THE EFFECTS OF A KINDERKINETIC INTERVENTION PROGRAMME ON THE MOTOR PROFICIENCY LEVELS AND SCHOLASTIC PERFORMANCE OF CHILDREN AGED 6- 8 YEARS

by

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DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and has not previously in its entirety or part been submitted at any university for a degree.

gouws

Signature

2009/01/12

Date

DEDICATION

Psalm 23

"Surely goodness and love will follow me
all the days of my life,
and I will dwell in the house of the LORD
forever"

I hereby give appreciation and acknowledgements to the following people:

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Lastly, to my Husband and my parents, thank you for all your support and prayers.

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LIST OF ABBREVIATIONS

BOMPT – Bruininks-Oseretsky Test for Motor Proficiency

QNST-II - The Quick Neurological Screening Test

ABSTRACT

The effect of movement on academic performance is often underrated. Movement is essential to learning and can be regarded as the door to learning. Researchers argue about the importance of movement because there seems to be a positive interchange between the brain and the body. This study reports on the influence of a kinderkinetic intervention programme on the scholastic performance of 6-8 year old children. Children were selected from schools in the Northern Zululand area of KwaZulu/Natal. Two groups of children were used in this study (a control and experimental group) went through a pre-test and post-test using three test batteries. The experimental group was subjected to an eight-week kinderkinetic movement programme. The results indicate that the children in the experimental group showed an improvement in scholastic performance compared to the children in the control group. There was a significant correlation ($r=.36$, $p \leq 0.05$) between motor proficiency scores and the scholastic performance of subjects in the experimental group. There was a meaningful relationship ($r=-o.55$, $p \leq 0.05$) between the motor proficiency scores and the scores obtained on the Connor Classroom Behaviour Questionnaire. There was a significant relationship ($r=-0.35$, $p \leq 0.05$) for the control group and a negative correlation of ($r=-0.35$, $p \leq 0.10$) for the experimental group. Three of the four hypothesis were accepted.

Key words: movement programme; academic performance; scholastic performance; motor proficiency; motor development

CHAPTER ONE

PURPOSE OF THE STUDY

1.1 INTRODUCTION

Numerous research studies have indicated that Human Movement Scientists and Physical Educators have identified the benefits and importance of fitness and health in the development of children (Arnold, 1979; Katzenellenbogen; 1994, Pillay & Oosthuizen, 1994; Miller, 1995: Dwyer, Sallis, Blizzard, Laraus & Dean, 2001). Less emphasised is the impact of movement on the scholastic performance and the cognitive development of young children (Hannaford, 1995: Goddard-Blythe, 2000: Kokot, 2003). As research does not consistently show that movement programmes have appositive effect on learning, physical education is often seen as a frill (Shepard, 1997: De Jager, 2001), and has been discontinued in many South-African school (Summerford, 2001).

In this age of high technology, it is often found that the motor development of primary school children has not kept pace with their cognitive development and chronological age. The importance of motor development cannot be over-emphasized, for it pervades a child's behaviour and development. According to Scheepers (2002), accomplishments based on motor development contribute to intellectual development. Children do not automatically develop skills, knowledge, attitudes and behaviour that lead to regular and enjoyable participation in physical activity (Scheepers, 2002). A wide repertoire of fundamental skills obtained in childhood would make more specific skills easier to acquire in adolescence and adulthood. Motor skills development is enhanced when children are stimulated to perform and exercise specific activities focusing on the development of motor skills. Through movement activities, a child acquires skills, knowledge and attitudes that help him/her to discover and understand his/her body: how it works, its physical abilities and its limitations (Scheepers, 2002).

Physical education is an integral part of the complete education of every child and aims to increase physical competence, health related fitness, self-responsibility and enjoyment of physical activity for all learners (Bunker, 1981). Physical education plays a significant role in the pre-school years, as early childhood years are the most opportune time for perfecting the motor skills basic to all subsequent physical activity, and sport skills, Skills which should enhance with learning (Seefeldt, 1984).

Research has also proven that physical education has an encouraging result on important scholastic areas, namely, reading and mathematics (Grissom, 2005). Young children who receive additional physical activities as part of their school programme show increased brain function, higher energy and concentration levels, improved self-esteem and better behaviour which may all support cognitive learning (Tremblay,Inman,& Willms, 2000;Cocke, 2002).

1.2 PROBLEM STATEMENT

It is essential for all children to learn motor skills so that they may be able to explore their environment and thus enhance their cognitive and social development. Behaviour in the motor domain has long been judged as a significant indicator of unusual child development as can be seen from the inclusion of movement tasks in well-known early childhood screening inventories. The adequate development of fundamental movement abilities, fine motor skills and perceptual motor abilities is essential for school beginners, as these provide a child with the necessary basic tools to be a successful scholar (Pienaar, 1994). Findings from research done by Saakslahti, Numminen, Ninikosi, Rask-Nissila, Viikari, Tuominen & Valimaki (1999) , Thomas (1999) and Rudisill, Lawrence, Goodway & Wall (2000), suggest that a physical activity and a pre-school skill development programme has a dramatic influence on participants' loco-motor skill and coordination performance and that a lack of such a programme, could negatively influence motor development and school performance.

Results show that even minimal instruction time of a development specific programme resulted in significant changes to motor performance. Thus, children who do not have experience of or sufficient exposure, to such programmes may not develop their loco-

motor skills before starting school. Research by Goodway & Branta (2003) shows an agreement with these findings. Graham (1987) purports that there appears to be a false assumption in believing that students learn motor skills by playing games. It must however be remembered that there are not hours and hours scheduled for physical education which can be devoted to playing one particular game. With this restriction in mind, motor skill acquisition should be considered an essential goal in a physical education programme.

Research by Goodway & Branta (2003) shows that those children who received additional physical education classes showed acceleration in their psychomotor development which ultimately resulted in improved academic skills. These learners showed no reductions in their grades and standard test scores, rather many had improved on these parameters. Thus, physical education can be introduced without compromising academic performance. Black (1995) reports that good physical education programmes can boost academic achievement and also feels that children may be learning more in physical education lessons than ever imagined. He concludes that schools which require children to sit all day long deny children an important connection between movement and learning.

The turn of the century has been characterized by vast technological progress. Children now find themselves in an environment full of sedentary alternatives such as television and computers. Cycling and walking to school have become rare conducts as many parents drive their children to school. All of these factors have contributed to a decline in the motor behaviour of children.

In one of the few studies conducted in the North West Province, Pienaar (2000) found that the motor proficiency levels of children were not up to standard and states that this requires urgent attention on a national level. The total well-being of children entails sound development in all areas of their development.

1.3 PURPOSE OF THE STUDY

The main focus of this study was to investigate the effects of an 8-week kinderkinetic movement programme on the scholastic performance of children 6-8 years of age. The results of the study might justify the use of a kinderkinetic movement programme to support scholastic performance of these children.

1.4 HYPOTHESIS

In accordance with the stated purpose of this study, the following hypotheses were formulated:

Hypothesis 1: There will be a positive correlation after participation in an 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and scholastic performance of children between ages 6-8 years.

Hypothesis 2: There will be a positive correlation after participation in an 8-week kinderkinetic movement programme will have a beneficial effect on the motor proficiency levels of children between the ages of 6-8 years.

Hypothesis 3: There will be a positive correlation after participation in an 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and the results of the Connor classroom behavior questionnaire.

Hypothesis 4: There will be a positive correlation after participation in an 8-week kinderkinetic movement programme will bring about a positive relationship between the QNST levels and the scholastic performance of children between ages 6-8 years.

1.5 LIMITATIONS

Limitations are possible shortcomings or influences that either cannot be controlled or are the results of delimitations imposed by the investigator (Thomas &Nelson, 1985). Some of the subjects in this study had illnesses or were recovering from injuries that might have had an influence on their performance on the day of testing. The researcher also had to take the nation's wide public sector strikes which took place during June 2007 into consideration. Only those schools that gave permission to partake in the testing are represented, not all the schools in the country. The researcher did not have any control over how the teacher divided the children scholastically.

1.6 DELIMITATIONS

Some limitations refer to the scope of the study which is usually imposed by the researcher. These are often called Delimitations (Thomas & Nelson, 1985). Subjects were selected from 3 private schools and 2 Public Schools on the North Coast of KwaZulu Natal. The chosen subjects were learners between the ages 6-8 years. The main reason for the age selection being that by the time children have reached school going age they have already been exposed to a variety of experiences that could influence their future success at school.

1.7 DEFINITIONS

1.7.1 Motor Proficiency

Sherril (1993), defines motor proficiency as the specific abilities measured by testing running speed, agility, balance, bilateral coordination, strength, upper limb coordination, response speed, visual-motor control, upper-limb speed and dexterity. Motor proficiency further entails rhythm and co-ordination in the successful performance of loco-motor, balance and manipulative skills (Sherrill, 1993). Motor proficiency is used to describe the level of skill one possesses.

1.7.2 Scholastic Performance

Scholastic performance refers to the academic performance of an individual in Literacy, Numeracy and Life Skills (Mayoss, 2008).

In the subject area of Literacy the child had to achieve the required results needed in reading, spelling and sight words (child is able to apply phonic skills to new words). He was able to recognize words in known and new situations. The child was also able to write interesting stories applying punctuation and spelling skills. He was able to edit a set piece of work. The child was able to write in a variety of written formats, e.g. book review, recipes, letters. The learner was also able to apply oral skills that were taught to him, e.g. to stand in front of the class and deliver a speech in a comfortable manner, speaking loudly and clearly. They should also apply grammatical skills such as verbs, adverb, and nouns to worksheets that were given to him for homework or class work (Mayoss, 2008).

In Numeracy the child had achieved or exceeded the desired standard in Numeracy. He has a good number concept, can recognize number symbols and number names. He was able to do 2,3,4,5 and 10 times tables and division, and can be challenged to find his own solutions. Basic concepts covered in the previous grades are explained but in a more abstracted way. The child has to come up with his own methods to do activities such as doubling and halving (Mayoss, 2008).

In Life Skills there are learning areas such as Arts and Culture, Social Science, Natural Science and Management Science. The child in this specific grade was given enough exposure and practice before getting the opportunity to apply these skills in a practical manner (Mayoss, 2008).

In order for the child to be promoted to the next grade he had to achieve a satisfactory mark (Mayoss, 2008).

1.7.3 Movement Programme

Meaningful movement programmes are those that allow children to learn movement skills based on sound physical education principles in an interesting, and organized manner. Meaningful motor programmes focus on children *learning* movement skills rather than just keeping them happy, active and good (McCall & Craft, 2000).

1.7.4 Kinderkinetics

Kinderkinetics is designed for children to learn and grow while developing confidence, independence and fundamental motor skills. It supports and educates children about movement, fitness and health. Kinderkineticist assists children to acquire neccessary skills to live active, healthy lives. To develop any skill, one needs to explore it, experience it and practice it. As many as possible experiences and freedoms should be provided to children with the opportunities to increase their ability and enhance their motor development that will also influence their academic performance and social life (www.puk.ac.za/faculty/health/brs/kinderkinetic).

1.8 RESEARCH PROCEDURES

The researcher approached the principals from selected schools located in KwaZulu-Natal. A full discussion took place which included an explanation of the purpose of the research project and a description of what the study entailed and what was hoped to be achieved. A proposal of this study was then be forwarded to and discussed at a school governing body meeting. A proposal of the study was also presented before the Faculty of Science Research Committee and co-members of the Department of Human Movement Science, University of Zululand. After authorization and approval was granted for the study by the University of Zululand Ethics Committee, Faculty of Science Research Committee and the School Governing Bodies, a letter has been sent to the parents of the subjects(Appendix A and B).

This letter explained the nature and procedures of the study and procured parental and subject approval in an informed consent document. On approval of the parents and children, the study will commence.

1.8.1 Data analysis

The researcher applied the following inferential and deferential statistical measures to analyze the data collected: mean standard deviation, paired t-test and correlation. The researcher also graphically displayed the findings of the study.

1.9 CONCLUSION

The study was part of the author's commitment to extending the benefits of participating in a Kinderkinetic movement intervention programme.

Twenty four children (n=24) between the ages of 6 and 8 were used as subjects in this study. The children were all English speaking pupils attending Government and Private schools in the Darnall, Stanger and Richards Bay areas in KwaZulu-Natal.

By becoming aware of these outcomes it is hoped that schools would make use of Kinderkinetic intervention movement programmes to augment their Life Orientation programmes.

CHAPTER TWO

REVIEW OF RELATED STUDY

2.1 INTRODUCTION

The effects of movement on scholastic performance are often underrated. Studies using movement to remediate learning difficulties indicate conflicting results (Bass, 1995; Dwyer et al. 2001; Longhurst, 2002; Kokot, 2003).

As research does not consistently show that movement programmes have a positive effect on scholastic performance, physical education, in some school has been regarded as unimportant. Dejectedly, in many South African schools, physical education has been discarded. Currently, physical activity forms part of the Life Orientation subject, which result in 45-60 minutes a week being spent on physical activity (Cloete, Botha, Cloete & Van Wyk, 2007). In view of this, many children in South Africa are being denied access to an opportunity that could stimulate their learning capacity.

This research is an investigation into the effect that a kinderkinetic programme has on the motor proficiency levels and scholastic performance of children aged six to eight.

2.2 THE DEVELOPMENT OF KINDERKINETICS IN SOUTH AFRICA

The development of Kinderkinetics as a field of study began officially in 1994 within the Human Movement Science Department of the former Potchefstroom University for Christian Higher Education (now known as the North-West University) to address the void that the removal of physical education from the school curriculum created. The University of the Free State began training Kinderkineticists in 1998 followed by the Tygerberg College and University of Zululand in 2008. Currently there are 45 registered

Kinderkinetic practices and 148 Kinderkineticists registered with the South African Professional Institute for Kinderkinetics.

Kinderkinetics is a field of study which aims to increase the total wellness of children between the ages of 0-12 years by stimulating, rectifying and promoting age-specific motor and physical movement. The word KINDER refers to the specialization area which focuses on 0-12 year old children while KINDESES (movement) refers to the optimalization and rectifying of child movement in the 0-12 year old category.

Scientifically-based individualized exercise programmes are used in the profession of Kinderkinetics to assist children of various ages in their psycho-motor, physical and neuro-motor development. The main purpose of the Kinderkinetic programmes is the development of gross motor, perceptual-motor and fine motor skills. Secondly, Kinderkinetic programmes address the individual differences that influence the achieving of physical activity goals and aspirations, and the variables associated with success and failure.

Within Kinderkinetics, the following programmes are offered to develop gross and fine motor movements:

Specialized programme (0 - 13 years)

This programme helps children to overcome problems by using individualized programmes. Factors includes obesity and specific motor problems as well as providing help by using physical skills for disabled children

Programme for special populations

This is a water therapy programme for children with Down Syndrome and cerebral disability. It is used to improve their function from a motor and physical aspect of their development.

Baby programme (0 - 24 months)

Early development programme for the optimal development of babies between the ages of 0 - 24 months.

Pre-Primary programme (2 - 7 years)

This programme is for children between ages 2 - 7 years and focuses on the child's gross-motor skills in a group. The aim of this programme is the optimal development of the young child.

Sport skill programme (8 - 12 years)

This is a programme for children between ages 8 - 12 years where basic sport skills, for instance soccer, rugby and netball are taught. The aim of the programme is to teach the basic rules and mostly to learn the necessary fundamental skill. This programme takes place in group form (www.puk.ac.za/faculty/health/brc/kinderkinetic).

Wellness programme (12 - 14 years)

This is a programme for older children between ages 12 - 14 years that helps them to develop a healthy and balanced lifestyle. Programmes are presented in group form. The aim of the programme is to transform sedentary children to active children and to follow through into active adults.

Kinderkinetics includes two important and invisible senses that are involved in the motor development, namely vestibular and proprioception. Vestibular has to do with the mechanism in the brain that plans movement before it is executed. It refers to the achievement, control and execution of movements and the body's balance with regards to gravity.

Proprioception includes perception of the body, muscles and the joints. A child must be aware that his body consists of different limbs with different functions. This awareness determines how the child will react and function in the given space. The Kindekinetics

movement intervention programme also includes sensory integration and reflexes. Reflexes influence how people read and write (www.puk.ac.za/faculty/health/brc/kinderkinetic).

2.3 THE CURRENT SITUATION OF MOVEMENT PROGRAMMES IN PRIMARY SCHOOLS IN SOUTH AFRICA

During the post-apartheid period of South Africa physical education found itself as a subject without its own identity. It now functions as only one of the learning outcomes of Life Orientation (Department of Education, 2002). There has been a paradigm shift from a traditional aims-and-objectives form of education characterised by rote learning, teacher-centred and content-based education to a child-centred, outcomes-based education system which is characterised by the concept of lifelong learning (Van Der Horst & McDonald, 1997). The majority of schools, due to this transformation, have shifted to a more classroom-based and academic-based educational content which has leads to a respective lack of creative and activity-based learning. Outcomes-based education emphasises life skills in real life situations. Knowledge is not seen as being transferred intact from the teacher to the learner, instead, knowledge is seen as being constructed in the mind of the learner. Moreover, it also emphasises the 'holistic development' of a child (Le Grange & Reddy, 1998). Each learner brings his/her own prior knowledge and experiences to any learning situation (Curriculum 2005; 1997). Learners make sense of the new knowledge in the context of their prior knowledge and then develop their original concepts as learning takes place (Le Grange & Reddy, 1998). It is for this reason that Curriculum 2005 embraces Life Orientation under which physical activity and skills development fall. Some of the most important specific outcomes of Life Orientation are to help learners:

- Understand and accept themselves as unique and worthwhile beings.
- Demonstrate the values and attitudes necessary for a healthy and balance lifestyle.

