

**THE INFLUENCES OF A GROSS MOTOR DEVELOPMENT PROGRAMME ON
THE LIVES OF RURAL MARGINALISED MULTI-GRADE PRIMARY SCHOOL
LEARNERS**

by

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ABSTRACT

This study investigates the impact of a Gross Motor Development (GMD) programme on the lives of learners in marginalized multi-grade environments in rural areas of the Western Cape. Numerous studies globally suggest that gross motor development programmes bring stability, positive motivational changes and structure in learners' lives constrained by challenging socio-economic environments (Portela, 2007, & Lopes et al., 2013).

A transformative research paradigm was employed in order to address the research questions posed by this study. A purposive sampling technique was used to collect data from three schools, one in each of three Western Cape rural educational districts that border the Cape Metro; West Coast/Hopefield, Cape Winelands/Wellington and Overberg/Grabouw. In all three schools the Centre for Multi-grade Education had an academic research/training and support partnership. Within a trans-current mixed method design, qualitative data are used to substantiate and augment phenomena exposed by the quantitative data. The data in the qualitative phase of this study are collected using observations, reflective journals and journal notes.

The research investigated the influence of an 18-month gross motor development programme on learners' lives in three multi-grade schools in the Western Cape of South Africa. A sample of 50 (N=30 males and N=20 females), grade 4-6 multi-grade learners participated in the study. The gross motor skills were assessed using Project 4 – IMAD+ Test Battery, previously developed by the Cape Peninsula University of Technology, Centre for Multi-grade Education. The test battery consisted of a series of physical exercises designed to assess gross motor proficiency. The scholastic achievement of learners was understood from the Annual National Assessment scores (ANA) of 2013. The data revealed that a total gross motor ability percentage score change occurred in the sample 50 (N=30 males and N=20 females) from 32.12 % to 56.82 %, indicating a significant overall gross motor improvement of 24.7 % in an 18 month period.

Improved self-esteem, positive attitudinal and motivational changes and increases in class attendance occurred among the learners. This improvement aligns itself with research that indicates that the development and improvement of motor skills through physical activity are related to positive development of self-esteem among learners (Corbin, 2002:128-145).

This study contributes to the growing body of knowledge on education at rural, marginalized schools, and suggests that providing learners with the opportunity to participate in a structured programme is likely to improve motivation which will contribute toward positive scholastic achievement. It is recommended that policy-makers should encourage and implement structured gross motor skills development programmes at school. Further research on the influence of GMD provincially and nationally should be encouraged.

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GLOSSARY

Terms/Acronyms/Abbreviations	Definition/Explanation
ANA	Annual National Assessment
ANOVA	Analysis of variance
BMI	Body Mass Indices
BOT-2	Bruininks Osertsky Test of Motor Proficiency
CAPS	National Curriculum and Policy Statement
CAT	Charlop Atwell Test Battery
CMGE	Centre for Multi-grade Education
CPUT	Cape Peninsula University of Technology
DBE	Department of Basic Education
ERP	Education for Rural People
FAO	Food and Agriculture Organization
FAS	Foetal Alcohol Syndrome
FG	Fitnessgram
Foetal Alcohol Syndrome (FAS)	“Foetal alcohol syndrome (FAS) is a pattern of birth defects, learning, and behavioural problems affecting individuals whose mothers consumed alcohol during pregnancy” (NICUS, 2008).
FTB	Fitness Test Battery
GMD	Gross Motor Development
GMA	Gross Motor Ability
Gross Motor Development	“Gross Motor Development refers to changes in children’s ability to control their body’s movements, from infants’ first spontaneous waving and kicking movements to the adaptive control of reaching, locomotion, and complex sport skills” (Adolph, Weise & Marin 2003, 134).

IAAF	International Amateur Athletics Federation
IMAD+	Innovative Motor Ability and Development
Marginalized	“The process whereby something or someone is pushed to the edge of a group and accorded lesser importance. This is predominantly a social phenomenon by which a minority or sub-group is excluded, and their needs or desires ignored” (Business Dictionary, 2016).
Multi-Grade	Multi-grade teaching as a form of “teaching, which occurs within a <i>graded system of education when a single class contains two or more learner grade levels</i> ” (Berry 2010:1).
NEEDU	The National Education Evaluation and Development Unit.
PIRLS	Progress in International Reading Literacy Study
SACMEQ	Southern and Eastern Consortium for Monitoring Educational Quality
SES	Socio Economic Status
TIMSS	Trends in Mathematics and Science Study
UN	United Nations
WCED	Western Cape Education Department
WCRSS	Wake County School System
WHO	World Health Organization
WSSD	World Summit on Sustainable Development

CHAPTER 1: INTRODUCTION AND OVERVIEW



The Hand of Knowledge (Photo Credit: G.F. Joubert).

1.1 Introduction

Multi-grade teaching is a pedagogic approach that offers substantial opportunities to improve teaching and learning in various learning settings; particularly in the small, scattered and remote rural schools where geographic and socio-economic conditions strain the South African government's financial commitment to provide quality education (Joubert, 2009:1). More than 30% of all primary schools in South Africa are in a multi-grade environment, estimated to be 7000 out of 21000 schools (CMGE, 2009a:5). Montgomery, Kiely and Pappas (1996:1401-1405) are supported by the ODI (2009) that states that socio-economic considerations, especially poverty, clearly retard the holistic development of learners.

