activity. I wrote a sentence dictated by pupil A and she read it back well. Pupil A also read more of the story "Ar ol y Parti."

Conclusion; Pupil A will play with the wooden Active 8 and marbles and the "Bean Bag" games.

Brain Gym Balance 6:

Term 2 Year 4

Goal: I am able to colour the pictures which i am drawing well.

Pre Activity: Pupil drew and coloured.

Learning Menu: XSPAN Balance.

Post Activity: Pupil drew and coloured.

Conclusion: Pupil pleased with her result.

Appendix 5E

"Handwriting Pupil A"

Year 2

Mae cat yn pap.

Mae lloes itiau
i thal

Year 3

Mae Pw ar ei
ben ei ~~hath~~ hwn.

Mae gŵn Pw ei
fain ei hwn.

Year 4 Term 2 The pupil has printed the sentence

Robbly robin
n g o h c y n
o u r

The same sentence using cursive script 5 minutes later

Ra @ dd y
ro bi n g o ch
y n o @ r

Year 4 Term 3

mae Billi
y tu aua
i Slop Mrs
Raci .

Rydwi ei Siau
aros yna
am byth.

Appendix 5F “Pupil A Welsh Reading Test”

Prawf Glannau Menai Chronological Age 8 Years and 8 Months

Reading Age	5 years 3 months
Comprehension	6 years 9 months
Spelling	6 years 6months

Appendix 5G

“British Ability Scales II chronological age 9Years and 2 Months”

Test	Percentile
Word Definition	24
Verbal Similarities	14
Matrices	62
Quantitive Reasoning	7
Recall of Designs	46
Pattern construction	14
Recall of Digits	18
Recogniton of Pictures	96

Appendix 5I “Pupil A Year 4”

Term 1

- The pupil could remember the lower case letter –sound combinations post the 6 week summer holiday. She could also remember many upper case letter-sound combinations.
- Problems with B,b/d/p reversals c/g, m/n and double letters in Welsh
- The pupil could succeed in playing the Stile tray games matching words to words and pictures to words.
- Pupil A was able to complete worksheets y filling in the blanks and doing word searches.
- The researcher-teacher introduced typing skills which also reinforced letter-sound combinations using both upper and lower case.
- Pupil A could write simple sentences as dictation using cursive script eg. Bydd dad yn cysgu.
- Pupil A began to be able to play SWAP and SNAP games using multisyllable words.
- Pupil A began to succeed in reading books such as “Y Parti”, “Y Dyn Eira”, “Ar ôl y Parti”

Term 2 and 3

- Consonant-vowel –consonant word recognition
- Cursive script
- Dictations from “O Gam i Gam” by E.Griffith
- Use of Stile for reading and recognition of words
- Card game NEWID word recognition
- Double letters
- Frequently occurring words e.g. roedd, chwarae
- Typing skill program
- Emphasis of prople letters p/b/d, c/g, g/p, t/f, B/b, D/d, P/p, th/dd, ff/ph
- Reading sentences, paragraphs or pages from “Dyna Ni2”, “Y Parti”, “Ar ol Y Parti”, “Chwarae”, “Rob Ben a y Ser”, “Ar Foe Oer”, “Speic”

Appendix 6A

WISC III Psychological Assessment

Name of Test	Raw Score	Standard Score	Age Equivalent
Information	10	13	8.2
Similarities	12	14	9.2
Vocabulary	22	13	8.10
Comprehension	20	17	10.2
Arithmetic	12	10	6.10
Digit Span	9	8	6.2
Picture Completion	15	12	7.10
Picture Arrangement	19	12	7.10

Reading Assessment WORD

WORD Basic Reading	Below Average		
WORD Reading comprehension	Below Average		

Appendix 6B

"Handwriting"

Year 2 Term 2

Mae mam a sam y ny ⁹ r. ✓

Dwl yn hoffi llyma nam. ✓

Du ma da y ny fan. ✓

Mae gan mam ham. ✓

Mae gan y cat yn h. ✓

Term 2 Year 2

Mae gen da _a ham. ✓

Mae sam ar y mat. ✓

Mae lo cam i ben y dery. ✓

Mae het gen _a Ted. ✓

Mae lo pêl ar y mat. ✓

Appendix 6 C

Prawf Glanai Mennai

Pupil C's chronological Age 7 Years 4 months

	Standard Score	Reading Age	Percentile
Reading Accuracy	88	6y 6m	22
Reading and Understanding	89	6y 6m	24
Spelling	87	6y 0m	20

Appendix 6D

Year 3 Term 1

Dydd Llun ydi
hi. ✓ da iawn

Mae y car yn
chwyd i gyd.

Mae car Rhys

yn rhy her i fynd i
ben. y rhwng

ydi ei chof yn sych.
Da iawn ✓

Mae di bach gan
Bach gl mam. Ichi ✓

Mae cath yn y sach. ✓

arddrols

Mae chwiler gan mam. ✓

Year 3 Term 3

Rodd Sioned a Sian
yn chwatae fêl. ✓

Year 3
Term 3

Gwnaeth y ddwy chwaer
caestall ar y blaen. ✓

Mae angen Paeri ar bent
Caerdyddleni. ✓

ardderchog

Mae'r

Mae'r Cym bach yn ddol o
hysel. ✓

Mae'r Cym bach yn ddol yn
y nyth o hysel. ✓

A fydd y gath yn lladd y Cym
bach? ✓

Kid y Cym bach dilyn yr nyth? ✓

Dydi y mam y Cym bach byth yn
i'r nyth. ✓

Mae'r Cuch coch ar ddwr y
llyn ✓

gwah
ardderchog!

Appendix 6E

Prawf Glannau Menai

Pupil C's chronological Age 7 Years 4 Months

	Standard Score	Reading Age	Percentile
Reading Accuracy	88	6y 6m	22
Reading and Understanding	89	6y 6m	24
Spelling	87	6y 0m	20

Appendix 6 F

Prawf Glannai Menai

Pupil C's chronological Age 8 Years 4 months

	Standard Score	Reading Age	Percentile
Reading Accuracy	89	7 y 6m	24
Reading and Understanding	98	8y 0m	45
Spelling	76	7y 9m	20

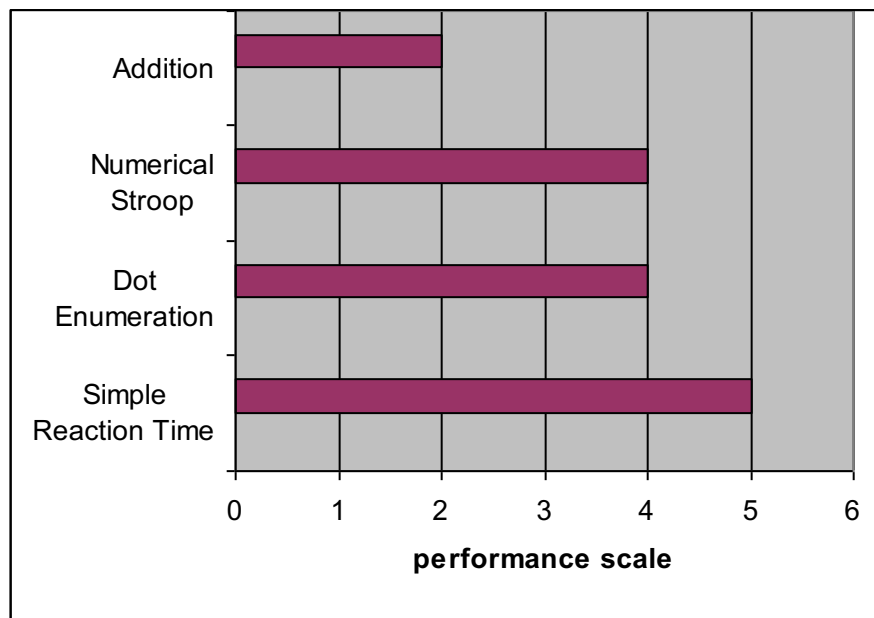
Basic Number Screening test - Gillham and Hesse

Pupil C's chronological Age 8 Years 4 months

Number Age	Standard Score	Percentile
7 Years 9 Months	87	20

Appendix 6G “Dyscalculia Screener Pupil C”

Chronological Age 8 years 4 months



The pupil performs appropriately for the age-group in the two capacity tests. However, arithmetic achievement is low and his pattern of results suggests that the pupil is not failing in arithmetic because of dyscalculia. Please refer to chapter to chapter 6 of the manual.