- Evaluate and participate in activities that demonstrate effective human movement and development.

Generally, there are two schools of thought around the status of physical education. The first is that physical education should be an essential part of the core curriculum and the second being that physical education, while important to a child's development, is regarded as being of secondary importance to the core academic curriculum (Gabbard, 2000).

As stated in literature by Hendricks (2004), the Life Orientation focus and the area of the physical education curriculum is divided into three phases; the Foundation Phase, the Intermediate Phase and the Senior Phase.

In the Foundation Phase (Grade R to 3) of the physical education curriculum, learning focuses on children discovering, exploring and experimenting with movement patterns in an aim to stimulate gross motor development and physiological growth (Sitzer, 2003). Examples of the physical education focus in this foundation phase include learners participating in free play, demonstrations of specific skills, using a combination of body parts, performing basic movements in a sequence or pattern, and exploring expressive movements using contrasts of speed, direction, body shape and position (Department of Education, 2002).

Research indicates that even though the Education Department sees the important role played by physical activity in the well-being of learners, Life Orientation under which physical activity falls is still given fewer credits and time on the time table (Gildenhuys, et al, 1995; Thomson, 1996). It is clear that physical activity gets very little, if any, time within Life Orientation as a learning area. This therefore calls for greater attention to the physical activity patterns of learners in general. With this in mind, schools should be vigilant in ensuring wherever possible, continued physical activity through participation and development of fundamental motor skills which will consequentially promote positive attitudes towards sport and physical activity.

Arguments for the promotion of physical activity participation are most prominently put forward by experts in health-related science, who extol the benefits of exercise for physical well-being (Sallis, 1994 and Fletcher, Blair and Blumenthal, 1992). Health concerns related to the increasingly sedentary lifestyle in modern countries, especially the positive relationship between chronic diseases and inactivity and disturbing data on physical activity levels in children and youth, particularly girls (Armstrong and McManus, 1996) has instigated a search for ways to encourage physical activity participation (Sallis and Taylor, 2000).

Benefits of being physically active are also thought to extend to psychological and sociological realms and according to Gruber(1986) and Sonstroem (1984), characteristics such as attitudes, orientation and self-perceptions can often be linked to either sport and exercise participation or with social and interpersonal behaviour patterns (Barber, Eccles and Stone, 2000).

Schools offer an ideal environment for the development and upholding of healthy habits. Werner, Timms, and Almond (1996) reported from a news briefing by the American College of Sports Medicine that schools are the most likely place to change movement activity patterns. It was further suggested that movement education curricula should provide movement experiences that are enjoyable, provide significant amounts of movement activity, and promote lifelong participation in movement activities.

The better private schools have long realized the importance of developing a healthy mind and body. Some of the private schools have the following physical programmes available during school time:

Let's Play: Their objective is to encourage children and their families to play and engage in physical activities. They have partnered with organizations that have existing, sustainable programmes in place to get children aged 0-18 active through schools, events and community programmes. **Active Education** offers age-specific instruction by trained professional coaches at schools that contract them to run physical education programmes and also expose children 3-7 to ball skills and movement through the Kid-in-action programme.

Kidi-sportz: addresses low muscle tone in children aged 3-7 years by strengthening the abdominal muscles, improving hand-eye and foot coordination, balls skills, flexibility, strength, gross motor coordination and basic gymnastics.

Little champs: This sport academy promotes and develops motor skills in children 2-7 through playful sports related activities which are incorporated into carefully constructed gross motor skills development programmes to improve speed, agility, balance, eye-hand and eye-foot coordination and spatial-awareness.
Play-ball: instructs, inspires, conditions and familiarizes trains and changes children's behaviour in a positive way through the medium of confident, competent sports participation (Your Sport, magazine 3rd Quarter, 2007).

Although physical education programmes can be justified on the basis of their health benefits alone (Sallis, 1991) it is important to understand any effects on academic achievement. It has been hypothesized that physical activity at school could enhance academic performance by increasing cerebral blood flow, changing hormone secretion and improving self-esteem, but none of these mechanisms have been adequately documented (Shephard, 1997).

Many parents regard academic performance as the single most important indicator of success for their children and overlook other aspects of physical and psychological development. Indeed, too much physical activity is commonly regarded by parents as an energy drainer that affects concentration on academic work and has therefore been discouraged.

In another review of several correlation studies, poor reading achievement was consistently found to be strongly related to inattentiveness and behaviour problems (Mcgee and Share, 1988).

According to Vail (2006), academics and physical education used to be in two separate worlds. In fact, some educators continue to see them as competing factions, one fighting for the mind and the other for the body. These days, however, the demarcation between mind and body, between academic education and physical education, is wavering. Physical educators are adding academic elements to their lessons, and regular classroom teachers are using physical exercises and activities to help boost students' concentration and focus.

Elementary movement education is often the child's first formal experience with movement instruction. Physical education and the effects of physical activity on the body can stimulate various parts of the brain (Blakemore, 2003; Jensen, 1998) and have favourable effects on academic achievement (California Department of Education, 2002; Meada & Randall) as well as and guide individuals towards a more physically active lifestyle.

It is through movement that children can build a foundation of motor skills for future participation in sports and other physical activities (Maeda and Murata, 2004).

2.4 MOTOR PROFICIENCY

Although the term motor proficiency has been widely used, there appears to be little in terms of defining what the term really means.

Sherrill, (1993) defines motor proficiency as the specific abilities measured by testing running speed and agility, balance, bilateral coordination, strength, upper-limb coordination, response speed, visual-motor control, upper-limb speed and dexterity.

Motor proficiency is said to be multidimensional (Sherrill, 1993). It is based upon the execution of flexion, extension and rotational movements that to be successful performance of loco-motor, balance and manipulative skills. Motor proficiency further entails rhythm and co-ordination in the successful performance of loco-motor, balance and manipulative skills (Sherrill, 1993). Motor proficiency is used to describe the level of skill one possesses.

2.4.1 FACTORS THAT INFLUENCE MOTOR PROFICIENCY

As humans, we learn to exist within our environment. Throughout our life span, we constantly develop or adapt our abilities and skills to live our lives in a satisfying and meaningful manner. The capacity to exist within the environment is influenced by our ability to function and the quality of our functional ability is related to all aspects of development. During the process of motor development children change in size, shape, maturity, physical activity and motor proficiency. These changes are driven by two factors namely *biological factors* which include genetics, gender and maturation and *environmental factors* which include experience, opportunity, encouragement, demographics and social factors (Gallahue 1982 & Thomas, 2001).

According to Newell (1986), the ability to perform a motor skill depends on the interaction between the learner and the environment. The personal characteristics of a child's motivation and previous motor skills experience all influence motor skills performance. Newell (1986) also states that motor skill ability also depends on physical characteristics such as body size, strength and balance and brain maturation. The extent to which children develop their genetic potential for motor skills depends on temperament and personality factors such as energy levels, adventuresome-ness, aggressiveness and persistence as well as their attitude towards their body, their build and their eagerness to participate in group activities and compete. Shy children or children with low self-esteem will have difficulty competing with other children and, since motor skills are developed primarily in the context of the peer group, these children will miss out on the opportunity to acquire and develop such skills (Edward & Finn-Stevensen, 1987).

2.4.1.1 Biological factors

a. Gender differences

Prior to puberty, gender differences in the motor proficiency of children are generally small. These differences tend to increase throughout the high school years. These slight differences favour boys in direct and straight forward shows of power namely, in tasks such as ball-throwing velocity and standing broad jump. Girls on the other hand, sometimes excel in actions involving accurate hopping and balance. These differences may be caused by subtle contrasts in the rate of neurological maturation exhibited by the two genders and by the accompanying attention difference this may bring about. Research suggests that the differences found are due to parents, peers, teachers and coaches, who provide opportunities and encourage girls and boys toward different activities. Girls are generally encouraged to play quietly and practice fine motor skills such as drawing and colouring-in whilst boys are encouraged to participate in more vigorous movement activities such as running, chasing and jumping (Bouchard et al., 1994).

Research by Govatos (1959) and Krombholz (1997) shows that with respect to physical performance of motor skills, significant differences are identified in the scores between girls and boys, where boys exceeded on some items and girls on others. Boys and girls of similar growth status seemed to be equally effective in activities involving running and jumping. However, boys appear to excel more than girls in throwing and kicking. In terms of specific skills, significant relationships exist between specific physical skills, such as the 40-yard dash, standing broad jump and throwing distance and various growth measurements such as height, weight and carpal development of children in the primary grades (Govatos, 1959). In terms of developmental sequences regarding the specific action of throwing, research has shown boys to achieve mature throwing patterns at an earlier age compared to girls (Butterfield & Loovis, 1993).

b. Age

The shaping of human development is demonstrated by an orderly sequence of events which occur throughout an individual's development process. Muscular strength and the proficiency of gross motor skills improve with advancing chronological age throughout childhood and adolescence with the gender difference in performance tending to favour that of males (Rarick, 1980).

Literature by Rudisill *et al.* (2002) shows that motor activity, defined as a combination of perceptions in new motor patterns, is often influenced by intellectual, affective and cultural factors and also varies with age. It is recognized that with a steady and sustained growth, an increased ability to execute motor skills and master more complex and elaborate motor tasks is very apparent. Not only do children of the same age grow at different rates, children today are taller than they were in previous generations and they also mature at an earlier age, a phenomenon known as the secular trend (Edward & Finn-Stevensen, 1987). Research by Krombholz (1997) showed that an increase in physical growth increases physical performance as well as cognitive performance. Measurements of physical fitness and body coordination also increased with increasing age.

c. Genetics and Maturation

Genetics and maturation contribute to and control the body's internal environment. The body's internal chemistry must be balanced to support growth, development and functional activities such as movement. Hormones play a major role in controlling physical growth, initiating puberty, regulating the body's metabolism and the body's ability to utilize chemical sources of energy for growth, maturation, adaptation and learning. Few maturation differences are observed between boys and girls before puberty. However, following puberty girls are typically smaller and have less muscle than boys (characteristics that are likely to impact on motor and sport performance). Thomas (2001) states that late maturing children, while not as large at the time (or often

as skilled), will on average be larger than early maturing children. If early maturing children are selected for youth sport teams because of their size and skill, later maturing children often drop out even though their potential may be greater for high school sports.

2.4.1.2 Environmental factors

a. Proficiency

The development of proficiency goes hand in hand with the process of growth and maturation. Older children, on average, perform motor skills better than younger children. However, practise to develop expertise has consistently been shown to overcome age with more expert younger children performing better than less experienced children (McPherson & Thomas, 1989). Research by Thomas and Thomas (1988) proves that practice alone does not guarantee expertise and suggests that the quality of practice is what is essential. They encourage children to practise correctly, practise the 'right' things, practise a lot and practise as they will perform.

b. Physical factors

Malnutrition, season of birth and the number of people living in a household are examples of physical factors that influence the motor development of young children (Cintas, 1995). Malnutrition may affect motor development by affecting the stature or physical growth and energy levels of children. The season of birth may be associated with the onset of children's locomotion. It is hypothesised that heavier clothing or the absence of floor experience during the cold season may delay the onset of locomotion in some infants. In environments where chaotic or crowded conditions exist, opportunities for motor skills development may be restricted for the young child (Loucaides et al., 2004).

Seasonal and geographical influences are also examples of physical environmental factors which influence motor proficiency. According to data from the National Children

d. Social factors

Children learn certain behaviours by observing others, who serve as models, and by internalizing those behaviours. Role models, especially those significant to the child, can encourage or discourage behaviours. This is done through the role model, by either engaging in certain activities or not, or by how they label certain activities. The process of social learning extends throughout life as other people and situations influence individuals. Social learning involves many types of behaviour including: social skills, physical skills, traits, values, knowledge, attitude, and dispositions. Socialization is critical for motor development. Children who are socialized into motor experiences are more likely to learn motor skills. Increased proficiency in skill performance is enjoyable and rewarding in itself and in turn promotes continued participation. Parents appear to be a strong social influence in physical activity, this can either be via direct support, encouragement and motivation or indirect, through modelling or an interaction of the two. Children whose parents are physically active have been reported to be nearly six times more active than those children whose parents are inactive (Kohll & Hobbs, 1998).

e. Psychological factors

Self efficacy is the confidence an individual has to change or maintain certain actions. Self efficacy is closely linked to intention when describing factors which influence physical activity. However, it is not sufficient just for an individual to intend to be physical active, but rather to believe that he or she has the capabilities to engage in physical activity. With self efficacy and confidence come perceived barriers such as lack of time, lack of interest or desire, unfavourable weather or access to equipment and facilities which become potential factors capable of influencing motor proficiency in children. Attitudes and knowledge are two additional avenues which have been tapped as psychological determinants of physical activity. It is generally thought that children

will participate in physical activities to which they have a positive attitude (Kohll & Hobbs, 1998).

f. Leisure time activities

A frequently cited determinant of physical activity and motor proficiency is the amount of time children spend watching television and playing video games. Although the hours of viewing per week have not been shown specifically to be related to decreased levels of physical activity, these viewing hours certainly reduce the opportunity to be active. Leisure time variables such as participation in sports clubs and availability of exercise equipment at home have also been found to be significant correlates of physical activity and motor proficiency (Kohll & Hobbs, 1998). A study by Graft et al. (2004), involving an analysis of children's leisure behaviour showed that children who are more active (either in organized extramural activities and/or on a regular basis) do have better gross motor development. Similar findings have been reported in research by Krombholz (1997). The study by Graft *et al.* (2004) also showed that children with a higher weekly television viewing frequency tended to demonstrate poorer gross motor development.

g. Physical education presented at school

Nearly all children attend school; therefore school can play a noteworthy role in increasing a child's physical activity level and promoting healthy fitness behaviour. According to the National Youth Fitness Study (NYFS) (Kohll & Hobbs, 1998) of first to fourth grade children showed that the frequency with which schools conduct physical education classes is related inversely to the amount of time children are given for recess. This suggests that schools use recess to substitute rather than supplement physical activity. In this study (NYFS) it was stated that 76% of the children never saw a classroom or an appropriately qualified teacher for physical education (Kohll & Hobbs, 1998).

2.4.2 DEVELOPMENT OF MOTOR PROFICIENCY

A child is a complex, composite and complete being and has an identity more than a mere combination of his/her components (Nourbakhsh, 2006:41, Pienaar, 2004). According to Nourbakhsh (2006:41), the general trend of development involves all aspects of the child's identity meaning their perceptual-motor, affective and cognitive development evolves together.

Perceptual-motor development can be defined as a child's response to external stimuli that are perceived through visual, auditory and kinesthetic senses (Payne & Issacs, 2002, Haywood, 1993).

Factors responsible for perceptual-motor development in children 6-14 years are: general dynamic coordination, movement speed, synchronous-symmetrical voluntary movements and asynchronous-symmetrical voluntary movements as cited in Nourbakhsh, (2006:41). According to this Nourbakhsh, the development of the above mentioned factors will have influences on the development of motor skills in children, such as finger skills, hand-eye coordination, balance and the function of large muscles of the body.

Physical educators and the sport scientists found a positive correlation between perceptual-motor development and academic performance in children (Delecato, 1966; Cratty, 1979). Levine (1987) found that writing mistakes that children make were due to a lack of fine motor coordination, poor motor-visual evolution and perception disorders of attention.

Green (1990) concluded that those physical education programmes which put emphasis on perceptual-motor development increase the mental activity of children. According to research, the motor and perceptual development patterns of a child and his/her concrete mental operation should be identified and the impact should be recognized on personality, cognitive abilities and affective characteristics of children, by teachers, physical educators and sport sciences experts.

Motor proficiency leads to the development of fundamental motor skills. Fundamental skills involve gross movements that involve body parts such as feet, legs, trunk, head, arms and hands (http://www.clt.estate.edu/bdean/Motorskills/Introduction_files/fullscreen.htm).

Fundamental motor skills play a significant role in the development of a child's overall motor skills. Fundamental motor skills provide the foundation for more complex motor skills. This view is further maintained by Goddard-Blythe (2000) who suggested that attention, balance and co-ordination are the primary ABC's upon which all later learning depends.

The development of motor proficiency also has positive implications for health (Haywood, 1993). Exercise can help reduce asthma symptoms, a major cause of student absenteeism (Haywood,1993). Regular exercise can alleviate stress, anxiety and depression – problems that can affect school performance and can even improve their self-esteem. Children who are physically active on a regular basis are healthier than those who are sedentary. Physical activity in many schools and homes does not have the level of importance it deserves (De Viliers, 2005; Ntshingila, 2004). Research shows that physical activity patterns developed in childhood tend to last throughout adulthood (Janz, Dawson and Mohoney, 2000). The motivation to continue with sport or any kind of physical activity is enhanced if motor proficiency levels are at an acceptable level. Research done by Wrotniak, Epstein, Dorn, Jones and Kondilis (2006) on the relationship between motor proficiency and physical activity in children (n=65) between the ages of 8-10 years indicated that children in the quartile of motor proficiency were more physically active compared to the children with lower levels of motor proficiency who had similar levels of physical activity. Motor proficiency is positively associated with physical activity and inversely associated with sedentary activity in children (Wrotniak, Epstein, Dorn, Jones and Kondilis, 2006).