A central aspect of this holistic education is the provision of a structured, gross motor skills development programme. Given South Africa's Department of Basic Education's removal of Physical Education as a subject from schools and the type of deprived contexts of rural schools, this study seeks to investigate how the implementation of a gross motor skills development programme can enrich the lives of rural learners where such programmes have been critically lacking.

If learners from marginalized, multi-grade schools wish to survive in today's knowledge-based society, encouraging motivation towards their schoolwork is imperative. Motivation in learners is critical because it predicts motivation later in life (Gottfried, 1990; Broussard & Garrison, 2004; Lai, 2011). This study seeks to investigate the impact of a Gross Motor Development programme on the lives of learners in marginalized multi-grade environments in rural areas of the Western Cape.

1.2 Context of the Research

The study is located in the rural Western Cape of South Africa. The researcher investigated the rural, marginalized environment of the Western Cape and the impact of a gross motor development programme on the lives of these learners. It was apparent that most learners from these deprived environments have a limited range of physical activities from which to choose. They have little access to sport facilities and sport resources. Anecdotal evidence suggests that the only physical activities that these learners engaged in are when they walk to school and back home daily.

The researcher acknowledges that the practice of sport is vital to the holistic development of learners, fostering their physical and emotional health and building valuable social connections. The World Health Organization (WHO) and Hardman et al. (2014) underline this statement as convincing proof that the physical fitness and health status of learners and youth are substantially improved by regular physical activity and reduced symptoms of anxiety and depression (WHO, 2010:20). Sport offers opportunities for play and self-expression: both of which aspects are beneficial for young people and especially those with few other opportunities in their lives. Not only do physical education programmes promote physical activity; there is evidence that such programmes correlate to improved scholastic achievement. South Africa's Department of Basic Education has removed and re-instated Physical Education from the curriculum on several occasions from 1994 to 2016; with the following result:

The change to the curriculum has resulted in Physical Education being removed as a stand-alone subject and incorporated into the Life Orientation curriculum. This has led to a drop in physical education participation at schools due to lack of trained practitioners and understanding of physical education content (South Africa. Department of Basic Education, 2015:1).

South Africa's Department of Basic Education has not acknowledged that sport is a profoundly important component for holistic development. This neglect has developed an environment of doubt among educators, learners and the general South African education community; suggesting that sport or physical education does not bear significant importance in the holistic development of learners. By contrast to such doubts, the research conducted here confirms the importance of sport in the general holistic development of learners in the current South African education environment.

1.3 Rationale for the Study

This study is motivated by personal, contextual and research imperatives. As a sports coach, my keen interest in the influence of physical skills development programmes on youth drives the study. Having completed a Master's thesis on holistic fitness programmes, this doctoral study is a natural extension of the earlier research into the influence of gross motor skills development on constructive learning, particularly in rural marginalized schools.

The research imperative is driven by the phenomenon that no clear dispensation has been presented by South Africa's Department of Basic Education to address the need for physical education in schools especially those too poor to afford sporting facilities. Gross motor development as addressed in the National Curriculum and Policy Statement (CAPS) (South Africa. Department of Basic Education, 2012) is the guideline by which learners in South Africa are prepared for the future.

The Curriculum and Assessment Policy Statement refers to motor development in the Life Skills syllabus but does not indicate which phase is relevant or whether this Statement is simply a general statement in CAPS which provides teachers with learning outcomes through which the learner's physical and motivational development have to take place within the school context (South Africa. Department of Basic Education, 2012:12). No clear guidelines, however, are given as to how this development can take place in a multi-grade environment in CAPS or how gross motor development activities enhance the scholastic achievement of learners. The only physical education components that are addressed in CAPS do not stipulate learning directions or learning pathways. This obvious lacuna in curriculum has actuated the need for the present research.

1.4 Research Problem and Aims

Gross motor skills development programmes are critically lacking in rural marginalized schools, and are particularly important in multi-grade classrooms in such contexts. This study aims to understand the influence of gross motor development on the lives of learners from such marginalized environments.

1.4.1 Aims and Objectives

The aim of this research was to determine whether a gross motor development programme could, in fact, influence the lives of learners from rural marginalized multi-grade primary schools. In doing so, the research project intends to empower its subjects, the learners in rural disadvantaged multi-grade schools in accordance with Denscombe's (2002:27) fundamental philosophical enquiry: "how can it help those who are being researched?" The research project aims to develop a structured and sustainable gross motor development programme specifically designed for the needs of learners from a rural marginalized, multi-grade environment.

The primary objectives of the study are as follows:

1. To investigate physical changes in learners from the implementation of a gross motor development programme.
2. To investigate the influence of the Gross Motor Development (GMD) on motivation, self-esteem and attitude.

1.4.2 Research Questions

The main research question is:

How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school?