Adapted from Butterworth (2003)

Appendix 6 H

Year 4 Term 1

Doedd niw gwydd wedi gweld
+ turci turci turci
Dihunodd Siôn a Siâna
pharatoi
phara toi i fynd allan.
pharatoi
pharatoi pharatoi.

Year 4 Term 3

Hottun furd is siwe gysla
 sy flundiau. ✓

Yn y dōs barthog fynydd
 is plant.

Gorodd Swyn hyd yn y
 ffair. Swyn hwyd

Mae ddyth @ blant

Wedi Myned Dawy y gwydel.

gwydel.

Appendix 6 I “Educational Psychologist Assessment”

Prawf Glanai Mennai

Pupil C’s chronological Age 8 Years 9 months

		Reading Age	Percentile
Reading Accuracy		8y 3m	34
Reading and Understanding		9y	63
Spelling		9y 0m	55

Neale Analysis of Reading Ability Test

Pupil C’s chronological Age 8 Years 9 months

	Reading Age	Percentile
Reading Accuracy	7 y 3m	20
Reading and Understanding	7y 0m	22
Spelling	6y 1m	2

BAS Basic Number Skills Test -

Pupil C’s chronological Age 8 Years 9 months

Number Age	Percentile
8 Years 5 Months	47

Appendix 7A “Year 1, 2 and 3 Reports”

Year 0

- Pupil B has settled well into school and has been a happy member of the classroom.
- He recognizes letters of the alphabet and has read a number of books from the Reading Scheme.
- He enjoys practical mathematics and all aspects of the mathematics scheme.
- He recognizes numbers to 10 and knows their value. This is of help with addition and subtraction.
- He enjoys drawing colourful pictures and makes an effort to write his own sentences.
- He also shows an interest in science, Music and Creative Activities and enjoys PE and dancing lessons.
- He speaks Welsh at all times in the classroom.

Year 1

Mathematics

Enjoyed and showed interest in the work-has quite good understanding. Made progress but needs to concentrate better to complete the tasks.

Welsh

Oracy

Contributes regularly and usefully to class discussions.

Reading

Shows improvement needs more confidence to read new words

Writing

More independent-can writes short sentences.

English

Listens well and contributes intelligently

Reading

Has not had an English reading book yet as he needs more time to establish Welsh reading success first.

Music

Enjoys listening to music and singing.

Year 2

Mathematics

Pupil B has gained a good understanding of mathematical work. Mental work is very good. Can use and apply his skills to many tasks.

Welsh

Oracy

Always eager to contribute to class discussions. Listens well.

Reading

Has made good progress-more meaningful

Writing

Shows improvement-needs to concentrate more on his spelling.

English

Oracy

Speaks intelligently and fluently

Reading

Made good progress throughout the year.

Writing

Can write short sentences to describe his pictures – tends to form words phonetically.

Music

Enjoys music lessons.

Performs confidently on his own and as a member of a group.

February 2001: Report Sent to Authority requesting specialized help with literacy skills

The nature of the learning difficulty

Continues to write incorrectly, confuses letters of the alphabet, vowel digraphs are weak, and does not understand what he has read. Reading aloud is incorrect and it is difficult to understand his hand writing. Sentences are very untidy and his spelling is weak.

Special Educational Provision

The School's Provision

Individual daily attention every now and again from the class teacher. Using O Gam I Gam and Alpha to Omega

Provision from the Education Authority.

Hour of help weekly by a specialist teacher qualified to teach dyslexic students.

Help from Parents at home

Reading books read at home with parents help and support.
Parents also implementing other help.

Year 3

The wltch di dric fot sch
He sat cw the s/inch.
The man ney to held him
and his deal nit the g/c
the twmp wd from bly
bed can to sit in the mwt

Appendix 7 C “ WISC III Assessment of Pupil B”

Chronological Age: 8years 2 months

Verbal sub-tests

	Ability Range
Information	Average
Similarities	Superior
Arithmetic	High average
Vocabulary	High average
Digit-Span	Low Average

Performance Sub-tests

	Ability Range
Picture completion	High average
Coding	Below average
Picture Arrangement	Average
Block Design	High Average

This assessment stated that pupil B functioned in the average high ability range in comparison to pupils of the same age.

This means that the school and parents knew that Pupil B was capable of understanding the curriculum and developing knowledge appropriate for the different Key Stage levels.

The up and down profile was also an indication of specific learning difficulties which helped to explain Pupil B’s challenge with spelling, reading and arithmetic.

These results indicate that Pupil B will need time to produce answers. Answering questions quickly will be a challenge. Expecting quick responses could cause Pupil B to freeze up, unable to think.

The coding test requires similar skills to those needed to copy handwriting from the board or a book. It is an indicator of writing difficulties, fine motor control, which is related to dyspraxia.

Pupil B has poor visual discrimination and reading difficulties because he cannot discern differences in similar letters and words without specific training.

Teach to convert auditory to visual memory. The pupil cannot answer spelling fast because he has to visualise it in his mind and then read it off.

The combination of low processing speeds (coding) and short term auditory memory (digit span) problems clearly explains the inability to do mental arithmetic quickly.

Consider reducing the volume of work required if the pupil struggles to finish work in a reasonable amount of time.

Appendix 7D “Recording Mathematics Key Stage 2”

17 Mae 424 o blant yn mynd i Ysgol Dewi Sant.

(a) Dydd Llun, roedd 4 disgybl yn absennol o'r ysgol.

Pa ganran o'r disgyblion oedd yn absennol ddydd Llun?

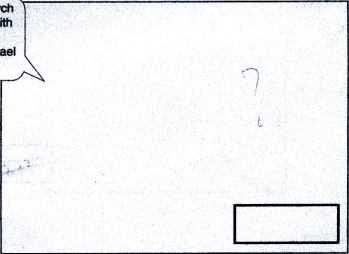
Rhowch gylich o gwmpas un o'r canrannau isod i ddangos yr ateb bras.

1% 2% 3% 4% 5% 10%

(b) Dydd Mawrth, roedd union $\frac{3}{8}$ o'r 424 disgybl o Ysgol Dewi Sant wedi mynd ar daith ysgol.

Faint o'r disgyblion oedd wedi mynd ar y daith?

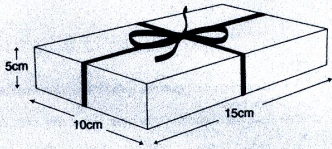
Dangoswch eich gwaith cyfrifo. Gallech gael marc.



17 Cylfarwng allan o 4

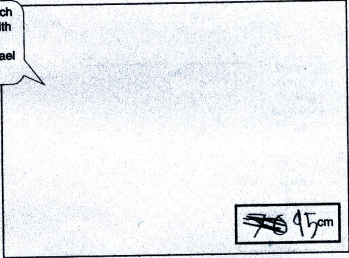
18 Mae Steven wedi clymu rhuban o amgylch y blwch fel yn y llun.

Mae Steven yn defnyddio 25cm o'r rhuban i glymu'r cwlmw ar dop y blwch.