2.4.3 MOTOR SKILL DEVELOPMENT

The development of motor skills is important for our daily living and is a process that involves both inherent abilities and considerable practise during childhood and adolescence. Self-selected, unplanned play is important for acquiring motor skill abilities as well as structured movement instruction. Without this formalized learning, movement performance and improvement is really left to chance. In an article by Smith and O'Keefe (1999) they purport that this factor is often not recognized and even some professional educators assume that such essential skills will emerge automatically. However, as with many skills, young children need to learn and practice these skills until they can proficiently participate in a variety of games and sports. Findings show that when teaching interventions are applied for the learning of fundamental motor skills children, aged four to six years, are able to achieve full proficiency (Smith & O'keefe, 1999).

Literature shows that movement skills may be defined as identifiable movement patterns which are used to accomplish certain tasks. These skills can be categorized into a four level developmental hierarchy (figure 2.1).

- *Level one* is made up of the rudimentary skills of sitting, crawling, creeping, standing and walking.
- *Level two* consists of what is usually called fundamental motor skills which emerge from birth to the end of about six or seven years of age.
- *Level three* represents loco-motor skills such as running, jumping, hopping, galloping, skipping, and object control skills, such as throwing, catching, striking, kicking and dribbling. These fundamental motor skills provide the foundation for the learning of other more specialized movement skills.
- *Level four* is at the top of the hierarchy of specialized movement skills. These are referred to as ontogenic (development of an individual) skills and are specific to the needs and interests of a particular person (Burton, 1992).
-

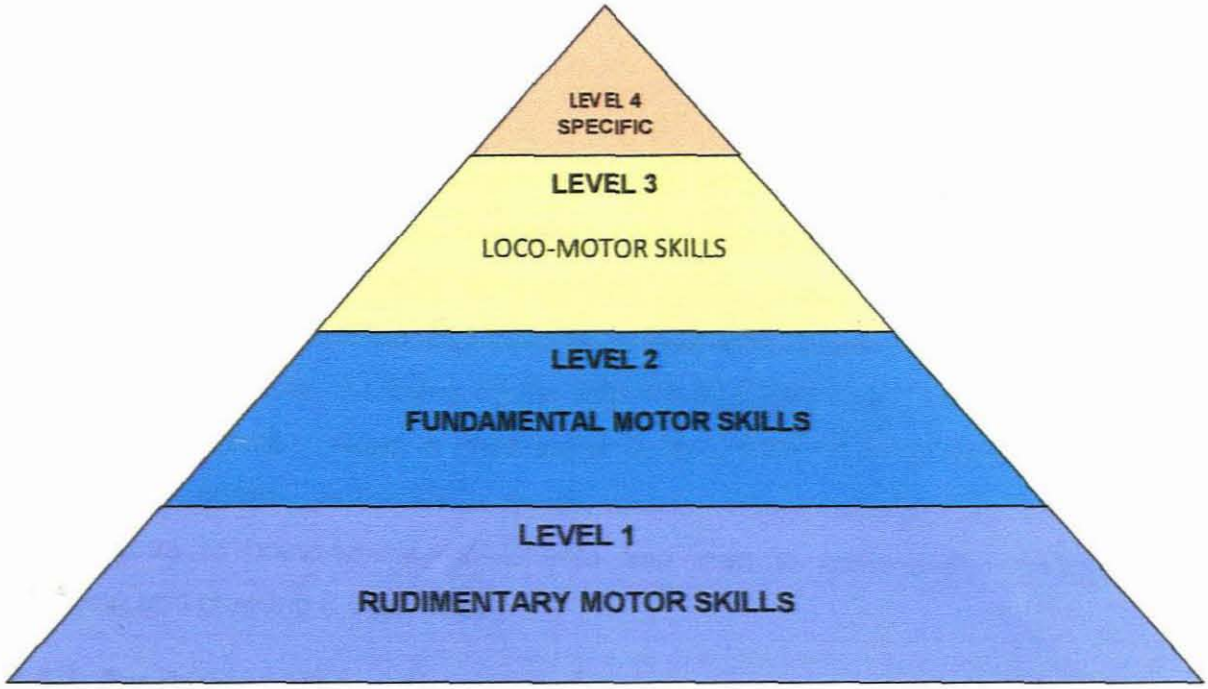

Figure 2.1 Levels of motor skill development.
(Adapted by Gouws, 2008)

Understanding the various levels of skills that children need to learn is important. These skills set the foundation for adult activity and, when learned correctly, performers move with confidence and style. All individual dual and team sport activities use fundamental and specialized skills of one type or another (Dauer & Pangrazi, 1989).

2.4.1 Rudimentary motor skills

During early childhood, discovering and exploring movement provides children with many exciting and thoughtful learning experiences. Young children are delighted with their emerging capabilities and find opportunities to learn, play and practice. It is during this age bracket that children develop a foundation for body management abilities needed in games, recreational activities and for sport specific skills. Research also shows that early and appropriate movement experiences help to create and extend neural networks in the developing brain. Constructive and well planned lessons are required to enhance these areas and others like cognitive, social and emotional aspects (Carson, 2001)

A child's motor development depends on his/her total physical development. In order to crawl, walk, climb and grasp, the infant must first have reached a certain level of skeletal, neural and muscular development (Louw, 1995). At birth, infants have a repertoire of movements that can be used in their new environment. The collections of movement responses, exhibited by the infant and young child, are used to build later movement patterns. When a child starts to be mobile they go through a series of movement patterns performed with all limbs. They will typically progress from homologous to homo-lateral movements and then to cross-lateral patterns during creeping and crawling (Louw, 1995).

2.4.2 Fundamental movement skills

Fundamental motor skills are the ABC's of movement. These basic skills are divided into two categories; locomotive skills, which involve moving the body from one point to another; and manipulative skills, which involve moving objects with hands and feet (Goodway & Robinson, 2006). Fundamental skills are those that involve the projection and reception of the body and are used during both work and leisure activities by most individuals. They are seen as universal in the motor pattern range. These skills include basic movements such as walking, running, hopping, twisting, throwing, catching and striking an object. Walking and running retain their importance in the achievement and continuation of physical fitness throughout life. Other skills, such as skipping and rolling, also have a significant contribution during childhood. Development of such skills is emphasized during elementary school (Seefeldt, 1984).

Fundamental motor skills are prerequisites to the learning of sport specific skills such as the skills used in soccer, basketball, hockey, etc.

Balance is considered to be a fundamental gross motor skill since all gross motor skills requires some element of balance. Proper development of static and dynamic balance skills is thus considered as essential in the development of gross motor skills (Du Toit & Pienaar, 2001).

To define dynamic and static balance, Knight and Rizzuto (1993: 1296), offer the following:

> *"Dynamic Balance: The ability to maintain a balanced position, while moving through space –the centre of gravity is shifting constantly to remain inside the base of support."*
>
> *"Static Balance: The ability to maintain a stationary position, for a specified period of time –the centre of gravity remains the base of support."*

2.4.3 Loco-motor and non-loco-motor Skills

Loco-motor skills are used to move the body from one place to another or to project the body upward, as in jumping and hopping. These skills form the foundation of gross motor coordination and involve large muscle movement (Goodway & Robinson, 2006).

Non-loco-motor skills are performed without appreciable movement from place to place. These skills are not as well defined as locomotor skills. They include bending and stretching, pushing and pulling, raising and lowering, twisting and turning, shaking, bouncing and circling (Goodway & Robinson, 2006).

2.5 MOTOR SKILLS THAT LAY A FOUNDATION FOR LEARNING

a. Body awareness

Body awareness is a broad term that includes how people picture their body, their attitude towards their body, and the knowledge of what their body is capable of doing as well as the limitations (Pyfer, 1997).

b. Spatial Awareness

Spatial awareness is the ability to work within one's own space – an area one arms length around in all directions. This perceptual-motor skill affects handwriting and all *graph and fine motor work. It combines with eye-hand coordination and centre-line* skills to influence all copy work (http//www.theteacherspot.com, n.d.).

c. Balance

Balance is the ability to maintain equilibrium in static or dynamic position. Balance is very important to almost every motor function (Pyfer, 1997). Balance is a very important skill in any movement. It helps to produce coordinated movements (Pienaar, 2004). .

d. Dynamic balance

Short term memory skills flow out of dynamic balance. How one controls one's body when suspended in the air for any length of time affects the proficiency of dynamic balance. Children who have difficulty following a series of directions tend to be weak in this skill area (http//www.theteacherspot.com, n.d.).

e. Laterality

This is the ability to distinguish between the left and right sides and that the body consist out of two sides (Pienaar, 2004). Laterality is also the awareness of the difference between the two sides of the body (Pyfer, 1997).

f. Bi-laterality

This is the ability to use the upper and lower parts of the body independently. Bi-laterality affects the ability to conceptualise ideas

g. Cross laterality

This is the ability to use opposite sides of the body at the same time in a smooth, rhythmic manner. Cross-laterality affects the ability to read sequence and prioritize items (http//www.theteacherspot.com, n.d.).

h. Tracking

Tracking is the ability to deal with objects and people outside of our own space. Tracking affects copying information from outside one's own space. It allows for the transfer of information from far (white board in classroom) to near School book on desk). (http//www.theteacherspot.com, n.d.).

i. Centre-line

This is the ability to perform tasks directly centered on our mid-line. It is the ability to work efficiently from left to right, such as reading test questions and writing the answers on an answer sheet (http//www.theteacherspot.com, n.d.).

j. Eye-foot coordination

Eye-foot coordination requires that the eyes and feet work together to achieve a given result. It works best when the focus eye (the dominant eye) matches the dominant foot so that the eye and foot can work together to accomplish a given task (http//www.theteacherspot.com, n.d.).

2.6 IMPORTANCE OF MOTOR PROFICIENCY ON SCHOLASTIC PERFORMANCE

Each milestone achieved by the child in terms of motor skills has implications for other developmental domains. Motor skills and 'play' are important precursors of the more formal and stylized elements of what are referred to as cognitive or intellectual development (Wade, 1992). For many years there has been a link between movement and successful learning. Theorists believe that movement reflects neural organization and provides stimulation to the neurological systems necessary for their development and optimal functioning. Today, these views are reflected in research by Pica (1998) and De Jager (2001), who agree in considering the brain and body as a united whole. Interplay of the human brain and body allows us to clearly see that movement is an integral part of all mental processing and that every movement is a sensory-motor experience which is linked to our understanding and interpretation of our physical world from which all our learning originates (Fredericks et al. 2006). Furthermore, movement remains a significant medium for cognitive, social, emotional and motor development through the child's pre-school and early primary school years (Luebke, 1981).

A view from Goddard-Blyth (2000) suggests that attention, balance and coordination constitute the primary ABC's upon which all later learning depends. If these skills are not developed by the time that children enter school, children will run the risk of later developing specific learning difficulties not only because they lack intelligence, but because the basic systems fundamental to learning are not fully developed when these

children start school. The development of these fundamental skills plays an important role in a child's school readiness development since a child's gross motor skills are closely related to his/her fine motor, cognitive and perceptual development (Gallahue & Ozmun, 1998). Thus, movement which is meaningful for development will ensure that these skills develop in the holistic growth of a child.

Perceptual motor skill development is directly related to the central nervous system and the processing of information received via the sensory organs. There are many areas within perceptual motor development that are supportive to the complete development of a child. These are bilateral proficiency, throwing, catching and kicking, balance and acceleration, and deceleration.

Bilateral proficiency is trained through cross lateral activities while catching helps children to practice reacting to information provided by pro-prioceptive organs and the eyes. The skill of acceleration and deceleration teaches a child the principles of motion and the inter-relationship that exists between stability and mobility (Gallahue & Ozmun, 1998).

Spatial awareness earlier referred to as a perceptual-motor skill which lays a foundation for learning, is reported by Corso (1993) to be reliant on a healthy gross motor development and movement awareness. Spatial awareness is the term given to a person's conscious awareness of their place in time. However, without balance, spatial awareness is impossible. Children need to first have gained experience and practice in orientating their bodies in space, by moving up, under, over and in front of objects, in order to attain spatial and directional awareness. Until then, they may experience difficulty dealing with letter identification and the orientation of symbols on a page (Olds, 1994).

Memory has shown to be correlated to positive movement skills in research by Hager (2000). It is concluded that movement is necessary to stimulate the ability of the brain to perceive, process and store information appropriately. Therefore, movement is seen as essential in strengthening both long and short term memory (Hager, 2000)

Research by Krombholz (1997) shows those children who are commonly labelled as clumsy experience tremendous difficulties in developing adequate movement skills. These problems occur in the absence of general sensory and intellectual impairments and without signs of neurological damage. Children with this kind of problem are less likely to seek out new and exciting experiences because of an association with repeated failure in the movement domain and their interactions on the play ground are limited. As a result, they will have a poor knowledge of evaluating, understanding and elaborating information related to movement. Contrary to this, children who are successful at movement patterns are more likely to become willing learners motivated by curiosity and will find pleasure in participating. Poorly coordinated children perceive a lowered competence in the motor domain, have reduced social support and interaction from peers, and develop higher levels of anxiety. Consequently, they are less likely to investigate situations for building movement patterns. These children also lack interest in physical activity and perseverance in challenging situations. According to the Competence Motivation theory, children who are successful at movement will be intrinsically or self-motivated in the motor field. In Contrast to this, children's self-motivation is likely to be reduced if they repeatedly fail at movement tasks (Rose, 1998). Motor proficiency is very important in children and the importance there of cannot be separated from the importance of normal physical activity. The above mentioned researcher has found a positive correlation between perceptual - motor development and academic performance in children (Nourbaksh, 2006:41).

Motor proficiency has also been found to have a positive effect on academic scores of learners. When children are active, which is related to higher motor proficiency, their academic performance improves. Studies show that providing more time for physical

activity (by reducing class time) can lead to an increase in test scores, particularly in the area of mathematics (Shepard, 1997).

Gonzales, Cortes and Dobbins (2003) found that the effects of physical education programmes that include motor-perceptual proficiency add to academic performance when they exanimate mathematics, reading and writing skills.

2.7 THE IMPORTANCE OF MOVEMENT PROGRAMMES ON THE DEVELOPMENT OF MOTOR PROFICIENCY

Movement has been found to be the key to the brain's development. Without movement, the neural network that comprises the brain is underdeveloped, resulting in insufficient information processing and learning (Black, 1990:38). It has long been believed that movement is essential and can be regarded as the door to learning. The benefits of physical exercise for fitness and health are seldom questioned. More seldom does the debate focus on the impact of movement on the academic performance and also the mental development of young children. Research consistently shows that movement programmes have a positive effect on learning, so schools do not have a clear mandate in this regard. The result is that physical education is often seen as a frill and has been discontinued in many South-African Schools which might be a misguided way of thinking (Summerford, 2001:6).

There is a link between movement and successful learning, this theory stems from earlier researchers such as Kephart (1975), Ayres (1979), Cratty (1972, 1973) and Delacato (1959; 1974). The researchers believe that movement reflects neural organization and that it also provides the stimulation to neurological systems that are necessary for their development and optimal function. Pica (1998:8) and De Jager (2001:8) more recently agreed that we consider the brain and body as a unit, therefore, the sooner we see the connection the more clearly we can see that movement is an integral part of mental processing.

Black (1990:38) reports that good physical education programmes boost academic achievement and children may be learning more in physical education classes than anyone ever anticipated. The researcher concludes that schools requiring children to sit still for most of the day are denied the connection between learning and movement.

While we report positive findings, it is necessary to consider the content of movement programmes or the variety of movement programmes that is used to then stimulate the brain. The nature and quality of the movement programmes in early childhood development education should for that reason be evaluated.

2.8 THE EFFECT OF LACK OF MOVEMENT

Pheloung (2003:53) has found some evidence that a lack of or insufficient degree of movement during a child's development contributes to learning restraint.

When children enter school and the above-mentioned skills are not developed, they may later develop specific learning disabilities. This is not because they lack the intelligence but because their basic systems linked to learning are not fully in place at the time they start school.

Spatial awareness, which is needed for school readiness, is dependent on healthy balance development (Corso, 1993). Until children have had the experience of orientating their bodies in space by moving up, under, beside, and in front of objects, it is possible that they will have difficulty dealing with letter identification and the orientation of symbols on a page (Olds, 1994:33).

Kaga (1999) indicated that the vestibular system, in combination with other systems, plays an integral role in the normal development of a child. The vestibular system is the sensory system considered to have the most influence on the other sensory systems and on the ability to function in everyday life (Cheatum & Hammond, 2000). Kaga (1999) indicates that a child who suffers from vestibular loss in both ears will most

probably have impairment of postural control and locomotion although other delays in development are also seen (Pienaar et al, 2007).

The above mentioned postural control (head control) and locomotion (sitting, walking) are usually impaired (Kaga 1999) and these delays and inabilities are generally the cause of other problems experienced with equilibrium (Guytin & Hall, 2000), spatial orientation (Pienaar, 2004) and poor school performance (Reynolds *et al.*, 2003).

Movement is therefore so meaningful for development and will thus ensure that these skills develop fully.

2.9 THE MOTIVATION FOR INTERVENTION PROGRAMMES

McCormick & Hikson (1996) reports that when children are exposed to early intervention programmes they will be more successful at primary as well as secondary school level, compared to a child who received remedial assistance later in life. A child whose background is limited will not benefit as much as a child who is exposed to early intervention.

This foundation that early intervention provides children is a risk in that the initial learning and behaviour patterns that influence a child's development are all established during these beginning years. Guralnick's (1998) research shows that there are certain critical periods where a child is more susceptible and responsive to these initial learning patterns.

2.10 CONCLUSION

One of the fundamental goals of any kinderkinetic programme should be to prepare students for the challenges of the 21st century by providing opportunities to attain the skills and knowledge to be physically active as part of a healthy lifestyle. Children should become competent in movement forms, motor skills, social skills and learn to enjoy physical activity while not compromising safety.

Children who master various motor skills will reap the benefits of a physically active lifestyle, better health, higher educational achievement, better preparation for work,

improved attendance, and improved in their self-concept. Establishment of lifelong patterns of participation in physical activity expands beyond the physical education class tot the opportunities and support provided the school and community.

There is an agreement in the literature that a movement intervention programme has an influence on a child's scholastic performance. In accordance with literature that support the importance of movement to improve scholastic performance. The infusion of short bouts of physical activity can certainly help children. We know from literature already cited that physical activity enhances academic performance.

The priorities in education continue to be on the development of the mind, often to the disadvantage of the body. Despite the overwhelming need for children to increase their levels of physical activity many parents, teachers, and administrators still believe that the mind should take precedence over the body (Pica, 1998).

The researcher deemed it necessary to design and implement a kinderkinetic programme and evaluate the effect the programme has on the motor proficiency levels and scholastic performance of children aged between six and eight.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This study was designed to study the effects that a kinderkinetic movement intervention programme would have on the scholastic performance of children. In accordance with the stated purpose of this study, the following hypotheses were formulated:

Hypothesis 1: An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and scholastic performance of children between ages 6-8 years.

Hypothesis 2: An 8-week kinderkinetic movement programme will have a beneficial effect on the motor proficiency levels of children between the ages of 6-8 years.

Hypothesis 3: An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and the results of the Connor classroom behaviour questionnaire.

Hypothesis 4: An 8-week kinderkinetic movement programme will bring about a positive relationship between the QNST levels and the scholastic performance of children between ages 6-8 years.

3.2 Research Design

This study was qualitative and quantitative in nature as it consisted of both test batteries and questionnaires.

The main focus of this study was to evaluate the effects of an 8-week kinderkinetic movement intervention programme on the scholastic performance of children. In order

to achieve this goal, a randomized experimental group design with two groups of the dependant variable was adapted for this study. Subjects were randomly assigned to one of the two groups. (Experimental group or control group).

This study involved the administration of a pre-test measuring the dependent variables, the provision of a kinderkinetic intervention programme, and the administration of a post-test measuring the dependent variables.

3.2.1 Research Variables

a. Independent variable: The Kinderkintic movement intervention programme

b. Dependent variables: Motor proficiency levels, Scholastic Performance and Classroom behaviour.

3.3 Measurement Instruments

The three measurements used in this study were the Bruininks-Oseretsky Test of Motor Proficiency (BOMTP), the Quick Neurological Screening Test (QNST) as well as the Connor Classroom Behaviour Questionnaire. The BOTMP and QNST were administrated by the researcher and the Connor Questionnaire was completed by the classroom teacher. A General Information form for the subjects that included their name, age, gender, scholastic performance was completed by the researcher. With the above form there was also a consent form for both the parents as well as the participants (see Appendix A and B).

3.3.1 Measurement of Scholastic Performance

A grade-point average for the areas of numeracy, literacy and life skills from the 2nd and the 3rd term report cards was used to measure the learners' scholastic performance.

In table 3.1 the following consecutive integer scores were used in the scholastic report to represent the child's mark on his/her report card:

Table 3.1: Explanation of report card scores.

Achievement	Score	Description
Poor	1	Few skills and very little, or no, knowledge and values demonstrated.
Below average	2	Some of the knowledge, skills and values are demonstrated, but others are lacking
Average	3	Much of the knowledge, skills and values are demonstrated, but with some minor limitations.
Above average	4	Most of the knowledge, skills and values are demonstrated.
Excellent	5	Outstanding ability is continuously demonstrated

3.3.2 The Bruininks-Oseretsky Test of Motor Proficiency (BOMTP)

The Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) (Bruininks, 1978) was used to assess the motor proficiency levels of the subjects. The BOTMP is widely used in Adapted Physical Education (Miles, Nerengarten, & Nearing, 1988; Parker & Bradshaw, 1987) and is useful in assessing the motor proficiency of children with disabilities (Haubenstricker, Seefedlt, Foundation & Sapp, 1981: Stengel, 1991). It is considered to be fun and interesting to children (Roswal, Frith, & Dunleavy, 1984) and the instructions and trials are useful in gauging the individual's understanding of the motor task to be assessed (Connolly & Michael, 1986). The standardised procedures permit replication and comparison between and within individuals in the study.

The BOTMP test thoroughly assesses the motor proficiency of able-bodied students as well as students with serious motor dysfunction and developmental handicaps. The test can also be useful in developing and evaluating motor training programmes (Robert, H. Bruininks, 1978).

The complete battery includes 46 items, whiles the short form, and consists of the following 8 subtests:

1. Running speed and agility
2. Balance
3. Bilateral coordination
4. Upper Limb coordination
5. Strength
6. Response speed
7. Visual-motor control
8. Upper-limb speed and dexterity

The BOTMP provides a separate measurement of gross and fine motor skills making it possible to obtain meaningful comparisons of performance in two areas. For practical reasons, the short form of the BOMTP was used in this study. The long form contained some items that were judged to be too complex and difficult for the subjects in this study. None of the items in the short form required special adaptations for the subjects in this study. The long form takes approximately one hour to administer to each subject and the short form takes approximately 20 minutes. Reliability for the long form ranges from .80 to .94, and for the short form from .81 to .89, and face validity has been accepted by adapted physical educators (Sherrill, 1993). A copy of the short form of the BOMPT appears in Appendix F.

3.3.3 The Conner Classroom Behaviour Questionnaire

The Conner Questionnaire is one of the most widely used children's rating scales in the world and is often used with children presenting behaviours typical of ADHD (Attention-deficit/hyperactivity disorder) This questionnaire is suitable for use by clinical psychologists, educational psychologists, child psychiatrists and teachers. It is particularly useful for measuring changes, evaluating intervention strategies, and monitoring remedial treatment. The assessment comprises of either a short form containing 28 items or a long form containing 39 items. The age range for the questionnaire is between three and seventeen years. It takes 15-20 minutes to complete the long form (Health: Conner's rating scale, 1999, http://connorsteacherscale.html.) A copy of the questionnaire appears in Appendix G.
In this particular study the researcher used the long form of the Conner Questionnaire

3.3.4 The Quick Neurological Screening Test

The QNST-II is an individually administered screening instrument designed to evaluate areas of neurological integration as they relate to learning. The QNST-II (1978) is the revised version of the QNST first published in 1974 (Mutti, Martin, Sterling & Spalding, 1998).

The QNST-II offers a quick and accurate way for an educational specialist, school nurse, paediatrician and psychologist or rehabilitation therapist to detect soft neurological signs often associated with learning disabilities. It is designed to be used with individuals as young as five years as well as with older children, adolescents and adults. In Table 3.2 the researcher outlines the educational implications highlighted by the QNST.

The QNST-II was used to find the correlation between scholastic performance and motor proficiency and the neurological integration of the subject. Secondly the

researcher wanted confirmation of the children's improvement after the 8-week Kinderkinetic movement intervention programme.

Table3.2: Educational implications of the QNST-II test

ONST Subtests		SKILLS	EDUCATIONAL IMPLICATIONS
1		Figure Recognition and Production	Reading problems Problems with directionality Poor motor planning Poor visual spatial perception
2 & 3		Heel –toe- walk One leg stand on beam	Difficulty with sequencing Difficulty with Motor planning Sequencing with words and letters, handwriting, reading skills
4		Arm and Leg extension	Reading problems Trouble integrating and processing information Unable to plan movement patterns Writing problems Tire easily Incomplete homework
5		Finger to nose	Difficulties with poor motor planning and control Attention problems Problems with words on written page or placement of pencil in a specific place on the page Math problems
6		Thumb and finger circles	Physical education and sports activities will be tiring Homework will also be tiring Fine motor problems such as writing or crafts may be difficult and time consuming Difficulties with ordering and sequencing Sequencing problems relates to verbal fluency or inability to recall the order of letters in a word Spelling skills are apt to be impaired Reading difficulties coexist with interdigital dexterity
7		Rapidly reversing repetitive hand movements	Child will tire quickly at writing and fine motor activity Poor motor planning ability Problems with reading or doing a task where the right and left sides needs to work together

The 7 subtest tasks are common to standard paediatric, neurological and neuropsychological batteries and include assessments of balance, visual-motor integration, fine-motor control, sound discrimination and other developmental tasks (Yamamhara, 1972).

The QNST-II can be completed in 20-30 minutes. Observations of the person's performance on the various tasks are scored in light of performance criteria and each subtest score indicates a functional category that is noted directly on the protocol sheet. See Appendix H for example of QNST-II score sheet. The total sheet then determines an overall, criteria-based indicator of the person's performance.

The test manual provides chapters on the educational and medical implications for the behavioural tasks assessed which assist the examiner's interpretation of the test scores. A separate component, the Developmental Activities form, provides guidelines for remediation exercises (Yamamhara, 1972).

The QNST-II kit consists of a test manual, protocol sheets, cue cards (which provide scoring instructions), geometric figure reproduction sheets and developmental activities forms (Yamamhara, 1972).

3.4 PROCEDURES

A proposal of this study was presented before a panel of representatives of the Faculty of Science and Agriculture Research Committee as well as staff and students of the Department of Human Movement Science, University of Zululand. After authorization and approval was granted for this study by the Department of Education, University of Zululand Ethics Committee, Faculty of Science and Agriculture Research Committee and the Headmasters of the selected schools (see Appendix C), the parents of the children invited to participate in the study were informed of the study. Consent forms were sent home to the selected children's parents. All the parents signed the consent

forms, which were then placed in the researcher's file. With the permission granted by the parents of the selected children to do the study the following procedures were followed:

3.4.1 SELECTION OF SUBJECTS

The subjects in this study were children ranging between the ages of 6 and 8 years from schools in the Richards Bay, Stanger and Damall areas of Northern KwaZulu-Natal. After identification of the suitable candidates by the class teacher and researcher, motivation for the study was explained to the headmasters, classroom teachers and students. The necessary co-operation and consent from the subjects was obtained (see Appendix A, B and C). Boys and girls of all ethnic groups participated in the study.

Of the 50 children who initially qualified for the study, 24 children were tested on the Bruininks-Oseretsky Test for Motor Proficiency, QNST-II and Connor classroom behaviour test. At the time of the testing the other 26 children were either absent from school that day due to illnesses or due to the nationwide public sector strikes which took place during June 2007. The study was explained to the children and they were asked whether or not they wanted to participate in the study.

The most accurate method of data collection appears to be direct personal contact between the researcher and the subject (Vincent, 1995). In cognizance of this motivation, it was decided to confine this study to 3 private schools and 2 Public School on the North Coast of KZN.

Subjects were matched according to their age, gender and scholastic performance. The paired groups where then randomly assigned to either the experimental or control group by the researcher. See Table 3.3

Table 3.3: Pairing of Subjects

Pair	Age	Gender	Scholastic performance	Grade-point average
1	6	Boy	Below Average	2
2	6	Girl	Above Average	4
3	6	Girl	Average	3
4	6	Boy	Below Average	2
5	6	Girl	Average	3
6	7	Boy	Below Average	2
7	7	Girl	Above average	4
8	7	Boy	Average	3
9	7	Girl	Above Average	4
10	8	Girl	Above Average	4
11	8	Boy	Average	3
12	8	Girl	Average	3

3.4.2 PRE-TEST PROCEDURES

With the climate being taken into consideration, testing was done indoors rather than outdoors. All of the children wore their sports uniform, which consists of a T-shirt, shorts and sport shoes.

Before any testing commenced, an oral description and explanation of the test batteries were given to the children in English and Afrikaans, firstly in a group session and then individually before they took their test. During the actual testing each item was demonstrated and where there were doubts, a trial was given to ensure that the child knew what was required of him/her.

Each child had a score sheet with his/her name, age and results that were recorded by the author. All the testing was done by the researcher and, where necessary, aid was given by the teacher. A meticulous check was made to ensure that the children were free of illness and any other conditions that could influence the tests and thus invalidate the testing programme. Apparatus used during the testing was carefully checked and rechecked carefully before each testing session.

3.4.3 THE KINDERKINETIC MOVEMENT INTERVENTION PROGRAMME

To ensure that there were no disruptions in the normal school programme; time was scheduled specially for the Kinderkinetic movement intervention programme during school hours. On Tuesdays and Fridays the programme was presented to the School in the Richards Bay area, from 11h00-11h45, on Wednesdays from 8h00 to the schools in the Darnall and at 9h15 at the Stanger areas. The children of the experimental group participated for 8 weeks. The intervention programme contained skills that the children would use in every day play and learning; for example, balance, gross-motor, and fine-motor coordination. See Appendix I and J for an example of a lesson. Table 3.4 is an example of the schedule of the Kinderkinetic intervention programme.

Table 3.4: Schedule of the Study, Including the Distribution of Content during the Intervention Programme

DATES	ACTIVITIES
4-9 June 2007	Identifying the children
25 June – 10 July 2007	Pre-Testing all the children on the BOTMP, QNST and Connor
16 July 2007	Introduction to Kinderkinetic Intervention Programme for the experimental group
23 July 2007	Week 1 Lesson 1& 2
30 July 2007	Week 2 Lesson 3 & 4
6 August 2007	Week 3 Lesson 5& 6
13 August 2007	Week 4 Lesson 7 & 8
13 August 2007	Week 5 Lesson 9 & 10
20 August 2007	Week 6 Lesson 11 & 12
27 August 2007	Week 7 Lesson 13 & 14
3 September 2007	Week 8 Lesson 15 & 16
1 November 2007	Post-Testing of children

3.4.5 POST-TEST PROCEDURES

The identical protocol followed in the BOTMP pre-testing sessions was used in the post-testing session. Before the start of the post-testing session the researcher re-acquainted herself with all the testing procedures that were to be followed.

3.5 STATISTICAL TREATMENT OF THE DATA

The data was analysed using Corel Suite 8 Quarto Pro software.

- Descriptive statistics were used to determine means, standard deviations and maximum and minimum values.
- The t-test was used to determine difference among groups and the influence of the independent variable.

- Pearson product moment correlation between (1) motor proficiency and scholastic performance, (2) motor proficiency and classroom behaviour.
- Magnitude of increase values were calculated for the following dependant t-test scores of each group's pre-test vs. post-test assessment.

In all analysis the 95% level of confidence ($p < 0.05$) was applied as the minimum to interpret significant differences among sets of data.

3.6 DEBRIEFING OF THE SUBJECTS

After completion of the study, headmasters, teachers and the children who participated in the study were informed about the results. Brief explanations of the results were also provided.

The success of the Kinderkinetic movement intervention programme in improving their skills was explained. The researcher then explained to the control group that they would now be offered a Kinderkinetic movement intervention programme so that they also could improve their skills.

3.7 CONCLUSION

Following the selection and placement into an experimental or control group, all subjects in this study took part in the pre-test. An 8-week Kinderkinetic movement intervention programme was then followed for the experimental group, while the members of the control group received no adapted physical activity programme. At the end of the Kinderkinetic movement intervention programme all the children in the experimental group were re-tested using the 3 testing instruments, namely, BOMPT, QNST-II and Connor Classroom behaviour. The results of the statistical treatment of the data gathered as well as a discussion of these results are presented in Chapter 4.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

The acceptance of the importance of a Kinderkinetic movement intervention programme in the performance of a child's scholastic performance led the researcher of this study to focus on the question of whether a Kinderkinetic intervention programme could be presented in such a manner that some of the goals of scholastic performance could be achieved. With this in mind, it was decided to design an intervention programme specifically to enhance the motor proficiency and scholastic performance of children. Four hypotheses were formulated to guide this research:

Hypothesis 1: An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and scholastic performance of children between ages 6-8 years.

Hypothesis 2: An 8-week kinderkinetic movement programme will have a beneficial effect on the motor proficiency levels of children between the ages of 6-8 years.

Hypothesis 3: An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and the results of the Connor classroom behaviour questionnaire.

Hypothesis 4: An 8-week kinderkinetic movement programme will bring about a positive relationship between QNST levels and the scholastic levels of children 6-8 year old.

4.2 RESULTS

4.2.1 Scholastic performance

The data related to the subject's scholastic performance was gathered to support or reject the hypothesis:

> *Hypothesis 1: An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and scholastic performance of children between ages 6-8 years.*

Table 4.1 and 4.2 presents the distribution of the scores on Scholastic Performance for both the experimental and control group on the pre-and the post-test.