Beth yw cylfanswm hyd y rhuban mae Steven yn ei ddefnyddio?

Dangoswch eich gwaith cyfrifo. Gallech gael marc.



18

Appendix 7E “Key Stage 2 SATS Results”

Mathematics Level 5

Science Level 5

English Level 5

Welsh Level 4 (amanuensis not granted)

School Assessment

Mathematics Level 4

Science Level 5

English Level 4

Welsh Level 4

Appendix 7 F

“Occupational Therapist and WISC III Assessment”

WISC III

Chronological Age: 10years 8 months

Verbal sub-tests

Ability Range

Information
Similarities
Arithmetic
Vocabulary
Digit-Span

Average
High Average
Average
High average
Low Average

Performance Sub-tests

Ability Range

Picture completion
Coding
Picture Arrangement
Block Design

Low average
Well Below average
High Average
High Average

Appendix 7 F (page 2)

Occupational Therapy Assessment

Chronological Age: 10years 11 months

	Standard Score	Percentile Rank
Bruininks-Oseretsky Test of Motor Proficiency	30	2
Development Test of Visual Motor Integration	87	19

Appendix 7G

“Mathematics Assessment Year 7”

Number Work	34%	page 2
Mental Maths	51%	page 3
Algebra, Statistics, Shape and Space (this mark was much higher than the class average)	85%	page 4-6
Average Overall Mark	72%	

Teacher comments:

Please ask more questions
and improve the Mental Maths

Number Work

1. Cyfrifwch heb ddefnyddio cyfrifiannell.
 (a) 20×14 (b) $960 \div 30$

2. Cyfrifwch gan ddangos eich gwaith yn llawn
 (a) 34×21 (b) $1395 \div 31$

3. Dyma deli yn dangos dull teirho diwybllon un dosbarth wrth iddym ddod i'r ysgol:

Dull	bws	car	beic	cerdded
refer	12	14	2	8

Llunwch siart cylch i ddangos y wybodaeth yma.

4. Cyfrifwch gan ddangos eich syniau

(a) 4.66×18.305

$$\begin{array}{r} 4.66 \\ \times 18.305 \\ \hline 23.5270 \\ 139.8600 \\ 373.2600 \\ 839.1600 \\ 93.2400 \\ \hline 85.30570 \end{array}$$

(b) $18 \div 7.682$

$$\begin{array}{r} 18 \\ \div 7.682 \\ \hline 2.343 \\ \underline{5.526} \\ 2.4740 \\ \underline{5.0556} \\ 418.440 \\ \underline{418.440} \\ 0 \end{array}$$

(c) 18.2×6

$$\begin{array}{r} 18.2 \\ \times 6 \\ \hline 109.2 \end{array}$$

(d) $68.5 \div 5$

$$\begin{array}{r} 68.5 \\ \div 5 \\ \hline 13.7 \end{array}$$

Cyfrifwch heb syniau

(e) $8.7 \times 10 = 87$ ✓

(f) $0.54 \times 100 = 54$ ✓

(g) $58.9 \div 10 = 5.89$ ✓

(h) $764.6 \div 100 = 7.646$ ✓

5. Mae blwyddyn 7 yn gennod arfordd i waddi canol awstralia sydd mewn rheol. Dyma deli i ddangos eu canlyniadau.

Nifer mewn rheol	Nifer o ddiarcho
30	$30 \times 90 = 2700$
31	$31 \times 90 = 2790$
32	$32 \times 90 = 2880$

9) Cyfanswm 100

(a) Canllawech y galarfa olef yn y tabl.
 (b) Addech y canllaw i gael y ddau gyfanswm
 (c) Cyfrifwch y gymedr. 31

Mental Maths

Handwritten solutions for mental math problems, including calculations, diagrams, and multiple-choice answers.

1. 120 ✓ 12 108

2. 29 ✓ 30

3. 80 ✓ 8

4. ~~115~~ ✓ 45 murud

5. 5 cm ✓ 1.48m 1.51m

6. 4.5 ✓

7. 6 millir ✓ 42 millir

8. 0.15 ✓

9. 20 litr ✓ 5 litr 50km

10. £ 70 ✓ 7c 900

11. 82 ✓ 20% 30

12. 15 ✓ $P = \frac{1}{2}ab$

13.

14. 10 ✓

15.

16. 5 ✓ £1.50 33c

17.

18. 4 ✓

19. 21 ✓ 19 13 15 27

20. £ ✓ £2.00 8

21.

22. 10 cm ✓

23. 4 ✓ 10, 11, 13, 10, 15

24. 213 ✓ $213 \times 17 = 3621$
 $3621 + 170$

25. 1409 ✓

26. 4 ✓

27. 72 ✓

28. 34 ✓

29. 170.5 ✓ 17.05

30. 0.2 ✓

Algebra
Statistics
Shape
Space

6. Lloosoch y rhifau gyda 10 - nid oes angen symbol. W. Adran Fathemateg

a) $23 \times 10 = 230$ b) $242 \times 10 = 2420$

Lloosoch y rhifau gyda 100 - nid oes angen symbol.

c) $16 \times 100 = 1600$ d) $457 \times 100 = 45700$

7. Gemwrth Taz aroleg. Gofynnodi i ddau ddeudbarth cofrestru pa dim paktroed roeddent yn ei gefnogi. Defnyddiodd rhiciau (tali) i gefnodi.

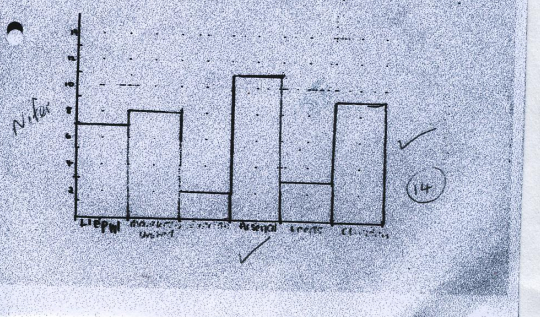
Tîm	Tali	Cyfanswm
Lerpwl		7
Manchester United		8
Everton		2
Leeds		11
Chelsea		9
	Cyfanswm	46

a) Gorfennoch y tabl. ✓

b) Faint o ddwygylion sy'n cefnogi Lerpwl? 22 ✓

c) Faint o ddwygylion sy'n cefnogi Everton? 2 ✓

d) Lliniach start-bar i ddangos sic'h canlyniadau.



8. Mae 720 weid genned aroleg ar sut mwynt yn cael eu clasu. Mae 12 yn defnyddio'r ffrustr.

W. Adran Fathemateg

a) Faint sy'n mynd adeir i gino? 3 ✓

b) Faint sy'n cael brechdanau? 6 ✓

c) Faint sydd yn y deubarth? 24 ✓

9. Beth yw enwau yr onglau canlynol? (ongl lem, ongl, atblyg, sgwâr, syth)

a) lem ✓

b) atblyg ✓

c) atblyg ✓

d) sgwâr ✓

e) sgwâr ✓

f) sgwâr ✓

Yr Adran Fathenwyg

11. Cyfrifwch yr onglau sydd wedi eu harsio gyda llythyren. Dangoswch eich gwaith.

a) $\frac{180^\circ}{120^\circ} = \frac{110^\circ}{x}$
 $\frac{180}{120} = \frac{110}{x}$
 $180x = 13200$
 $x = 73.33^\circ$

b) $\frac{110^\circ}{210^\circ} = \frac{36^\circ}{x}$
 $\frac{110}{210} = \frac{36}{x}$
 $110x = 7560$
 $x = 68.73^\circ$

c) $\frac{110^\circ}{210^\circ} = \frac{36^\circ}{x}$
 $\frac{110}{210} = \frac{36}{x}$
 $110x = 7560$
 $x = 68.73^\circ$

d) $\frac{110^\circ}{210^\circ} = \frac{36^\circ}{x}$
 $\frac{110}{210} = \frac{36}{x}$
 $110x = 7560$
 $x = 68.73^\circ$