Table 4.1: Pre-Test Scholastic Performance scores for both the experimental and control group pair on the pre-test

Pair	Age	Gender	Scholastic performance	Grade-point average
1	6	Boy	Below Average	2
2	6	Girl	Above Average	4
3	6	Girl	Average	3
4	6	Boy	Below Average	2
5	6	Girl	Average	3
6	7	Boy	Below Average	2
7	7	Girl	Above average	4
8	7	Boy	Average	3

9	7	Girl	Above Average	4
10	8	Girl	Above Average	4
11	8	Boy	Average	3
12	8	Girl	Average	3

Table 4.2: Post-Test Scholastic Performance scores for both the experimental and control group on the post-test

Pair	Age	Gender	Scholastic performance	Grade-point average	Experimental group	Control group
1	6	Boy	Below Average	2	average	Below average
2	6	Girl	Above Average	4	above	above
3	6	Girl	Average	3	above	average
4	6	Boy	Below Average	2	average	below
5	6	Girl	Average	3	above	average
6	7	Boy	Below Average	2	average	average
7	7	Girl	Above average	4	Above	above
8	7	Boy	Average	3	above	average
9	7	Girl	Above Average	4	Above average	above
10	8	Girl	Above Average	4	above	above
11	8	Boy	Average	3	average	average

12	8	Girl	Average	3	average	above

- Shading indicates subjects improved their score

In the Experimental group there were 6 children who, according to their scholastic report, had improved their scholastic performance in contrast to the Control group where, only 2 children improved on their performance.

The improvements are due to the emotionally and physically maturation of the children. Literature states that children who get regular physical activity or who are exposed to physical activities are able to concentrate better in the classroom environment (Vail, 2006). Exposure to physical activity affects the function of the brain positively. Exercises done by older children showed that physical activities helped to maintain cognitive function; this is the same in younger children. Researchers (Castelli,) are currently involved in the process of finding out more. The above mentioned researcher and her team from the University of Illinois found a positive relationship between mathematics and aerobic fitness.

Black (1995:33) reports that a good physical education programme can boost a child's academic achievement, and the researcher suggests that children learn more during a physical education class. The researcher concludes that children who sits till during class hours are being denied the connection that movement and learning have. Shephard (1997) suggests that when a generous amount of time is devoted to physical education during school time those children's academic performance might meet and even exceed those of children that do not get exposed to physical education.

4.2.2 The Bruininks-Oseretsky Test (BOTMP)

The motor proficiency of the subjects was measured using the short form of the BOTMP, administered before and after the experimental group completed an 8 week kinderkinetica intervention programme.

The data related to the subject's motor proficiency was gathered to support or reject the hypothesis:

> *An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and scholastic performance of children between ages 6-8 years.*

The data gathered in this study supports this hypothesis and demonstrates that a kinderkinetic intervention programme can be implemented that will result in a significant improvement in the motor proficiency.

Table 4.3 presents the distribution of the scores on the BOTMP for both the experimental and control group on the pre and the post test.

Table 4.3 Mean scores, standard deviations and t-values of the subtest items for all the subjects tested in the Bruininks.

	Test	M	SD	T-values pre- vs. Post-	Mag. of increase
Control	Pre	31.5	8.18		
	Post	38.08	7.25	-2.05	81%
Experimental	Pre	41.3	8.7		
	Post	48.26	9.4	-1.84	86%

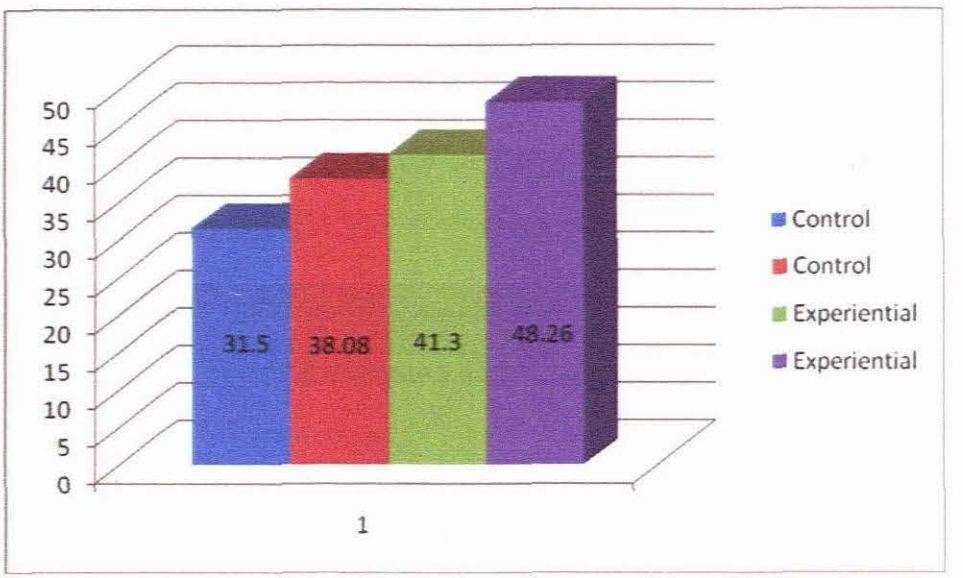

Fig. 4.1: Pre- and Post- mean scores for the experimental and control group for the Briuninks Test

In table 4.4 the differences between the two groups are explained according to each of the subtest of the Briuninks Test.

Table 4.4: Source of improvement in motor proficiency

Test Item	Experimental		Control	
	Pre	Post	Pre	Post
Speed and Agility	5.33	5.66	4.41	4.85
One leg stand on beam	5.72	5.92	3.26	4.16
Heel-toe walk on beam	3.42	3.66	1.66	2.42
Jump and clap hands	2.33	3.26	2.25	2.85
Standing long jump	5.25	5.3	3.91	3.75
Catch ball with two hands	3.26	3	2.66	2.83
Throw ball at target	1.92	2.41	1.75	2.26
Reaction speed	4.33	6.5	3.92	4

Draw line through spaces	0.66	1.5	0.25	0.92
Copy circle	0.33	0.92	0.08	0.75
Copy pencil	1.33	1.92	1.08	1.75
Sorting cards	3.92	4.83	3.25	3.75
Make dots	3.58	4.58	3.26	3.58

- Shading indicates item where subjects improved their scores

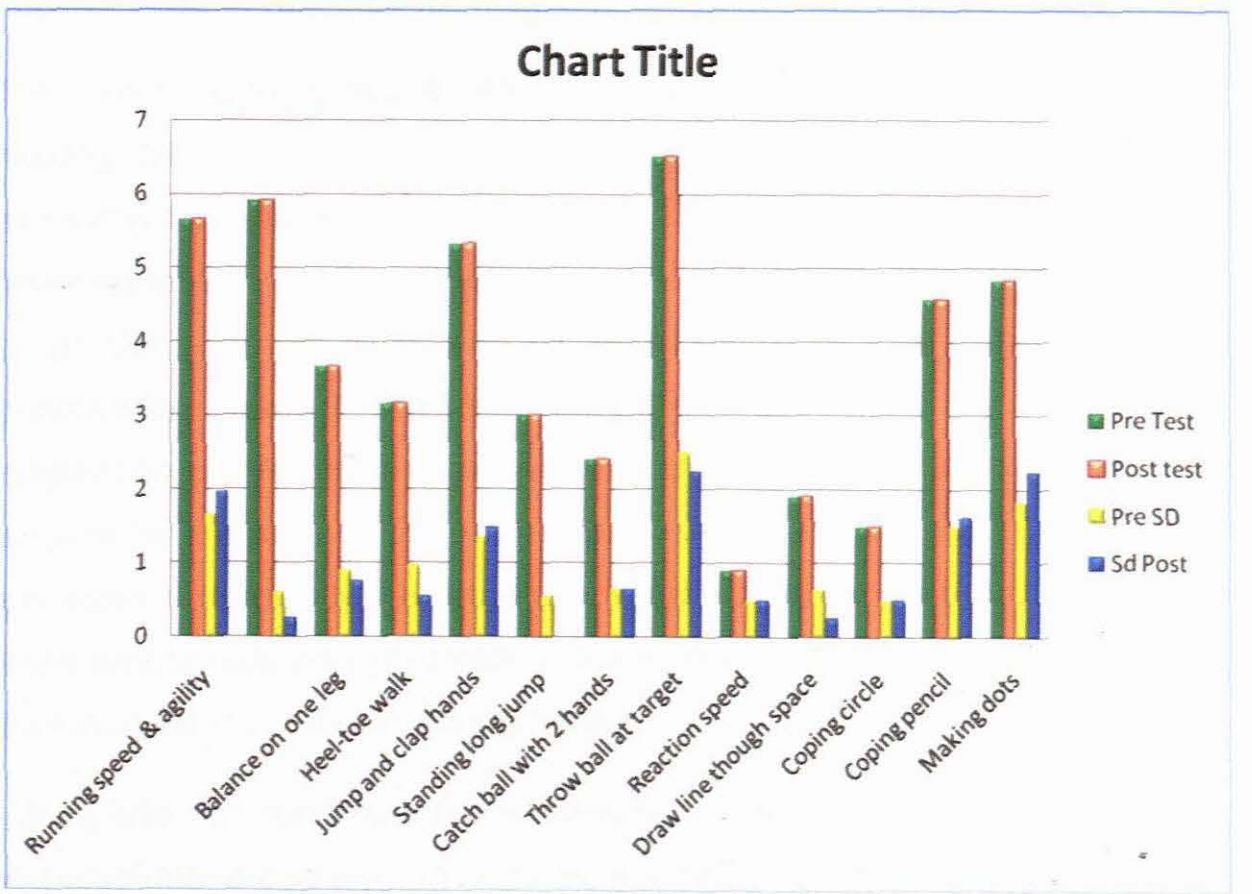

Fig. 4.2: Pre- and Post- mean scores for the experimental and control group for the BOMPT tests items

The particular test items that produced the greatest improvement from pre- to post-test are highlighted. The items that improved the most are the one leg balance on beam; heel-toe walk on beam; throw ball at target; reaction speed; draw line through spaces and making dots.

In the case of balance, literature states that children younger than age eight often verbalize or talk to themselves in order to direct themselves through any or all of the motor tasks. A child older than eight who continues this pattern may be an auditory learner and almost certainly cannot move without conscious direction (Thompson, 1996b). He often needs to hear his own voice to reinforce his memory.

The experimental group improved in the dexterity test, which includes making dots and drawing a line though spaces. With these two skills the experimental group also improved in their reaction speed. The improvement is confirmed with the QNST's figure recognition and re-production. Children older than six years should be able to name and re-produce the figures. The improvement also goes hand in hand with the maturation of the child, namely in the pre-test the children were in their second term of school, they were still new to all the writing skills that were expected of them. By the time the researcher did the post-test the children were emotionally and physically more matured than in the pre-test. They had learned to cope with the work load.

Along with the Kinderkinetica intervention programme, the children of the experimental group also participated in a ball intervention group. Their ball skills improved with the help of these two intervention programmes. The

experimental group children were exposed to more different type's balls skills compared the control group.

In Table 4.5 we discuss the correlation values of the experimental and control group's Scholastic performance against their performance in the Bruininks Test.

Table 4.5: Correlation values for the Bruininks Test vs. Scholastic Performance Pre- and Post-Test

Scholastic	Bruininks Test	
	Pre-Test	Post-Test
Experimental	r = 0.30	r = -0.08
Control	r = -0.15	r = -0.43

The researcher found that there were no correlation between the Bruininks Test and the Scholastic Performance.

4.2.3 The Connor Questionnaire

The classroom behaviour of the subjects was measured using the short form of the Connor Questionnaire, administered before and after the participation of the experimental group completed an 8 week kinderkinetica intervention programme.

The data related to the subject's motor proficiency was gathered to support or reject the hypothesis:

Hypothesis 3: An 8-week kinderkinetic movement programme will bring about a positive relationship between motor proficiency levels and the results of the Connor classroom behaviour questionnaire.

Table 4.6 Mean scores, standard deviations and t values of the subtest items for all the subjects tested in the Connor Questionnaire

	Test	M	SD	T values pre-vs. post	Mag. of increase
Control	Pre	131.4	15.2	-1.12	
	Post	135.9	13.67		12%
Experimental	Pre	123.8	17.7	-1.82	6%
	Post	123.0	20.09		97%

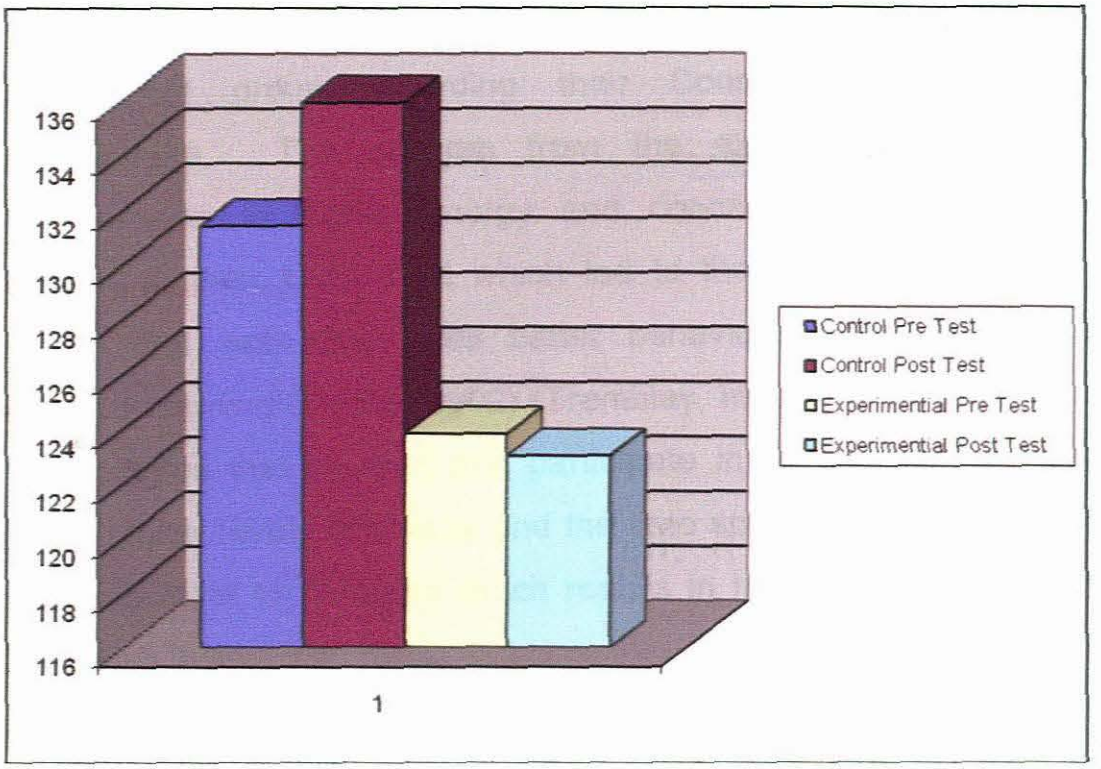

Fig. 4.3: Pre and Post mean scores for the experimental and control group for the Connor Teacher Questionnaire Test

Table 4.7: Correlation values for the Bruininks Test vs. Connor Teachers Questionnaire Pre- and Post-Test

Connor Teachers Questionnaire	Bruininks Test	
	Pre-Test	Post-Test
Experimental	r = 0.02	r = -0.55
Control	r = 0.37	r = 0.27

There were positive improvements in the scores of the children from the experimental group regarding their Connor Classroom Teacher's questionnaire. The children from the experimental group showed improvements in higher energy and concentration levels as well as changes in their body build which led to the improvement of their self-esteem and, with that goes better behaviour which may all support cognitive learning (Cocke, 2002) (Tremblay, Inman & Willms, 200). Linder (1999) states that children that participate in an intervention programme shows higher levels of energy and the time spent outside of the classroom may give relief to boredom which results in higher attention levels during classroom instruction.

4.2.4 *The Quick Neurological Screening Test (QNST)*

The subjects were measured using the short form of the QNST, administered before and after the experimental group completed an 8 week kinderkinetica intervention programme. The scores of the QNST work as follow; the less the child score in the test the better the child did in the test – a lower score is good.

The data related to subjects was gathered to support or reject the hypothesis:

An 8-week movement programme will have a beneficial effect on the QNST and the scholastic performance of children ages of 6-8 years old.

In table 4.8 the means scores, standard deviations and the t-values of all the subtest of the QNST-II is discussed.

Table 4.8 Mean scores, standard deviations and t-values of the subtest items for all the subjects tested in the QNST

	Test	M	SD	T-values pre- vs. Post-	Mag. of increase
Control	Pre	29.83	7.95	2.18	77%
	Post	23	7.32		
Experimental	Pre	23.16	5.30	4.41	44%
	Post	13.33	15.59		

Both in the t values in the above table showed it was significant.

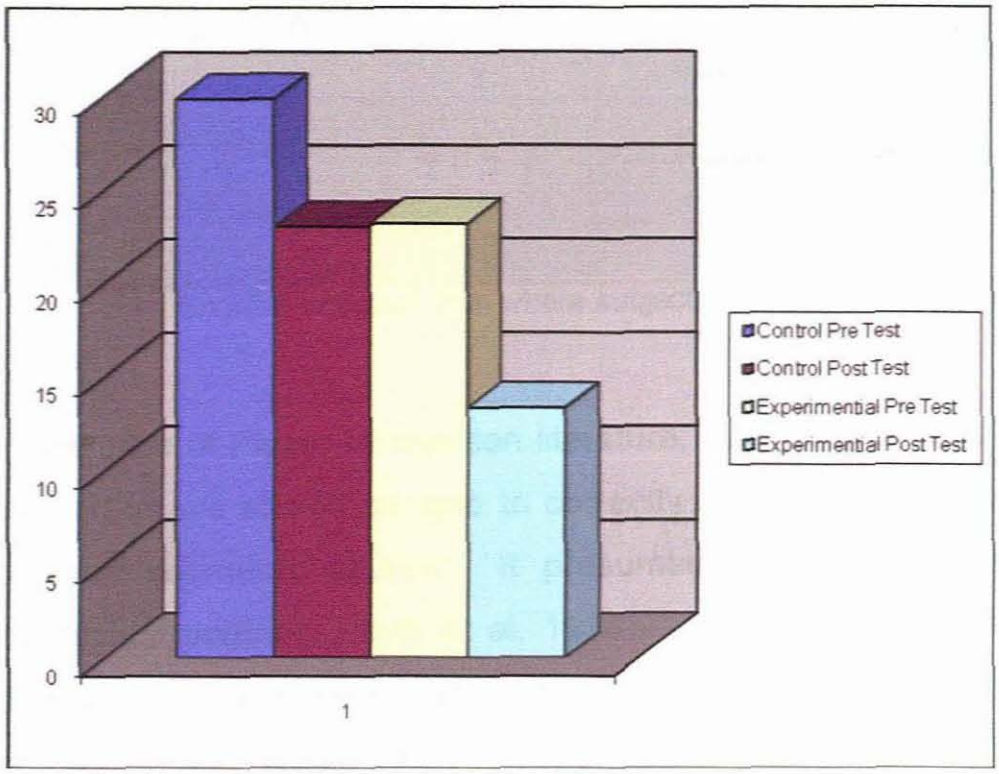

Fig. 4.4: Pre and Post mean scores for the experimental and control group for the QNST Test.

The particular test items that produced the greatest improvement from pre- to post-test are highlighted in table 4.9. The Experimental group had shown improvements in 9 of the subtest. As for the control group they only showed improvement in 1 of the subtest.

Table 4.9: Source of improvement in the QNST Test

Test Item	Experimental		Control	
	Pre	Post	Pre	Post
Figure recognition and production	0.91	0.16	1.9	2
Heel-toe walk	4.2	2.3	5.3	4.6
One leg stand	1.4	0.9	2	1.6

Arm and leg extension	3.2	1.5	4.7	3.4
Finger to nose	3.7	1.8	4.6	3
Thumb and finger circles	6.7	5.2	7.9	6.6
Rapidly reversing hand movements	3.2	1.7	3.6	2.3

- Shading indicates item where subjects improved their scores

In the case of Figure recognition literature, states that a child at the age of six and above should be able to correctly identify all five developmentally ordered geometric figures. It presumes average and above-average intellectual potential (Mutti et al, 1978). Correctly naming the objects is demonstrably related to reading readiness. The improvement of the results in the post-test can be the result of practice of this test in the classroom as the children also do art where they use all the different shapes as well as in the kinderkinetica intervention programme where we in cooperated figures either as part of the warm-up or as a station on its own.

In the arm and leg extension test, both the experimental and the control group have shown an improvement. The children who seem to improve with practice are apt to be developmentally immature and may be responsive to a success-orientated activity programme. With the help of the activity programme, the children would learn which muscles to use for a specific activity.

The tasks of walking heel-toe and one leg balance where only the experimental group showed improved deals with gross motor skills. Difficulties observed in the performance of any of these two tasks could interfere with physical education activities. Balance is often considered to

be closely related to auditory-perceptual skills (Sterling & Sterling, 1977b). Sequencing of word and letters, handwriting and reading skills are often more proficient when these neuro- motor skills develop at age appropriate pace (Gaddes & Edgell, 1994). The improvement of the child's gross-motor skills with the help of the Kinderkinetic intervention programme will mean the child's reading, writing and sequencing of letters will therefore also shown an improvement.

A positive relationship may exist between a child's ability at rapidly reversing repetitive hand movements and school performance (Denhoff et al., 1968). The experimental group showed an improvement in this test. Floppiness and poor muscle tone are noted in youngsters who are uncoordinated and who will become failure-orientated if too high expectations are placed on them for sports or academics. The participation in a Kinderkinetica intervention programme will help the child to cope with these high expectations.

In Table 4.10 the correlation values for the QNST-II test for the experimental and the control group were compared to scholastic performance.

Table 4.10: Correlation values for the QNST Test vs. Scholastic Performance Pre- and Post-Test

Scholastic Performance	QNSt-II	
	Pre-Test	Post-Test
Experimental	r = 0.20	r = -0.39
Control	r = 0.10	r = 0.49

The researcher found that there were no correlation between the values for the scholastic performance and the QNST-I

4. 3. CONCLUSION

According to research (Linder, 2002; Lazarus & Dean, 2001), there is a positive relationship between physical activity and academic performance. This research supports that when a significant amount of school time is dedicated to physical activity the child may even meet their academic standards.

The child has enhanced brain function, their energy levels are higher as well as their self-esteem and their behaviour is improved. This means that schools must increase the time spent on physical activity.

CHAPTER FIVE

RECOMMENDATIONS

5.1 INTRODUCTION

The main purpose of the study was to examine the influence of a kinderkinetica intervention programme on the scholastic performance of children between the ages of 6-8 years.

The results of this study demonstrated that children who participate in an eight week kinderkinetic programme can achieve significant improvement in their levels of motor proficiency, as well as improve on their scholastic performance and classroom behaviour.

5.2 RECOMMENDATIONS

The results of this study also lead to recommendation of topics for further research.

1. A continuation of such research is necessary to establish norm values of the motor proficiency for South-African children at various developmental stages of childhood.

2. Long-term follow up of participants who continued with and without intervention.

3. Schools should make more effort to enrich their physical education programmes and pay more attention to the development of the pupil's perceptual-motor abilities.

4. Representatives from the various Education Departments in conjunction with physical educators (life Skill facilitators) and Kinderkineticists should develop resource materials for teachers/facilitators that will show them how to teach various activities forming part of the Life Skills Curricula.

5. Teacher Education programmes at universities should make sure they include the knowledge and skills necessary to teach life skills orientation for children,

6. School Principals and other involved in decision-making about the education of children must be made aware of the potential of movement programme to improve the levels of motor proficiency. They must also be made aware of just how important it is that these children have the opportunity to develop toward their full movement potential.

The positive outcomes of this study are:

1. The intervention programme had a positive effect on the children as they enjoyed the activities.

2. The intervention programme prepared the children for formal education as they learned to work with a different teacher and complete formal educational tasks independently.

5.3 FUTURE RESEARCH

The results of this study also lead to recommendations about the focus of future research projects:

- A study similar design but longer is needed before it

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APENDIX A

UNIVERSITY OF ZULULAND:

DEPARTMENT OF HUMAN MOVEMNET SCIENCE

Dear Parents

With the co-operation of the University of Zululand, the Department of Human Movement Science and The Richards Bay Christian School I am busy completing a Master Degree in Kinderkinetica, the following came under research:

Title of Thesis: The effect of a Kinderkinetica movement intervention programme has on children 6-8 year's scholastic performance

I hereby request permission to conduct assessment of your child. Assessment will be done in school hours. The Principal have set time a side so that it does not interfere with their school time table. I assure you the assessment will in no way inconvenience teachers or disrupt the everyday activities of the school.

Yours faithfully,

Chantell Gouws

INFORMED CONSENT

I, ..., having been fully informed of the nature of the assessment and the research programme do hereby give my consent to have student participate in this programme.

I realize that it is necessary for me to report any signs of symptoms indicating any abnormality or distress.

I am aware that I may at any given time withdraw my participation in the programme.

I have read the form and I understand it. Any questions which I my have has been answered to my satisfaction.

SUBJECT SIGNATURE

_____	_____	_____
(Print name)	(Signature)	(Date)

RESEARCH INFORMED CONSENT

_____	_____	_____
(Print name)	(Signature)	(Date)

APENDIX B

CHILD CONSENT

I..... understand that my parents (mom and dad) have given permission (said it's okay) for me to take part in a project about

.....

.....

Done by.....

I am taking part because I want to, and have been told that I can stop at any time I want to and won't get into trouble (nothing bad will happen to me if I want to stop)

_____ _____

Signature date

APENDIX C

Permission letters from schools

SUNSHINE PRE-PRIMARY SCHOOL

PO Box 2046
Darnall 4480

Tel/Fax 032 486 1369

June 18, 2008

To Whom It May Concern:

We at Sunshine Pre-Primary gave permission to Chantell Gouws and the University of Zululand to test the Grd R (school readiness) group of the school for her Master Thesis.

Please feel free to contact the school for any further assistance.

Thank you,

ELIZABETH BEZUIDENHOUT
Principal

Richards Bay Christian School
Discovering Destiny

18 June 2008

To whom it may concern

Herewith verification that permission has been granted to test Grade 1,2 & 3 for the Master Thesis of Mrs Chantell Gouws with co-operation of the University of Zululand.

B. Chambler (Mrs)
Principal

Richards Bay Christian School
P.O. Box 50400
RICHARDS BAY 3900
Tel: 035-7861147
Fax: 035-7860592
E-Mail: info@rbcschool.co.za
Website: www.rbcschool.co.za

APENDIX D

Example of Grade R report card

NAME: _____ DATE OF BIRTH: _____

TERM: one: two: three: four:

Mass – Kg

1	2	3	4

Height – Cm

1	2	3	4

Key:

1	Few skills and very little or no knowledge and values demonstrated.
2	Some of the knowledge, skills and values are demonstrated, but others are lacking
3	Much of the knowledge, skills and values are demonstrated, but with some minor limitations

4	Outstanding ability is continuously demonstrated

LIFE SKILLS

1a Personal development and work skills	**TERM**			
	1	**2**	**3**	**4**
Self confidence				
Behavior in class				
Independence				
Responsibility				
Organization				
Attitude/ Motivation				
Following instruction				
Task completion				
1b Concentration				
General				
Alert and eager				
Attention Span				
Perseverance				
1c Creativity and Imagination				
Activities				
Music				

Outdoor				
Indoor				
2 <u>Social & Emotional development</u>				
a <u>Attitude to Children</u>				
Co-operation				
Sharing				
Following				
Leading				
Aggression				
Problem Solving				
b <u>Attitude to Adults</u>				
Friendly/relaxed				
Seek attention				
Co-operation				
Accepts authority				
Can be reasoned with				
c <u>Self image</u>				
Outgoing				
Self confidence				
Problem solving				
Expression of feeling				
Even tempered				

Self image				
3 Physical development				
a Large muscle co-ordination				
Posture				
Control				
Agility				
Balance				
Running				
Hopping				
Skipping				
Galloping				
Climbing				
Ball skills				
General stamina				
b Fine motor co-ordination				
Pencil grip				
Cutting/pasting				
Coloring in				
Writing patterns/tracing				
Numerals and letters				
Correct formation				
Recognize and write name				
Age appropriate drawing of				

self				
3 General				
First name				
Surname				
Address				
Telephone number				
Names of the days of the week				
Names of the months of the year				
Knowledge of age				
Knowledge of birthday				

LITERACY

1 Language	**TERM**			
	1	**2**	**3**	**4**
Vocabulary				
Self expression				
Participation				
Sentence construction				
Oral communication with adults				
Oral communication with				

peers				
Rhymes, music and singing				
Stories				
2 Auditory perception				
Listening skills				
Memory (relate details)				
Ability to carry out instructions				
Sequential memory				
Recognition of initial sounds at beginning of words				
3 Visual Perception				
Memory				
Sequential memory				
Recognition of letters				
Recognition of numbers				
Copying				

NUMERACY

	TERM			
	1	2	3	4

Rote counting to 20				
Counting objects to 10				
Value of numbers to 5				
Knowledge of names and symbols 1-5				
Comparison of numbers – more/less				
Concept of size, length, height				
Identify and name shapes				
Identify and name colors				
Counting in 5's				
Counting in 10's				
Left/Right awareness				
Position in space				
Solving verbal addition and subtraction problems up to 10				

APENDIX E

Example of Grade 1-3 report cards

Name: _____ Grade: _____

Numeracy

LEARNING AREA	**TERM**			
	1	**2**	**3**	**4**
Counting				
Number Concept				
Knowledge of Terminology				
Number Orientation				
Written Application				
Problem Solving				

Literacy

LEARNING AREA	**TERM**			
	1	**2**	**3**	**4**
Oral/News				
Thrass:				
Knowledge				
Reading:				
Word Recognition				
Fluency				
Comprehension				

Written Application:				
Imformal Spelling				
Formal Spelling				
Sentence Construction				
Creative writing				

Life skills

LEARNING AREA	**TERM**			
	1	**2**	**3**	**4**
Neatness of work				
Co-Operation in Group				
Completion of task				
Attention/Concentration				
Art/Creativity				
Computers				
Music				
Sport Application				
Thrass Writing:				
Letter formation				
Scripture:				
Memory verse				

Keys

1.	Few skills and very little or no knowledge and values demonstrated.
2.	Some of the knowledge, skills and values are demonstrated, but others are lacking
3.	Much of the knowledge, skills and values are demonstrated, but with some minor limitations
4.	Most of the knowledge, skills and values are demonstrated
5.	Outstanding ability is continuously demonstrated

APPENDIX F

BRUININKS – OSERETSKY EVALUATION:

Objective: To assess the motor proficiency of children from ages 5-14 years. The test can be used to assess whether a child is handicapped, and to determine the child's long term curriculum needs.

Sex: Boys and Girls

Reliability: Reliability estimates were obtained by the test-retest and were found to be satisfactory.

Validity: Construct validity was assessed by analyzing the relationship of test content to important aspects of motor development cited in the literature; relevant statistical properties such as relationship of test score to age, internal consistency of subjects and factor analysis was also tested.

Equipment and Material required: Marking material, tape measure, balance beam, pencils, mats, target and balls.

Test procedures (14 items):

Sub test 1: Running Speed and Agility

The child runs to the end line, picks up a block, and runs back across the start/finish line. The child is timed between the first and the last crossing of the time line. Two trials are given for this test.

Administration and recording:

Stand beside the timing line and have the subject stand behind the start/finish line. The recorder makes the child aware of the commands that they are about to give. When the command "On your mark, get set, go" is given the child runs as fast as he/she can to the block, pick it up, and brings it back across the start/finish line.

Start the watch when the subject crosses the timing line and stop the watch when the child crosses the timing line with the block. If the child slows down as his approach the timing line, remind them to continue to run fast across the start/finish line.

Start the trial over if the subject:

a. Stumbles or falls
b. Fails to pick up the block
c. Drops the block before crossing the timing line.

On second trial, encourage the subject to run faster.

Record the time to the nearest 0.2 second in the appropriate space on the Individuals' form. If the hand of the stopwatch is between two numbers, record the higher number.

Subtest 2: Balance

Item 1: Standing on preferred leg on balance beam

The child stands on his preferred leg on the balance beam, looking at the target, with his hands on hips, and with the other leg bent so that it is

parallel to the floor. The subject must maintain the position for 10 seconds to achieve a maximum score.

Administration and recording:

The recorder must say "Stand on the beam on your (left/ right)leg and raise your other leg like this (demonstrates). Place your hands on your hips and look at the target. Stand like this until I tell you to stop. Record the length of the time the child was able to maintain balance.

Item 2: Walking forward heel-toe on a balance beam.

Have the child stand at one end of the balance beam. Say "Place your feet on the beam. Place your hands on your hips. When you walk, hit the toe of your back foot with the heel of your front foot (demonstrate). Walk to the end of the beam. Remember, keep your feet on the beam, and your hands on your hips as you walk. Ready and begin".

Administrating and recording:

Stand at the one side of the line and count the child's steps keeping both correct and incorrect steps for six steps. A step is incorrect if the subject:

a. Does not touch the heel of the front foot to the toe of the back foot.
b. Moves the back foot forward to touch the heel of the front foot.

Remind the child as needed to walk heel-to-toe and to keep hands on hips. After six steps have been taken, tell the child to stop. If the child places one or both feet completely off the beam before taking six steps, stop the trial and record the number of steps taken on the beam.

On the Individual record form, record the number of correct steps.

Subtest 3: Bilateral Coordination

Jumping up and clapping of the hands

The child jumps as high as possible before landing. The child must clap five times to achieve a minimum score. Two trials are given.

Administration and recording:

Count claps when the child performs the jump. Do not count claps that are made while the child's feet are on the floor or slaps that are made below the chest level. Mark the trial "0" if the child loses balance and touches the floor with one or both hands when landing.

Subtest 4: Strength

Standing Board Jump

The child jumps as far forward as possible. Start from a bent-knee position. The distance of each jump is recorded. Three trials are given.