12. Beth yw enw'r ddau driongl isaf?
 Triongl a) isogones Triongl d) hafal ochlog

13. Rhwng y canlynol mewn trefn gan ddechrau gyda'r lleiaf:
 0.07 0.707 0.077 0.7
0.07 0.077 0.7 0.707 (10/10)

Yr Adran Fathenwyg

10. Mesurwch yr onglau

a) 51°

b) 51°

c) 10°

d) 70°

Yr Adran Fathenwyg

11. Cyfrifwch y canlynol gan awed eich gwaith yn gywir. Dangoswch eich swyddu.

a) $4.5 + 3.2 = 7.7$

b) $2.8 + 7.9 = 10.7$

c) $23.4 + 17.7 + 8.2 = 49.3$

d) $12.4 - 4.5 = 7.9$

e) $12.4 - 4.5 = 7.9$

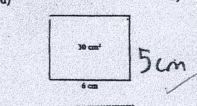
f) $12.4 - 4.5 = 7.9$

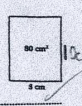
12. Beth yw perimedr y sioptas yma?
 110cm 60mm 20cm

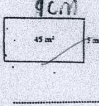
13. Cyfrifwch arwynebedd y sioptas yma:
 450cm² 60cm² 70cm² 108cm²

Yr Adran Fathemateg

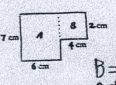
16. Darganfyddwch yr hyd neu'r lled coll:

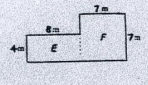
a)  30 cm^2
 6 cm
 5 cm

b)  80 cm^2
 8 cm
 10 cm

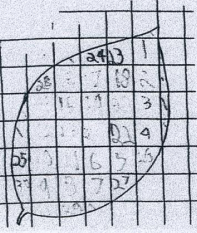
c)  45 cm^2
 7 cm
 9 cm

17. Cyfrifwch arwynebedd y siapiau yma.

a)  $B = 6 \text{ cm}^2$
 $A = 16 \text{ cm}^2$
 22 cm^2

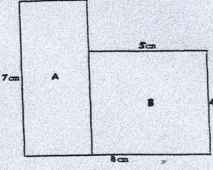
b)  $F = 4 \text{ cm}^2$
 $E = 16 \text{ cm}^2$
 20 cm^2

Amcangyfrifwch arwynebedd y ddielen drwy gyfrifo sgwariau: 30 cm^2



Yr Adran Fathemateg

Darganfyddwch arwynebedd y siap yma:



$B = 20 \text{ cm}^2$
 $A = 16 \text{ cm}^2$
 36 cm^2

Aihsygrifwch gan ddefnyddio rheolau algebra:

(a) $f = 2 \times g$ (b) $d = e + f$ (c) $r = 2 \times s + 1$

$f = 2g$ $d = e + f$ $r = 2(s + 1)$

21. Symleiddwch:

(a) $d + 2d + 3e + 6e$ (b) $8f + 5g - 2f - 7g$

$3d + 9e$ $6f - 2g$

22. Os yw $a = 2$ $b = 5$ $c = 8$ cyfrifwch werth

(a) $2a + 3b$ (b) $\frac{c}{a}$ (c) $2ab - c$

19 4 12

(12)

Yr Adran Fathemateg

23. Edrychwch ar y rhifau yma

x x x x x
 13357

Cwblhewch

(a) cyfanswm y rhifau = 20

(b) cymedr = $\frac{20}{4} = 5$

canolrif = 3

modd = 7

amrediad = 5

(3)

Appendix 7H

My grandmother

English Exam

Her neim is mij. Thes is haw she lwcs waet long haer, a bawt a sais of a tinai, afri taim I can rimembor she wers trawsis and nomaei a t short.

My grandmothoer is fferi fit wen she comes from Astralia she gows worcing efri were with my mum and me. Won of her feifrat wocing pleisis is arawnd the laci.

Her hobisi is fishing, worcing, Golf and raiting. She's not the best at Golf ecsept she's briliant at fishing. I can rimembor wen i was fishing with her and she cot thre fishis.

I thinc that my gran is caind efon ddo wen I was smol i can rimembor gowing for a worc widd her and getting a raw of her for standing on the lein wen a car ceim past. Bot on the yddy hand she got a lot of hiwmor.

She lifs in astralia in Pitobara tis a rili nais pleis she nos of the histori of the plaes. Thers milions of shiprecs arawnd ther.

6/20

Haw fit old pipal ar.

My gran warcs abawt 2 mails a dai. Byt not mowst old pipal don't warc a lot. I thinc thae shwd warc a bawt a maial a day and thae shwd haf fitnis clybs for old pipal.

My gran has gows to plae golf. She startid plaing golf to haf a warc. Ol old pial shwd dwo thinc is best for them and cip fit.

6/20

The deth row

I cym from America byt i maygraitid to Brityn aftor my dredfyl Experience prison. Do you wont to her the stori? Yes. An *engaging story*.

It startid wen i wos in uiwnifysate. I wos hafing a parti with my maits wen won of my maits went in to my rywm to boro sym books. Wen we caim back i mystaf fgotyn to lock the bedroom door and symwon mystaf cripd in and stolyn my gun that i had cept for self difens. The pyrson that had stolyn my gyn had shot a welthe man he mystaf been an asasin because he had choson a pyrfect taemeng to stel the gyn. I had ben awt to colet sym mor drincs for the parti.

Wen i had caem back there wos polis syrching the rywms for ani efydyns and the asasin had crepd awt pwting the gyn back where it bilong. I wos twc to cystde and then to cort.

Faif wics laitor i wos taicyn to cort where i wos stod to trail.

The cort rwm where i wos stod to trail wos a big room with mane pepl siting in rows on rows.

Efriwon sydanli went cwaiot as a man spowc he said "Jon Jowns has bin charchd of mydryr. He shal spic his craims a gainst him" "He had a gyn in his rwm with his fingar prins on it and the gyn containd a bwlit that had bin the saim as in the bode of the ded man and he wos not in the parti at the taim of the mydryr." "Ni his difens" said the Jyj. My frend rows up and said "I went to his ryw to powt sym books back wen he had gon to get sym food and the gyn was stil there." Then aftor the Joore had gon awt of the room to desaid fi i was gilty or not. Wen thea ceim back in thea said " We haf desaidid That he is gilty of mydr."

The jyj said "If that is so he sal be exsiciwtid" Aftry that I can not rimebor for i wos sent to prison. I was maid to stai there for twelf irs.

I wos in a smol sel with a desc and a fiw aitms and a bed with a blancit and a matrys. I onli had sym fisitors my Mym and Dad and a cypl of frens thae ol said that thay wyr faiting for my cais.

Won day i wos sent to a van and took to a bilding ner the prison. I niw i wos gowing to the deth caembor to be exsiciwtid. As i stept in to the deth chaibor there wos a there wos a pin

with a licwid in it. I niw there wos a poisyn
that wyd cil me as i wos cymandid to sit dawn
i sat on a yprait chere.

The necst secynd there wos a bang as the
door opynd and a man worcd ran in saing "The
lor has said that the shwd not cil him and he
swd bi frid for thae haf fawnd efydys that he
swd not be cild"

Wen I hyrd this I faented. Wen i woc up i
wos in my Mym and Dads haws. The gyfamat
wos swsd and my Mym, Dad and me wyr
going to maigrait to Briton and lif in scotlynd.
With the myni we had we disaidid to maic a
wydland arior in scotlan and protes abawt
captil pynishmynt.

That is wot is the wyrst theng that can
hapyn to you. It took mi too iyrs to ricyfyr
from the madnys.

you have obviously carefully
considered your ideas for
the story.