Administration and recording:

Have the child jump up and down a few times before starting. Then say "Stand behind the line (point to the starting line) with your feet spread about as far as your arms at your sides a few times. When I say go swing your arms back and jump forward as far as he can. When you jump, let your arms swing forward and try to land on your feet. Ready, go".

Correct the child and re-administer the trial if the child shuffles over the starting line before jumping or if the child jumps up instead of forward.
On the record form, record the distance jumped on each trail by noting the number that is nearest the point where the back of the child's heel lands. If one foot lands behind the other, measure the foot that is nearest to the starting line. If the child loses balance and falls backward, measure to the point where the child's hands (or other part of body) touches the floor.

Subtest 5: Upper Limb Coordination

Item 1: Catching a tossed ball with both hands

The child stands on a mat and with both hands, catches a tennis ball tossed underhand from a distance of 3 meters. The correct number of catches is recorded. One practice and five recorded trails are given.

Administration and recording:

Say "Stand on the mat and with both hands catch the ball when I throw it to you". Give the child one practice trial. Stand behind the strip of masking tape and slowly toss the ball underhand in a slight arc so that it comes down between the child's shoulders and the waist. Then say "Catch the ball with both hands each time I throw it to you"

Count the number of correct catches made in five trials. A catch is incorrect if the child:

a. Misses the ball or traps is against the body
b. Steps off the mat
c. Catches the ball with one hand

If the child misses the ball because it is thrown above the shoulders, below the knees, or outside the child's reach re-administer the trial. Between trials, repeat instruction as necessary. Record the number of correct catches.

Item 2: Throwing a ball at a target with preferred hand.
With the preferred hand, the child throws a tennis ball overhand at the target from a distance of 1.5 meters. The child receives a point each time the ball is correctly thrown and hits the target.

Administration and recording:
Say "Stand behind this line (point to the masking tape on the floor in front of the target). You are to throw the ball overhand at the bull's eye (point to the target and them demonstrate). Throw from behind this line". Give the child one practice trial. The child may throw overhand in a modified sidearm motion with both feet stationary, or may take one step forward toward the target while throwing. Then say "Ready. Begin". Stand behind the child and count the number of correct throws in five trials. A throw is incorrect if the child:

a. Steps over the line
b. Misses the target
c. Throws underhand

Subtest 6: Response Speed

The child places the preferred hand flat on the wall, next to the response speed stick. The examiner holds the stick vertically against the wall and then drops the stick. The child uses the thumb of the preferred hand to

hold the speed stick number that is at or just above the tape strip when the stick is stopped is the trial score. The point score is derived from the trial score. Two practice and seven recorded trials are given.

Administration and recording:
Sit beside the child, facing the wall. The child should be seated with his or her preferred arm away from you. Say "We are going to find out how fast you can stop the falling stick". Place the response speed stick flat against the wall in front of the child so that the starting line on the stick is even with the top edge of the tape. Then say "Let me show you what to do. Put your (left/right) hand against the wall next to the red line on the stick". Help the child place the preferred hand against the wall with the thumb about 1.3 to 1.5 cm from the stick, spreading the fingers in a comfortable fan-like position. The thumb should be over, but not on the stick before it is dropped. Say "Watch the red line on the stick. When you see the red move, stop the stick as fast as you can with your thumb. Just before I let the stick fall, I will say "Get set". Then when you see the red line move, stop the stick with your thumb as fast as you can.

Give the child two practice trials. For each trial, say "Get set" slowly and deliberately and then wait for the number of seconds shown on the table below before releasing the stick. Count the seconds perpendicular to the tape strip and make certain that the child is observing the red line before you release the stick.

Trial	Pause
practice	1 second
practice	3 seconds
1	2 seconds
2	3 seconds
3	1 seconds
4	3 seconds
5	2 seconds
6	1 second
7	1 second

On the record form, record the response stick number that is at, or just above, the tape strip when the child stops the stick. That is the trail score. Record "0" for a trial if the child does not stop the stick before it hits the floor.

To obtain the point score for the test, rank the scores for the seven test trials form the highest to the lowest, the median score is the point score.

Subtest 7: Visual-motor Speed

Item 1: DRAWIND A LINE THROUGH A STRAIGHT PATH WITH THE PREFERRED HAND.

Administration and recording:

Clip the page to a clipboard and have red pencils ready to use. While holding one corner of the clipboard say, "This is a road (Point to the path). Take the red pencil and draw a line from here (point to the car) to the end

of the road here, (point to garage). Take as much time as you need. Ready be

Allow as much time as necessary. Keep your hand on the clipboard and do not allow the child to rotate the test page more than 45 degrees while drawing. Record the number or errors made, up to the maximum of seven each item. An error is made each time the line goes outside the boundary lines. Count and additional error for each 1.27cm the line remains outside the boundary lines. One recorded trial is given.

Item 2: COPYING CIRCLE WITH PREFERRED HAND

Item 3: COPYING OVERLAPPING PENCILS WITH PREFERRED HAND

Administration and recording:

Item 2and 3 are administrated and recorded the same way.

Clip the paper to the clipboard and have black pencils ready to use. Say "Look at the (name the shape) in this box. With your (left/right) hand make one just like the shape in the empty box below (point to the box). Take as much time as you need. Ready, begin".

Allow as much time as necessary for the child to complete each drawing. Erasing is permitted. Keep your hand on the clipboard and do not allow the child to rotate the test page more than 45 degrees while drawing. One trial is given for each drawing.

Subtest 8: Upper Limb Speed and Dexterity

Item 1: SORTING CARDS WITH PREFERRED HAND.

With the preferred hand, the child sorts a mixed deck of red and blue cards into two piles, separating them by color. The number of cards correctly sorted 15 seconds is recorded. One practice and one recorded trial is given

Administration and recording:

Place one red and one blue card on the testing pad in front of the child. Shuffle the remaining cards. Say "When I say go, put all the red cards here (point to the red card) and all the blue cards here (point to the blue card). Use your (left/right) hand to sort the cards one at a time as fast as you can (demonstrate). Hold the cards in your hands. Now try it". As a practice trial, have the child sort five cards. Then re-shuffle the cards, leaving one red card and one blue card on the testing pad. Then say "Keep sorting the cards with your (left/right) hand until I tell you to stop. Ready, go". Begin timing when the child touches the cards. Count the number of cards the child sorts' correctly. If the child sorts more than one card at a time, give credit for one card. If the child changes hands, re-administer the trial. After 15 seconds tell the child to stop.

On the record form, record the number of cards correctly sorted. Do not count the guide cards.

Item 2: MAKING DOTS IN CIRCLES WITH THE PREFERRED HAND

The child makes a pencil dot inside each of a series of circles. The number of circles dotted correctly in 15 seconds

Administration and recording:

Clip the paper to the clipboard and have red pencils ready to use. Say "When I say go, take the red pencil in your (left/right) hand make one dot in each of the circles as fast as you can". Demonstrate by tapping with the eraser end of the pencil in a left-to-right progression in the practice circles. Then say "Now you try it here" (point to practice circle). Have the child make one dot in each of the practice circles. It is not necessary for the child to make dots from left to right. Then say "Make one dot in each of these circles (point to circles below the line). Put a dot in as many circles as you, ready, begin".

Begin timing when the child touches the pencil to the paper. After 15 seconds, tell the child to stop.

Scoring: Raw scores on each of the test items are converted to point scores according to tables provided in the test manual. Point scores for each item can then be added together to arrive at a single point score of the test. The maximum score on the BOMTP (short form) is 98.

INDIVIDUAL RECORD FORM

☐ 1. RUNNING SPEED AND AGILITY

EXECUTION # 1:_____ sec EXECUTION # 2: _____ sec.

> 11.0	10.9-11.0	10.5-10.8	9.9-10.4	9.5-9.8	8.9-9.4	8.5-8.8	7.9-8.4	7.5-7.8	6.9-7.4	6.7-6.8	6.3-6.6	6.1-6.2	5.7-6.0	5.5-5.6	< 5.5
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

☐ 2. . ONE LEG BALANCE ON BEAM (10 Sec)

EXECUTION# 1: _____ sec EXECUTION # 2:_____ sec.

0	1-2	3-4	4-6	7-8	9	10
0	1	2	3	4	5	6

☐ 3. . HEEL-TOE EALK ON BEAM (6 steps)

ATEMPT # 1: = _____ steps ATEMPT # 2 =_____ steps

0	1-3	4	5	6
0	1	2	3	4

☐ 4. ALTERNATING FOOT TAP AND FINGER CIRCLES (90 sec)

RIGHT (1) WRONG (0)

☐ **5. JUMP AND CLAP HANDS**

EXECUTION # 1: _____ claps EXECUTION # 2: _____ claps

0	1	2	3	4	>4
0	1	2	3	4	5

☐ **6. STANDING LONG JUMP**

EXECUTION # 1: _____ EXECUTION # 2: _____ EXECUTION #3 _____

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1`	2	3	4	5	6	7	8	9	10	11	12	13	14	15

☐ **7. CATCH BALL WITH TWO HANDS (5 attempts)**

AMOUNT OF CATCHES: _____

0	1-2	3-4	5
0	1	2	3

☐ **8. THROW BALL AT TARGET (5 attempts)**

AMOUNT OF: _____

0	1-2	3-4	5
0	1	2	3

☐ 9. REACTION SPEED

	SEC		MARKS		MARKS
ctice 1:	_____	1	xxxxxx		
ctice 2:	_____	3	xxxxxx		
1:	_____	2	_____	Highest	_____
2:	_____	3	_____		_____
3:	_____	1	_____		_____
4:	_____	3	_____	Median	_____
5:	_____	2	_____		_____
6:	_____	1	_____		_____
7:	_____	1	_____	Lowest	_____

☐ 10. DRAW A LINE THROUGH A STRAIGHT PATH

AMOUNT OF FAULTS: _____

0	1	2
0	1	2

☐ 11. COPY CIRCLE

MARKS: _____

0	1	2
0	1	2

☐ **12. COPY PENCIL**

MARKS: _____

0	1	2
0	1	2

☐ **13. SORTING FORM CARDS (15 sec)**

AMOUNT OF CARDS: _____

0	1-8	9-12	13-16	17-20	21-25	26-29	30-33	34-37	38-41	>41
0	1	2	3	4	5	6	7	8	9	10

☐ **14. MAKE DOTS IN CIRCLES (15 sec)**

AMOUNT OF DOTS: _____

0	1-10	11-15	16-20	21-25	26-30	31-35	36-40	41-50	51-60	>60
0	1	2	3	4	5	6	7	8	9	10

TOTAL FOR BRUININKS EVALUATION

98 **(maximum mark) _____(client's mark)_____(Standard)_____(Percentile)_____(Stanien)_____**

Researcher: _____

APPENDIX G

CONNOR'S TEACHERS QUESTIONNAIRE:

CHILD'S NAME_____ **OBSERVED ON:** _____

BY: _____

Listed below are descriptive terms of behaviour. Place a check mark on the column which best describes this child. Answer all items.

OBSERVATION		**Degree of Activity**			
		Not at all	**Just a little**	**Pretty much**	**Very much**
CLASSROOM BEHAVIOUR					
1	Constantly fidgeting				
2	Hums and makes other odd noises				
3	Demands must be met immediately - easily frustrated				
4	Co-ordination poor				
5	Restless or overactive				
6	Excitable, impulsive				
7	Inattentive, easily distracted				
8	Fails to finish things s/he starts - short attention span				
9	Overly sensitive				
10	Overly serious or sad				
11	Daydreams				
12	Sullen or sulky				
13	Cries often and easily				
14	Disturbs other children				
15	Quarrelsome				
16	Mood changes quickly and drastically				
17	Acts "smart'				

18	Destructive				
19	Steals				
20	Lies				
21	Temper outbursts, explosive and unpredictable behaviour				
GROUP PARTICIPATION					
22	Isolates him/herself from other children				
23	Appears to be unaccepted by group				
24	Appears to be easily led				
25	No sense of fair play				
26	Appears to lack leadership				
27	Does not get along with opposite sex				
28	Does not get along with same sex				
29	Teases other children or interferes with their activities				
ATTITUDES TOWARD AUTHORITY					
30	Submissive				
31	Defiant				
32	Impudent				
33	Shy				
34	Fearful				
35	Excessive demands for teacher's attention				
36	Stubborn				
37	Overly anxious to please				
38	Un co-operative				
39	Attendance problem				

APPENDIX H

THE QUICK NEUROLOGICAL SCREENING TEST

Purpose: Designed for use in screening for early identification of disabilities.

Population: Ages 5 and over.

Score: Norms suggest cutoff scores.

Time: (20) minutes.

Authors: Margaret Mutti, Harold M. Sterling, and Norma V. Spalding.

Publisher: Academic Therapy Publications.

Description: The Quick Neurological Screening Test (QNST) is composed of 15 observed tasks that reportedly can be used as a screening test for learning disabilities. These tasks are very simple in nature and were adapted primarily from a typical pediatric neurological examination; however, a few tasks were derived from developmental scales or neuropsychological tests.

Scoring: Subjective scoring is required for the tasks, which include: handwriting ability, perceptual ability for numbers written on the palms of the hands, eye tracking, finger to nose coordination, rapidly reversing repetitive hand movements, tandem walk, and arm and leg extension. The test requires that the examiner be highly observant of the child's behavior and make subjective ratings concerning the

child's performance. These subjective ratings are then compared to cutoff scores in the manual.

Reliability: Although subjective scoring is involved in the test, no direct measure of scorer reliability is presented in the manual. Indirect evidence suggests that there is some examiner bias. For example, in one study a test-retest reliability coefficient of .81 is reported after a month interval for 33 teaching disabled children who were tested by a single examiner. A single examiner is likely to exercise the same scoring bias on two administrations. A lower reliability coefficient of .71 was reported in another study after a 1 month interval with two different examiners. Apparently one examiner administered the first test and another examiner the follow-up test. The difference between these two correlations may imply that individual examiners employ slightly different criteria in scoring even though both attempted to follow the instructions.

Validity: The QNST seems to be best for matching the findings of a standard pediatric neurological examination. In one study of over 550 subjects, 30% of which had positive neurological findings, the QNST was abnormally high in 98% of these. No patient had a positive neurological examination and a QNST in the normal range. A major problem with the QNST, however, is that a large unspecified number of subjects had abnormally high QNST scores and no positive finds on neurological examination.

Subtest 1: HAND SKILL:

This task consists of asking Student to write his/her name at the top of the last page of the recording form. Student should use a pen; which makes it easier for the Examiner to observe irregularities in the written line. Next, Student is asked to write an age appropriate sentence of six to eight words. Such sentence gives Examiner an opportunity to note reversals or poor letter formation.

Scoring considerations:

Note which hand is used; although there is no score given for handedness, Examiner should circle Student's hand preference on the recording form. In the Comments section of the protocol, note observation such as: Does Student take up the pen with one hand and transfer it to the other to write? Does student write equally well with both hands? If Student can't remember the present sentence or writes words not presented, Examiner should make a note in the Comments section and be alert for auditory deficits.

Score 1 Student holds the pen clumsily or tightly

Score 1 if Student prints (as apposing to writing). Children younger than the age 8 are expected to print and should not be scored in error for doing so.

Score 1 if Student keeps eyes close to the paper.

Score 3 if Student exhibits observable tremor.

Subtest 2: FIGURE RECOGNITION AND PRODUCTION:

In this task, Examiner points to a series of five geometric figures on the last page of the protocol, and asks Student to first name and then draws each one. The figures are: a circle, a square, a rectangle, a triangle, and a diamond. How well Student is able to name and reproduce each figure is the measure of performance on this task.

Scoring considerations:
All irregularities described here should be noted in the Comments section on the protocol. These irregularities are:
Student has difficulty visualizing and verbalizing any differences between the figures he was shown and his reproduction. Inability to do so has possible educational implications.

Student experiences delays of confusion in naming the figures.

Any unusual approaches to pattern reproduction, such as feathered lines, or whether Student sometimes draws clockwise and other times counterclockwise, indicating an inconsistency of direction
Score 1 if Student cannot name a figure.
Score 1 if the figures seem to be drawn with extreme rapidity or carelessness or if Student draws them unusually slowly, with labored caution.
Score 1 if Student arranges the figures along the horizontal plane only.
Score 1 if the size of the reproduction differs greatly from those on the protocol, if they are unusually constricted, about half-as large, or twice as large and extremely irregular.

Score 1 if Student turns the paper to an unusual angle or rotates the paper more than 35 degrees while executing the drawings. Student may make the figure by turning the paper instead of the pen so that each side of the figure is formed by a single motion of the hand holding the pen – that would be scored as an error.

Score 1 if the figures are drawn so that they consistently lean to the left or the right.

Score 1 if Student shows a repetitive need to talk one's way through, or verbalize, in order to perform motor task.

Score 1 if poor closure is noted in more than one figure, where the lines overlap, or are not brought together to form corners

Score 3 if poor angle execution is evident in subjects over age 8; this occurs most often when drawing diamonds and triangles.

Score 3 if tremor, or visible shaking of Student's hand, is seen when Student attempts to draw any straight line

Subtest 3: PALM FORM RECOGNITION

This task consists of asking Student to identify, solely by touching, numerals drawn on the palm of the hand. Student places both hands, palms up, on both knees and then is asked to close his eyes. Examiner lightly touches Student's right hand to indicate top (closest to wrist) and bottom (closest to fingers). If Student is eight or younger, Examiner has Student write the numerals one through nine on paper to be sure that Student knows them. This allows Examiner to note any idiosyncratic numeral formation (e.g. 4). If Student does not know all the numerals, this task should not be administrated. This

procedure is also useful with older Student's if severe disability is suspected.