Unfortunately your spelling has
to be taken into consideration

9 | 1
 17 | 17

2	<p>1. It was small and desks crammed together and he had expected it to be a big football sized field place.</p>
2	<p>2. 'Liddy was the sports editor and had a razor-sharp tongue. It explains that he wants everyone that is under him in his job to speak formally to him.</p>
2	<p>3. 'I knew that my real test would come when the annual Five Nations Rugby Championship got under way and the Limerick Leader despatched me to Paris to cover the game. The editor of the newspaper could have sent any other reporter that had been working there longer than Fergal Keane but he decided to send Fergal Keane because he thought he made a better story.</p>
3	<p>4. The writer used short sentences, for example, 'We were horrified' and 'They were not just bad. Why?' From line thirty one Fonsie and Fergal Keane are enjoying themselves and in the middle of the story they get all afraid and then in the end they are saved and they are all happy. He makes the story tense by using short sentences and uses similes like 'They're like blooming ants down there.' - W. M. O'Connell? The passage ends with Fonsie and Fergal are on the verge of being sacked and then luck comes out of nowhere and they get congratulated for making the best sports page of the year.</p>

More detail needed.

Create suspense.

Section B

Well described The boat was wobbling a little bit in the salty sea wind. The sun was shining as bright as it ever had been it looked like it would be a clear day.

The sailor looked out onto the horizon. He was a young sailor who hadn't been fishing for long. His name was John. His hair was as messy as a mop that had just been used to mop up a football pitch.

Good use of a simile

As the day went on and the fishing boat had caught more and more fish and the crew were getting happier and happier. The weather turned against them. There was a strong northerly wind that brought dark, black clouds. With that came the night and it was pitch black.

The sailors decided that they might as well turn back and keep the fish they had got instead of taking the risk and staying out in this stormy weather.

As they headed back a huge wave came and rocked the boat nearly till it was on it's side. Then after this came another one and every one had to cling on to

what they could reach or they would be toppled into the freezing cold water.

They managed to steady the boat and they decided it would be easier to let the waves take it in, instead of trying to tackle and go faster than the waves. This was one of the worst decisions that they could have done.

A huge wave hit the back of the ship and sent the Captain flying off the bridge into the black pit of the salty freezing water.

GOOD

John was the closest to the wheel so he tried to scramble up the stairs to the bridge. When he did this a wave hit the boat and it span the boat so it wasn't facing the land anymore and it was more vulnerable to the waves, and John managed to grab the railing before he was flung also into the sea.

Lively
verbs
used
GOOD

When he reached the bridge and grabbed the wheel and steadied the boat somebody shouted from down below "watch that rock that's right in front of us but don't turn too sharp or we'll all be flung into the sea". John bellowed back "what did you just say?"

"I said to watch that rock that we're about to bang into."

When John saw the rock

he swerved the boat just in time and it scraped the edge of the rock and you could hear a grinding noise on the edge of the boat.

Unluckily for the crew they had just gone into shallow water with lots of big sharp rocks. With a bang the boat had found itself split in half after it ran into a solid rock.

The crew had all fallen into the sea and tried to swim for a close rock. They all died before they reached the rock in the freezing cold water. The last one of them with their head above water was John. He managed to grab a rock but as he clung onto it a wave came and covered him with water.

He was still clinging on the rock several days later when a life boat came out in search for them.

14
17

Well done, you have carefully managed to sustain some excellent detailed description. I am especially impressed by your wide and varied use of vocabulary.

Could the ending have been better? It ends rather abruptly.

Next time use short sentences to create a dramatic and tense atmosphere.

Ewch i feirhad gofleda,
gofleda i feirhad gofleda,
cwmant a gofleda dros
cwmant i feirhad gofleda,
ymalen i feirhad gofleda.

Appendix 7J

“Mathematics Assessment Year 8”

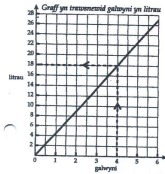
Pupil B scored 9/20 and the teacher wanted to move him down a set. (see page 2)

A meeting was arranged between the parents, SENCO and mathematics teacher.

The parents explained that the pupil had not had enough time to complete the paper. Pupil B had had only enough time to complete 3 of the 5 questions.

Following the meeting Pupil B remained in the top set and was subsequently allowed enough time to complete mathematics tests.

1 Mae'r graff yma'n tynnuodi galwysu yn litrau.



- a) Tynnuodi 4 galwysu yn litrau. 16 litrau
- b) Tynnuodi 27 litr yn galwysu. 5 1/2 galwysu
- c) Mae gan Mair ffordd llychaf ar ei dal i'w galwysu. 4 1/2 litrau

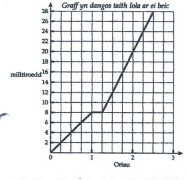
2 Mae Paul yn cynnyd shan newn 'oeddi soddiol'. Mae'n cost £2.50 am bob llyd.

Ynghyd â hysod y ddel yna mewn alghen. £1.50 x 11 = £16.50

Mae'r tabl yma'n dangos faint o arian mae Paul yn ei gael. Lloewch y tabl.

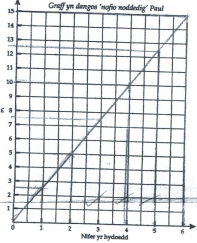
Nifer y hydoddi	1	2	3	4	5
Cyfanswm £	2.50	5.00	7.50	10.00	12.50

3 Mae llo yn mynd am dro ar ei beic.



- a) Mae hi'n gorffwrdd aros i drwsio oher y fflac. Faint o funudau mae hi'n gennys? _____
- b) Tithioddi lida ar wahantol funudol oen ar ei dda. Pa nos o'i ddech oddi gyllym? _____
Eglurwch sut mae'r graff yn dangos hyn. _____
- c) Dangosyddych funudol all hanner rath lida. _____

c) Lloewch graff o 'oeddi soddiol' Paul.



- ch) Dellyddych y graff i'ch helpu i ateb y cwestiynau yma.
- (1) Faint o arian mae Paul yn ei gael am 6 llyd? £15.00
- (2) Faint o arian mae Paul yn ei gael am 4 llyd? £10.00
- (3) Amcangyfrifwch sut llyd fydd yn rhaid i Paul safu os mwy oeddi £8.50. 3.05 hydoddi

- 3) Cychwch am faint o'i gloc y llyd y tennau yma'n cynnyd.
 - a) Tithi ar y gadael am 9.40 ar yr cynnyd 45 munud. 9.35
 - b) Tithi ar y gadael am 12.20 ar yr cynnyd awr a cheng munud. 1.40
- 4) Mae film ddeud yn cychwyn am 9.30 pm. Mae hi'n gorffwrdd am 11.15 pm. Mae Alan yn recordio'r film ar ddi gong 240 munud. Faint o arian fydd ar ei ar y llyd? 4.30

Given enough time enabled Pupil B to score 18/20

1. Darganfyddwch yr onglau sydd wedi eu marcio a hydysuennu. 75 $\frac{19}{20}$

2. Mae rhai o'r onglau ar y diagram yma wedi eu labelu. Cwblhewch y labelu.

3. Darganfyddwch yr onglau sydd wedi eu marcio a hydysuennu. Ynghifreirwch ym fath o onglau yw pob par o onglau: onglau eiddod, onglau cyfrinbol ymys onglau mewnol.

a

b

c

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4. a. Cyfrifwch yr ongl sydd wedi ei marcio yn yr hecagon rheolidd yma.

b. Ynghifreirwch swm onglau allanol y pentagon yma.

5. a. Ynghifreirwch grŵpiau D-Gn.

b. Mae cyfriniant B o A yn 055° . Beth yw cyfriniant A o B?

Once again given enough time enabled Pupil B to score 90%

48.5
54 90%

Prwff Hoes 5-7 Nadolig 2004

1. Symleiddiwch y cymarebau

3:9 $\frac{12:24}{1:2}$ $\frac{25:30}{5:6}$ (3)

2. Rhannwch 600 rhwng Auna, Bbo a Cara yn ol y gymhareb 7:1:4

$A+B+C=12$
 $7x+1x+4x=12$
 $12x=12$
 $x=1$
 $7 \times 1 = 7$
 $1 \times 1 = 1$
 $4 \times 1 = 4$
 $600 \div 12 = 50$
 $50 \times 7 = 350$
 $50 \times 1 = 50$
 $50 \times 4 = 200$ (4)

3. Cafodd swm o arian ei ranu rhwng Owenhan a Iwan yn ol y gymhareb 3:4. Os caelddi Owenhan £30, faint oeddi cyfanswm yr arian a ranwyd?

$3x = 30$
 $x = 10$
 $4x = 40$
 $30 + 40 = 70$ (2)

4. a) Cynyddwch 20 yn ol y gymhareb 3:2 $\frac{3}{2} = 1.5 \times 20 = 30$ (1)
 b) Lleihewch 60 yn ol y gymhareb 1:4 $\frac{1}{4} = 25 \times 60 = 1500$ (1)

5. Mae gan Sam model o'i heff gar, sef Mini Cooper. Graddfa y model yw 1:35. Cwbrhwrechwch y tabl:

Memariad	Model (cm)	Car lawn (cm)	Car lawn (m)
Uchder	5.0	175	1.75
Hyd	8.4	287	2.87
Diametr olwyn	1.6	56	0.56
Lled drws	1.1	36.3	0.63

6. Cwbrhwrechwch a) $4 - 5x = -2$ b) $-9 + 13x = 3$ (2)

7. Os yw $a=3$, $b=-2$ ac $c=4$, cyfrifwch wirth:

a) $a+b$
 $3 + (-2) = 1$ (1)

b) $2a+3b$
 $2 \times 3 + 3 \times (-2) = 6 - 6 = 0$ (1)

c) $2abc$
 $2 \times 3 \times (-2) \times 4 = -48$ (1)

d) $4b^2$
 $4 \times (-2)^2 \times 3 = 48$ (1)

8. Datrywch yr hafaliadau isod.

a) $2x+3=13$
 $2x=10$
 $x=5$ (1)

b) $4x+18=6x-2$
 $4x-6x=-2-18$
 $-2x=-20$
 $x=10$ (1)

9. Cyfrifwch cylchoedd y cylchoedd yma

5cm
 $C = \pi \times D$
 $C = \pi \times 5$
 $C = 15.7$ cm (2)

7cm
 $C = \pi \times D$
 $C = \pi \times 7$
 $C = 21.98$ (2)

10. Cyfrifwch ymestudoedd y cylchoedd uchod.

$A = \pi \times R^2$
 $A = \pi \times 5^2$
 $A = 78.5$ (2)

$A = \pi \times R^2$
 $A = \pi \times 7^2$
 $A = 153.93$ (2)

11. Cylchoedd cylch yw 30cm. Faint yw ei radiws?

$C = \pi \times D$
 $30 = \pi \times D$
 $30 \div \pi = D$
 $9.54 = D$
 $R = 4.77$ (2)

12. Faint yw arwynebedd y siap?

	x		
2	$2x$	$\sqrt{16 \times 12}$	
$2x + 16$			

(1) (2)

13. Diddymwch y crosffactan (cerch wnaed llunais os dynnwedh)

a) $4x^2 - 7$ $\sqrt{4x^2 - 7}$ (1) (1)

b) $2x(x-1)$ $2x^2 - 2x$ (1) (2)

c) $4x^2 + 2x - 8$ $2x^2 + x - 4$ (1) (1)

d) $6x^2 + 2x + 8$ $2x^2 + 1$ (1) (1)

14. Beth yw arwynebedd y siap?

	x		
x	x^2	$8x$	
1	12	8	

$x^2 + 9x + 8$

(3)

15. Cwtwllwch y bychain fel bod y ffactiynau, dogolion a'r canrannau yn gywirth.

a) $\frac{3}{5} = \frac{6}{10} = 0.6 = 60\%$ ✓

b) $\frac{7}{25} = \frac{28}{100} = 0.28 = 28\%$ ✓ (3)

16. Gosodwch mewn trefn, lleiaf yn gyntaf:

0.67 $\frac{0.75}{70\%}$ $\frac{0.7}{3/4}$

0.67 70% 0.7 $3/4$

(11)

17. Beth yw'r cyfanswm sydd rhaid talu os mae TAW, sef 17 1/2 % ar rwm o £360. Dangoswch eich dull llawn (dull heb ddefnyddio cyfrifiannell).

$10\% \text{ o } 360 = 36$

$5\% \text{ o } 360 = 18$

$2.5\% \text{ o } 360 = 9$

(11) (1/2)

18. Allan o'r 28 myfyriwr mewn doberth dawna, roedd 2 yn absennol. Pa gasur o'r doberth oedd yn absennol?

$\frac{2}{28} = 0.07 \times 100 = 7\%$ ✓

(2)

19. Mae prisiau gwahanol inwyddau yn gallu codi neu ostwng.

a) Mae pris bar o siocled wedi codi 5 centig. Yn wreiddiol roedd y bar o siocled yn costio 40c. Beth yw'r cynyddi canrannol?

$40 = 0.125 \times 100 = 12.5\%$

(2)

b) Os oedd car yn costio £995 yn arwydd sbectol, ond yn cael ei werthu yn ail law am £795. Beth yw'r llithriad canrannol?

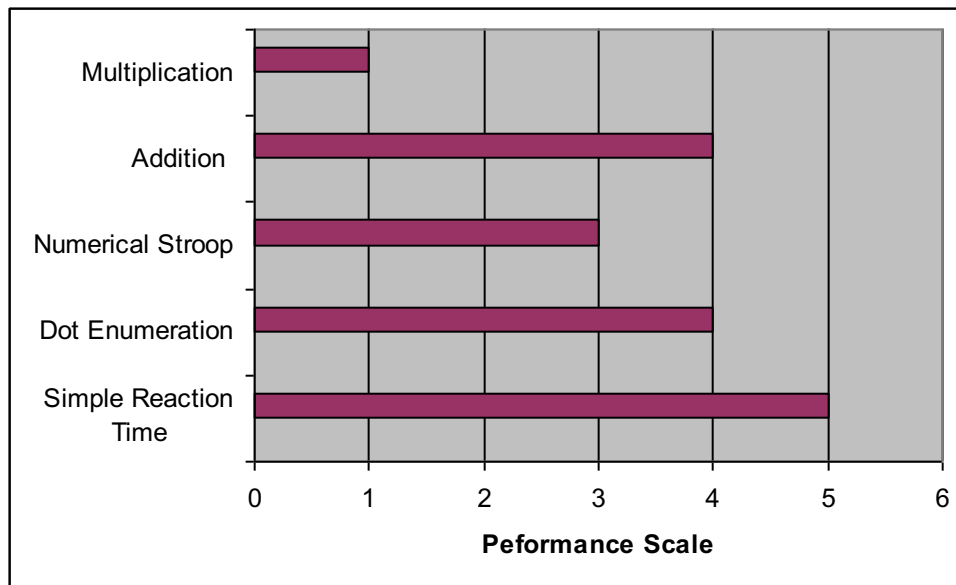
$795 = 79.9 \times 100 = 79.9\%$

$995 = 21\%$ ✓

(2)

Appendix 7K “Dyscalculia Screener Pupil B Year 9”

Chronological Age 13 Year 8 months



The pupil performs appropriately for the age-group in the two capacity tests. However, arithmetic achievement is low and this pattern of results suggests that the pupil is not failing in arithmetic because of dyscalculia. Please refer to chapter 6 of the Manual.