Using the forefinger or eraser end of a pencil Examiner writes the numeral, 3,9,5,7 in that order, in Student's right hand. Examiner then writes 2,8,4,6 in that order – in Student's left hand.

Scoring considerations

Score 1 if Student requests more than one repetition of tactile number presentation

Score 1 if Students responds with a letter instead of a number.

Score 1 for each numeral Student fails to recognize.

Subtest 4: EYE TRACKING

Examiner holds pencil at Student's eye level and asks Student to follow it as it is moved back and forth; this determines if Student is able to track a moving object with appropriate eye activity. The pencil is moved at a rate that keeps pace with the natural rhythm of Student's eye movements. It takes much practice to discern subtle disturbances and/or jerkiness in eye movements, either in the horizontal or vertical planes.

Scoring considerations

Eye preference is checked by asking Student to use both hands to hold a rolled sheet of paper as a "telescope" to sight on a doorknob or

other object. Whichever eye used to look through the tube is the preferred eye

Score 1 if Student moves his head in order to follow the pencil.

Score 3 if any jerkiness/eye movement disturbances are seen when Student follows the smooth horizontal motions of the pencil.

Score 3 if there are any problems during vertical eye tracking.

Score 3 if Student shows any inability to fixate on the stimulus or is distractible.

Subtest 5: SOUND PATTERNS

In this task, Student is asked to reproduce sound patterns after they are demonstrated. Student and Examiner facing each other, both have their hands palm-down on the knees. Using both hands, Examiner firsts pats out patterns that Student imitates with eyes closed. If student is 8 or younger and fails to execute the task successfully, ask student to reproduce the sounds by clapping both hands together, as demonstrated by examiner. Score the younger student only on clapping responses (There is no penalty for initial errors). After the motor reproduction is completed, examiner then presents the pattern orally for other reproduction by student. It is important that there be little or no noise to distract student during this task.

Scoring consideration

For each item to be scored, examiner should note on the protocol any mode in which student has difficulty.

Score 1 if student has any speech irregularities, such as lisp, staccato delivery.

Score 1 if any one sequence is missed. Be sure to note it in the comment section.

Score 1 if student uses any unusual mode of reproduction, such as one hand, clapping hands, or alternating hands.

Score 1 if student succeeds only when sound needs to be presented very loudly or if student is visibly distracted by outside noises.

Score 1 if student uses ant auditory reversals, turning around an entire sequence or confusing or reversing a small portion of any sequence.

Score 1 if student succeeds only with the rhythmic pattern, regardless of mode (motor or oral).

Score 3 if student perseverates (i.e., continues to reproduce the sound more than twice) on oral and/or motor modes

Score 3 if student misses oral reproduction of two or more sound patterns Score 3 if student misses motor reproduction or two or more sound patterns.

Subtest 6: FINGER TO NOSE

In this task, examiner observes motor planning, directionality, and spatial awareness. The student is asked to close both eyes, and reach back and forth between examiner's hand and the tip of his/her own nose. Before beginning, examiner holds up his right hand with index finger extended and asks student to "Hold up his/her finger." (Examiner must make no mention of right or left, as this is a check of left-right discrimination). Note whether student uses the right or the

left; student is expected to use his/her right hand (since that is what is modeled by examiner) regardless of his handedness, but no correction is made. Poor left-right discrimination is evidenced when student action's mirror examiner's

Scoring considerations:

Observe the path of student's movements and note the direction in which student's hand wanders in the space, the rate and the accuracy with which student is able to find the tip of his/her nose, and the steadiness of student's hand. Watch for tremors at rest or during the final movement. Also note any unusual posturing of body.

Score 1 if motions are made unusually fast or slowly.
Score 1 if student moves hand consistently to the right or the left of examiner's hand.
Score 1 if student moves hand consistently to top or bottom of examiner's hand.
Score 1 if student misses nose by one-half to one inch.
Score 3 if student misses tip of nose by more than one inch.
Score 3 if student's movements are random or show unsteady control.

Subtest7: THUMB AND FINGER CIRCLE

In this fine motor task, student is asked to form successive circles by touching the thumb to each finger in sequence, starting with the right forefinger and ending with the little finger. There should be no

mention of "left" or "right." If student gives a mirror response using left hand, make a check in the space provided on the protocol.

Scoring considerations:

Score 1 if student reverses the pattern (even if only once), starting with the little finger and ending with the forefinger.

Score 1 for slight movements in fingers of the other hand, which is evidence of development immaturity.

Score 1 if student makes a flat circle, constricted small, or an incomplete circle as illustrated.

Score 1 if student is tense and unable to perform without having his hand directly in front of him/her and concentrating intently.

Score 3 if there is excessive body motion or twitching on the opposite side.

Score 3 if student manifests confusion as to which finger should be activated or skip fingers in the sequence task. These errors occur twice in order to be scored.

For all motor tasks, it is important to note whether student's performance improves with practice or whether student tires easily and performance deteriorates.

Subtest 8: DOUBLE SIMULTANEOUS STIMULATION OF HAND AND CHEEK

In this task examiner observes whether student is able to feel a gentle touch on the hand at the same time as his/her cheek is touched. Seated with eyes closed, student is instructed to place both

hands palm-down on his knees. Examiner gently touches the back of both of student's hands at the same time, then both cheeks, then the right hand and left cheek at the same time, the left hand and right cheek, and then right hand and left cheek. It is important that all touches be done lightly and quickly and at the same time. Very young children, especially those who are developmentally immature, may not feel the stimulation on one side the first time they are touched.

Scoring considerations:

Score 1 for any involuntary jerk or reflexive movements when student is touched

Score 1 if student occasionally does not feel the stimulation or forgets to point where he was touched. This often happens on the first attempt.

Score 3 if student is older than the age of 6 and consistently does not feel or mention the touch to the hands

Score 3 if student of any age consistently does not feel the touch on only one hand. (Under no circumstances would examiner score both of the above items.)

Score 3 (and note) if student shows any unusual sensory-motor behavior, such as wrongly naming the touched place or twisting the hands, or arms in an uncoordinated effort to duplicate examiner's demonstration.

Subtest 9: RAPIDLY REVERSING REPETITIVE HAND MOVEMENTS

This task consists of a series of rapid, repetitive hand movement which examiner demonstrates by placing hands on thighs, palm-down, with fingers close together. Examiner then turns both his hands over simultaneously so that the backs are down. Examiner continues turning his hands over, slowly at first and then rapidly accelerating. Student sits with both feet flat on the floor, facing examiner.

Scoring considerations:

Score 1 for floppy rotations or unusual, uncontrolled finger motion

Score 1 (under rate) for rapid, careless movements or for extreme caution or mechanical motions.

Score 1 for any rigid or tense positions that result in double bounce.

Score 3 if student makes very large circular motions, approximately 1 foot in diameter. This behavior has possible medical significance.

Score 3 for asymmetry in rotating the hands. Each hand should move exactly as the other hand does. This is best noted by observing the positions of the thumbs; if one thumb is out of orbit; the movement is not symmetrical.

Subtest 10: ARM AND LEG EXTENSION

In this task, student is seated (facing examiner) with arms and legs extended in front of him/her. Examiner first demonstrates the task before asking student to imitate. It is important for student to spread his/her fingers as wide as possible because the tension thus engendered will bring out any tremor or rigid or tense position for which this test checks. Note random body, hand, or tongue

movements, motor tension or impersistance, unusual finger position, tremor or twitching.

Scoring considerations:

Score 3 for small, random, involuntary movements in the fingers, tongue, limbs, or head. These movements are irregular and more observable than the slight even shaking that would describe a tremor.

Score 3 for either hypertonic or hypotonic muscle tension. Hypertonic muscle tension can be difficult to detect – muscle will be unusually taut and feel as hard as a table top. Hypotonic muscles will feel flabby, or soft, like bread dough, even though both arms and legs are extended.

Score 3 if "unable to hold position", or if extremities drifts downward.

Score 3 if the whole body moves forward involuntary. At this point, positions of the extremities are not important.

Score 3 for any unusual finger positions.

Score 3 for wrist dip.

Score 3 for observable tremor or twitch. Check for tremor by lightly touching student's fingertips; tremors may not be easily visible.

Subtest 11: TANDEM WALK

In this task, student has eyes open and walks a straight line for at least 10 feet, placing the heel of each shoe directly against the toe of the opposite foot. Student then walks backward on the line, heel-toe. Next, student repeats the tandem walk forward with eyes closed.

Scoring considerations:

Score 1 if student has noticeably more difficultly managing the backward walk. The score for this task is primarily based on student's performance with eyes open.
Score 1 if harder to do with eyes closed. This is the only score derived from performance with eyes closed.

Score 1 for irregular hand position (e.g., one hand curls in, other curls out).
Score 1 if student crosses the midline or veers left or right out from midline.
Score 1 if student cannot maintain accurate heel to toe walk.
Score 3 if student exhibits pigeon-toed stance and bent knees.
Score 3 if student demonstrates poor balance.
Score 3 if student displays involuntary or spastic body movements not related to balance maintenance.

Subtest 12: STAND ON ONE LEG

In this task, student is asked to balance himself with eyes open, first on one foot, then on the other, for a count of 10 each time. Examiner demonstrates first, without saying left or right, but is careful to start with the right foot. If student does well on both right and left feet with eyes open, student is asked to repeat the task with closed eyes. This is the third observation of left-right discrimination. If student has a well-developed sense of left-right, he will start with the right foot, same as modeled by examiner. If student mirrors examiner and starts with his left foot, check the score box indicating poor left-right discrimination.

Scoring considerations:

On this task, the scoring items are not exclusive. It is appropriate to score poor balance as well as difficulty with eyes closed if both problems are observed.

Foot preference is determined by asking student to kick an imaginary ball.

Score 1 if student shows poor balance.

Score 1 if student finds task impossible to do with eyes closed.

Score 1 if student shows asymmetry, an observable difference in the ability to balance on one foot when compared to the other.

Score 1 if student balances by unusual posturing or wedging one leg against the opposite leg.

Subtest 13: SKIP

In this task, student is asked to skip across the room. Examiner observes how student follows directions and balances. Boys between the ages 9 and 13 may be reluctant to skip, so instructions should be worded so as to relieve any possible source of embarrassment.

Scoring considerations:

Score 1 for poor balance.

Score 1 for clumsiness or many extra steps.

Score 1 for asymmetry, consistently hopping only on one foot.

Score 3 if student is unwilling to try or is unable to perform. This is scored only after age 6 in girls and after age 8 for boys.

Subtest 14: LEFT-RIGHT DISCRIMINATION

This section is scored using performance from three other subtests (6, 7, and 12). It is determined by observing whether student holds up the right hand when examiner uses the right hand to demonstrate Finger to nose (subtest 6) and Finger circles (subtest 7), and by noting whether students mirror the leg stance demonstrated by examiner for Stand on One Leg (subtest 12). If student responds on any of the above tasks as if looking into a mirror, that response is developmentally immature. Each of these poor left-right discrimination responses should be scored as 1.

Subtest 15: BEHAVIORAL IRREGULARITIES

This final item is derived by general observation of student's behavior during the entire test session. After student leaves, examiner should record any behavior that seemed out of the ordinary during the completion of any of the individual tasks.

Score 1 for unusual behaviors: hair twisting, scratching, rocking, etc.

Score 1 for repeated or persistent behavior or performance of a task.

Score 1 for excessive talking.

Score 1 if student exhibits social withdrawal.

Score 1 for fidgeting; wriggling, finger or foot tapping is often seen in conjunction with excessive touching.

Score 1 for defensiveness or anxiety. Defensiveness may be seen by numerous explanations or excuses for what student views as inadequate performance. Anxiety can be induced simply by the test

situation. It can be noted in several tasks, but should be described and scored only if it persists beyond the first task

Score 1 excitability, distractibility, or impulsivity. These are additional characteristics of hyperactivity or possible problems with behavioral inhibition.

The following physical anomalies are not scored but are noted in the Comment section:

Poor motor planning (e.g. step on own toes, leaves wide spaces between feet on Tandem walk) is noted when student cannot implement motor acts, cannot visualize and then imitate examiner's demonstrated activity.

Poor ability to sequence can be observed when student has difficulty with Thumb and Finger Circles or uses reversals on Sound Patterns.

Poor rhythm sense can be noted when student cannot perform the rhythm sequence in the Sound Patterns or when student moves in general jerky, non-flowing way.

Left-right differences can be observed in tasks for Subtest 3 and 6 through 13. Examiner can observed and compare how student uses one side of the body versus the other side. If student has considerably more difficulty on one side than the other or if the two sides perform very differently, this should be described in detail.

NDIVIDUAL RECORDING SHEET

QUICK NEUROLOGICAL SCREENING

1. FIGURE RECOGNITION AND PRODUCTION

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2. HEEL- TOE- WALK (1, 5 meter)

More difficult backwards	1
More difficult closed eyes	1
Irregular hand position	1
Crosses the midline or veer left or right	1
Cannot maintain accurate heel-toe walk	1
Walking pigeon-toed	1
Poor balance (swinging of the arms)	1
Randomized body movements (top or bottom)	3

3. STAND ON ONE LEG (time)

Right: _____ sec. Left _____ sec

Show poor balance left – right discrimination	1
Poor balance	1
Impossible to do with eyes closed	1
Asymmetry	1
Balances by unusual posturing	1

4. ARM AND LEG EXTENTION

Small, random, involuntary movements	3
Hypertonic or hypotonic muscle tension	3
Unable to hold position	3
Whole body moves forward involuntary	3
Unusual finger position	3
Wrist dips	3
Observable tremor or twitch	3

5. FINGER TO NOSE

Unusually fast or slow	1
Hand consistently moves to the right or left	1
Hand consistently moves to top or bottom	1
Misses nose by one-half to one inch	1
Misses the tip of the nose by more than an inch	3
Movements are random or show unsteady control	3

6. THUMB AND FINGER CIRCLE

Reverse the pattern	1
Slight movement in fingers of the other hand	1
Makes flat circle, constricted small circle or incomplete circle	1
Tense and unable to perform	
Excessive body motion or twitching on opposite side	3
Manifest confusion as to which finger should be next	3

7. RAPPIDLY REVERSING REPETITIVE HAND MOVEMENTS

"Floppy" rotation	1
Rapid careless movements	1
Rigid or tense positions	1
Makes very large circular motions	3
Asymmetry in rotating hands	3

APPENDIX I

EXAMPLE OF INTERVENTION PROGRAM

TEST BATTERY		COMPONENTS		INTERVENTION PROGRAM/ ACTIVITES
BRUININKS		Running speed and agility		Skipping, running around obstacles in a figure-eight pattern
		One leg stand on beam		Walking over obstacle on the low board and walking forward with eyes focused on teacher's hand. You challenge the student by stepping over cross bar that is placed across the center of the walking board
		Heel-toe walk on beam		
		Alternating foot tap and finger circles		Jumping from jump box onto mat or into tire target. Challenge the student by walking up an incline board onto jump box, jumping sideways and twisting body in mid-air for alignment in the tire pattern
		Jump and clap hands		
		Long jump		
		Ball catch with two hands		Throwing and catching, and launching and catching a bean bag with the use of a rebound net and launching board
		Throw ball at target		
		Reaction speed		
		Draw line through a straight path		Dribble a ball (hockey, soccer ball) through a narrow path made of rope from point A to point B
		Copy circles		
		Copy pencils		
		Sort form cards		
		Make dots in circles		
ONST		Figure recognition and production		Place shape made out of foam on the ground and let the child only hop on the shapes, as well as naming the shape as

				he or she jumps on it
		Heel-Toe walk		Balance on balance board standing in the heel-toe position, one leg and also with closed eyes.
		One leg balance		
		Arm and Leg extension		Let the children to dish-to-tuck (Crucnhies). Let the child sit hugging legs (tuck), then let them extend legs while lying back (dish)
		Finger to nose		
		Thumb and finger circles		
		Rapidly reversing repetitive hand movements		

APPENDIX J

EXAMPLE OF INTERVENTION PROGRAM

WARM-UP/BODY AWARENESS:

- Musical warm-up with musical instruments
- Stretch high and low with hoola hoop
- Stretch to the left and right sides with hoola hoop
- Stretch forward and backward with hoola hoop

BALANCE, OVER ALL CO-ORDINATION:

- Balance on one knee and one hand
- Balance one foot and both hands
- Balance only one knee
- Walk over ladder, walk heel-toe over rope and frog jump over bean bags

SPATIAL ORIENTATION:

- 5 Tiger Jumps over beanbags
- 5 Bunny Jumps over beanbags

HAND-EYE CO-ORDINATION:

- Turn tennis ball around and around as fast as the child can
- Catch and throw tennis ball 10 times
- Hop and catch tennis ball 10 times

- Throw the tennis ball over hand and under hand through the ladder that the teacher is holding
- Roll ball with tennis racket through bean bags
- Bounce tennis ball on tennis racket
- Drop and hit ball with racket

COOL DOWN:

- Do push-ups
- Do dish to tuck (crunchies)