Adapted from Butterworth 2003

planhig → mawwoden → byffant → neidr → cartwm →
tylluan

planhig → mawwoden → byffant → neidr → tylluan

planhig → mawwoden → byffant → tylluan

crwagwair → gwirer → cartwm → tylluan

crwagwair → gwirer → tylluan

15

POH Y GOYLLIEDD O MAGNET
A AR GRŵP RHIF OCHOR

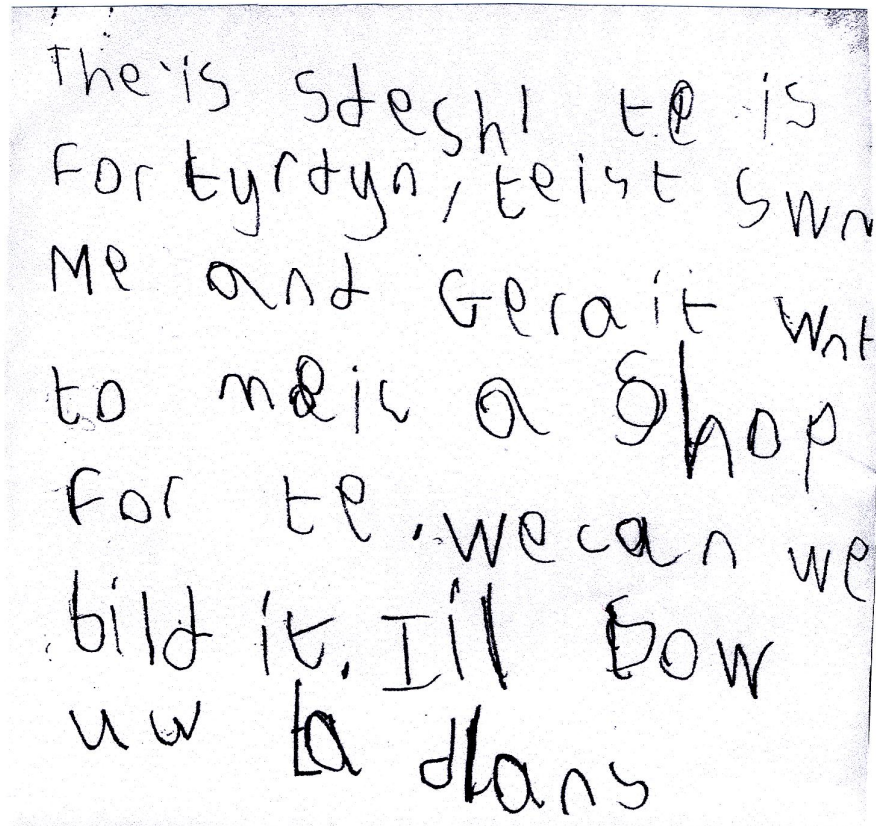
O MAGNET B, OS YN YN ATYNU
MAGNET B, OS YN YN ATYNU

OS NEW DDIW YN ATYNU
MAGNET B, OS YN YN ATYNU
YN GYMRWNG YN DWR BETH AR Y OCHOR ARALL

Appendix 7M

"History of Handwriting"

Year 2



The is steshi te is
for tyrdyn, teist swa
me and Gerait wht
to maie a shop
for te. we can we
bild it. I'll bow
uw ta dlan

Year 3

The image shows a handwritten musical score on a piece of paper. The score is written on five staves. The lyrics are written below the notes. The first staff has a treble clef and a key signature of one sharp (F#). The lyrics are: "The band starts to play". The second staff has a treble clef and a key signature of one sharp. The lyrics are: "The band starts to play". The third staff has a treble clef and a key signature of one sharp. The lyrics are: "The band starts to play". The fourth staff has a treble clef and a key signature of one sharp. The lyrics are: "The band starts to play". The fifth staff has a treble clef and a key signature of one sharp. The lyrics are: "The band starts to play". There are several drawings of musical instruments, including a guitar, a drum set, and a keyboard, interspersed with the musical notation. The handwriting is in black ink on a light-colored background.

Year 4

Trysar ac wjelod yr
Penys

yn noson Oar "Mam Mam"
 meddai Emin, "Be" meddai
 mam "Dwi wedi da dda map"
 Beth Dad i Mewn. "Beth sy
 yn bod" meddai Dad. Trandeth
 b yn, Harbur, Tintem yn
 llwtho y bafys, yr bore wed
 roedd Gwain, Dad, Emlun,
 Fintem, Gweno, Catrin a Cadem
 na mynd ar modaith. "Ea"
 meddai Tintem, b ^{dimod} Dued wedi
 roedd yn ahr' wedi Cystal-
 gweddol yr ynys "hai" Lwenth
 Tintem, edrychodd pam Bag
 Bang Bang "ai" meddai gwn
 "Anelwch" meddai Tintem
 "tonia ch", Rolld na awynia
 yn trio Bomio y bafys ond
 stopiodd. "Hiw" meddai Dad.
 roeddent Y noson a ho dop. Rhoed Im En
 y yr "Coldwig" bwg a Dad.
 ysbryd "Bw Bw Ha Ha" meddai ysbryd
 Ruedd a yn ofynnol y y p.

Year 5

Steffy

Amy 605M is a
605 old, Her name
is Steffy. She lives in
Astrakhan in a village and
Istanbul.

Her name is below name
the syllable part as
the same.

"Gok a meri" she always
says

Year 7

To Mij and David,
17/2/01
PICKYS, FROM
HOPE YOU LIKE THE
P.S. IF HOPE I PUK YAF SHORPER?
HOPE I HAD FROM YUVA SUN.
P.S. I ENJOY HARRY POTTER,
ARE THE FISH BAITING?

Year 8

Dear Jane and Tom,
How
are you?

I went to see a play
with mum in London.

We got two free nights
in the hotel.

Today I went
to the shop and
chopped wood for the
fire. Love

Appendix 7N “Key Stage 3 SATS Results2

Mathematics Level 7

Science Level 7

English Level 7

Welsh Level 5

School Assessment

Mathematics Level 7

Science Level 6

English Level 6

Welsh Level 5

1 Mae angen 200 gram o flawd ar Glyn er mwyn gwneud 10 teisen.



(a) Faint o flawd sydd ei angen ar Glyn er mwyn gwneud 25 teisen?

500 g

(b) Sawl teisen mae Glyn yn gallu ei gwneud â 320 gram o flawd?

Dangoswch eich gwaith.

$$\frac{200}{10} = 20$$

$$\frac{320}{20} = 16$$

16 teisen

17 Mae 49 280 o bobl yn talu am fynd i gyngerdd roc yn Stadïwm y Mileniwm.

Mae pris pob tocyd yr un fath. Y cyfanswm a delwyd am y tocyddau yw £763 840

Amcangyfrifwch gost un tocyd.

Dangoswch eich gwaith.

$$\frac{76000}{50000}$$

$$5 \frac{17}{25}$$

£17.00

2 (a) Mae Lucy am gyfrifo 202×77

Nodwch ddau rif y gallai Lucy eu defnyddio er mwyn amcangyfrif yr ateb yn gyflym.

200 x 80

(b) Cyfrifwch werth 202×77 yn union gywir.

Dangoswch eich gwaith.

$$\begin{array}{r} 202 \\ \times 77 \\ \hline 1414 \\ 14140 \\ \hline 15554 \end{array}$$

15554

Appendix 7P

“Educational Kinesiology Balances2

7/2/02

Goal: I am instantly flicking the puck in hockey.

Pre Activity: Practising flicking the puck and aiming into the goal area.

Vestibular Balance

Pre Activity Page 84 “Primitive and Postural Reflexes”

In-Depth checks

Quick- Checks and In-depth – Checks: Priority - swimmers

Menu

Cross Crawl lying with humming

Homolateral Crawl lying with humming

Commando Crawl

Post Activity: -repeat all pre checks

Practising flicking the puck into the goal area

Homeplay-commando crawl

26/2/02

Goal: I am instantly flicking the puck in hockey.

Pre Activity: Practising flicking the puck and aiming into the goal area.

Palmar Reflex Balance

Pre Activity Page 29 “Primitive and Postural Reflexes2

In-Depth checks

Quick- Checks and Indepth – Checks: priority Vestibular

Menu

Crocodile Crawl

Cross Crawl lying with humming and head to side

Lazy 8's on the carpet

Crocodile Crawl

Massage of hand gait points

Hand Massage

Thumb Rotations

Post Activity: -repeat all pre checks

Practising flicking the puck into the goal area

Homeplay-crocodile crawl

4/3/02

Goal: I am both holding the pen and writing easily.

Pre Activity: Wrote his name. This was printed and jolting with unevenly formed letters

In-Depth Pre checks

DLR

Double doodles

Positive Points

In –Depth post checks

Post Activity: Writing flowed easily with cursive script (Cursive script was not even mentioned during the balance

Homeplay: double doodles twice daily for 1 week.

20/3/02

Goal: I am writing automatically.

Pre Activity: Wrote a line of a sentence

In-Depth Pre checks

Seeing balance

In-Depth Pre Activity

Active 8's

Alphabet 8's

Space buttons

In –Depth post checks

Post Activity: Writing flowed easily with cursive script and he also filled in column of maths tables. All numbers were formed correctly and written confidently and quickly. He asked to do more of these exercises.

Homeplay: none needed.

Observation and follow up of previous balances.

He is able to flick the puck better in hockey

Has difficulty getting the “a” in alphabet 8's- problem getting the middle of the 8.

8/4/02

Goal: I am running fast

Pre Activity: Went running outside in the yard

In-Depth Pre checks

Menu

DLR

Writing balance

Double Doodles

Alphabet 8's

In Depth Post checks

Post Activity: Went running outside in the yard

Homeplay: Alphabet 8's and double doodles once per day for one week.

15/4/02

Goal: I am concentrating on the spot in the distance when I am running.

Pre Activity: Ran a race outside looking at a marked spot in the distance.

In-Depth Pre checks

XSPAN

Priority: Penguins

Menu

Brain Gym –Midline, Energy Exercises, Lengthening, deepening Attitudes

DLR

In –Depth post checks

Post Activity: Ran a race outside looking at a marked spot in the distance

Homeplay: Elephants twice per day for one week

Neck roll once per day for one week.

18/8/02

Observation

The child came to the session with a list of things to do better

To jump further and higher

Hit the hockey puck up in the air, over a player in defence to land 7 to 10 meters away in the goal

In football use good skills, such as dribbling, kick-ups and headers.

To write everything down myself, spell and form letters and numbers automatically.

Practice the trumpet every day on my own.

Muscle testing was used to find the priority area and the jumping goal came as preference for that balance.

Goal: I am feeling light in my legs as I extend forward and my arms pull my body forward.

Pre Activity: Spent time jumping on and off a 2 to 3 foot high wall. He felt very out of breath on completion of this activity.

Menu: Gravity Glider, Neck rolls, Rocker, Earth Buttons, Balance buttons.

Post activity Spent time jumping on and off a 2 to 3 foot high wall. He felt happy on completion of this task

1/2/03

Goal: To cope with school today.

Indepth Pre-Activity

DLR

In Depth Post Activity

Post activity

6/2/03

Goal: I am flicking the puck between floor and shoulder height

Pre Activity: He played with the puck aiming it at specific heights Pre Activities

Menu

In Depth Post Activities

Homeplay None needed

13/2/03

Goal: I aim the puck at where I want it to go.

Pre Activity: He played with the puck aiming it at specific places where he wanted it to go.

Proprioceptive Integration

In depth Pre Activities see Page 32 of Manual "Sensory Integration" by Rita Edwards

Quick checks

Menu

Midline Movements: Energiser

Emotional: Hook Ups, Positive Points,

Energetic: Water, brain Buttons

Post Activities

Homeplay: Energiser once per day for one week

27/5/03

Goal:. I am writing quickly and neatly in Science

Pre Activity:. Write out Science notes and drawings see Appendix

Vision gym Balance- Builder Circle

Pre Activities and In-Depth checks

Menu: Rainbow, Double Doodles, Bracelets, Arm Activation Stroboscope Lights

Post Activity: - Wrote out some science and relevant drawing see appendix

Homeplay- Double doodles once a day for 1 week

19/7/03

Goal:. I can draw good diagrams in Science and Art

Pre Activity:. Draw a sketch of a house see appendix

Primitive Reflex Balance Spinal Galant

Pre Activity

In-Depth checks

Quick- Checks and Indepth – Checks: Priority Centering

Menu: 3DR . Asked for water during the repatterning. Homolateral crawl was a challenge to get right

Post Activity: -repeat all pre checks, in depth checks

Post activity : Startling difference

Drew a drawing and did not want to stop drawing see Appendix

Kept drawing and writing for half an hour. Only stopped because a fiend came to play with him

Homeplay- not needed

23/8/03

Goal:. I am turning my thoughts about saving up money into direct action and doing the jobs which I am payed for

Pre Activity Went upstairs with a basket of clean clothes and put them away in the drawers and cupboards where they belong..

7 Dimension Balance

Dimensions

In-Depth checks

Balance Point GIP

Menu

Realm PEcology Gravity Balance

Structure 3DR, 8's, elephants

Post Activity: -repeat all In depth and pre checks

Dimensions

Post Activity: Noticeably energetic and enthusiastic about earning money by doing household jobs.

Homeplay-

Quick- Checks and Indepth – Checks:

Menu

Post Activity: -repeat all pre checks

Homeplay- Not needed

Observation: Very receptive to being balanced, enjoyed the knowledge I gave him throughout the balance

29/9/03

Goal:. I am thinking confidently about mountain boarding-skate boarding and jumping from a higher level.

Pre Activity:. Skate boarded sideways on the scooter and played on the lazy 8 balance board

7 dimension Balance

Dimensions

In-Depth checks

Quick- Checks and Indepth – Checks:

Balance Point: Ear to left

Realm: Structure

Menu: Movement Re-Education, Core Activation, Vision Circles, rainbow

In Depth checks

dimensions

Post Activity: -repeat playing on scooter and balance board

Homeplay- Lazy 8 once per day for one week.

Balance again in 3 weeks.

26/10/03

Goal:. I am counting the rests when they come up in the music

Pre Activity:. Played several lines of music with the trumpet

7 Dimension balance

Quick- Checks and Indepth – Checks:

Balance Point: Sphenoid

Realm: Structure-Menu: cross crawl, vision circles, Heliopic breathing

Post Activity: -repeat all pre checks
Homeplay- not needed

7/4/04

Goal: I am writing the words easily and automatically

Pre Activity: Did some free writing see Appendix

7 Dimension

Dimensions

Quick- Checks and Indepth – Checks:

Balance Point: Tap

Realm: Emotional

Menu: Movement Dancing

Post Activity: -repeat all pre checks

Post Activity: Noticeably different. Cursive script and freer than the pre activity printing-

Wrote freely see Appendix,

Homeplay-

13/8/04

Goal: I am spelling and writing correctly on paper and with typing

Pre Activity: Wrote a letter to his cousins see Appendix

Creative vision Balance

Pre Activity

In-Depth checks

Quick- Checks and Indepth – Checks:

Menu

Post Activity: -repeat all pre checks

Homeplay-

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