The study is a mixed method design and poses the following questions for the quantitative and qualitative aspects respectively:

1. **What are the physical changes in learners from the implementation of a GMD programme, and why?**
2. **What are the motivational, attitudinal and self-esteem changes in learners from the implementation of a GMD programme, and why?**

1.5 Research Methodology

A transformative, mixed-method design has been chosen for this study. Equal priority will be given to the quantitative and qualitative phases of this research project. The rationale behind selecting a transformative mixed-method design lies in the purpose of the research.

The transformative paradigm arose in reply to persons who have been driven to the societal margins through history and who are finding a means to bring their opinions into the world of research. There is no single approach that is related to the transformative paradigm. The transformative paradigm is characterised by the use of multiple methodologies, methods, techniques, and theories that sustain the previously discussed assumptions (Mertens, 2010:85-102). Further research has shown that the development of gross motor skills is positively correlated with scholastic achievement, but within a multi-grade environment this cannot be assumed.

As such, this study demands a transformative mixed-method approach that lends itself to explaining an unexpected phenomenon (Creswell, et al., 2011:229). The quantitative phase of this study will be conducted first, with the qualitative phase, which will include observations and journal notes, following sequentially.

1.5.1 Participants

The participants in this study comprised all the learners (n=50) at three schools in the Western Cape. Using non-probability sampling, the learners at these schools were selected for participation in this study due to the fact that: a) these schools are multi-grade schools, b) these multi-grade schools have a large enough sample of Grade 4-6 learners, c) and these schools are in a geographically close cluster.

1.5.2 Quantitative Research

1.5.2.1 Instruments

The researcher has used a combination of four standardised test instruments to collect data from the learners in this study in order to answer the research questions posed. These instruments have all been tested in marginalized environments and proved to have contributed valuable data for further research. These instruments make up an Innovative Motor Ability and Development (IMAD+) Test Battery. The instruments used were:

- **HUMAN KINETICS (Plowman & Meredith, 2013) Fitnessgram**
Fitnessgram is a comprehensive educational, reporting and promotional tool used to assess physical fitness and physical activity levels for learners. It is the most widely used health-related physical fitness assessment for learners in the world.
- **IAAF Kids Athletics programme (Gozzoli, Simohamed & El-Hebil, 2006)**
IAAF Kids' Athletics is one of the largest grassroots development programmes in the world of sport. Created in 2005, the programme, by the end of 2011, had reached a cumulative audience of 1.5 Million learners across 100 territories.
- **Fitness Test Battery/Fiksheidsevaluering (Nel, 2003)**
- **Unpublished Master's in Education (Joubert, 2011)**

The Annual National Assessment Test (ANA) results were used to establish the scholastic achievement contexts of the schools in the study. The ANA results from three sample schools for 2013 with reference to home language and mathematics for Grade 5 and Grade 6 were collected for learners that participated in the IMAD+ gross motor development programme. This Annual National Assessment interpretation is only an indicator of the situation in which these schools find themselves with regards to home language and mathematics in comparison to the Western Cape and the rest of South Africa.

1.5.2.2 Quantitative Data Analysis

The data have been analysed using SPSS, STATSOFT and SAS statistical programmes. The statistical analyses have been performed in several stages. The first stage involves the descriptive analysis of factor scores: means and standard deviations. The second stage of the statistical procedure has involved calculation of the practical significance (effect size) (d) of differences in means of different groups from the study population.

1.5.3 Qualitative Research

Within a transformative mixed method design, the qualitative data are used to explain and augment a phenomenon exposed by the quantitative data. In addition to the quantitative component of the empirical research, a qualitative study was conducted in order to explain the concepts exposed in the quantitative section of this study. Using a transformative mixed method design allows the researcher to explore and explain the phenomenon identified in the quantitative section of this research study.

The researcher used reflective journals, observations and face-to-face interviews to gather qualitative data from the three schools in the study.

1.5.3.1 Qualitative Analysis

The observations and journal notes were analysed by the researcher in order to categorise the data and draw interpretations from the learners' responses.

1.5.4 Reliability, Validity and Trustworthiness

The researcher complied with this part of the study in order to learn and understand issues around methodology so that the research would justify the decisions made.

The relevance and suitability of the reflective writing process suited the way the research was conceptualised. By means of data source triangulation that the researcher used in this study it could be determined how respondents differ with regards to the validity and reliability of the criteria. This knowledge could aid the researcher in identifying the strengths and weaknesses of the criteria (Tellis, 1997:2, Mills et al., 2010:749). This study relies on valid, authentic and trustworthy methods of collecting and presenting information and interpreting understandings.

1.5.5 Ethics

After the permission letter was granted from the Western Cape Education Department, informed consent was given by the principal of each school to become active learners in the study. All three schools made a determined and united effort to be part of the research. The privacy of the learners and the confidentiality of the research were guaranteed by the researcher.

Learners, parents, teachers and principals were assured that all information collected during the research would be treated as confidential. All learners completed a waiver and an indemnity form before any research commenced (Appendix B).

1.6 Literature Review

This review is an annotated review of the main concepts relating to the area under study. A comprehensive literature review is presented in Chapters 2 and 3.

Extensive literature searches conducted on the EBSCOhost and Nexus databases catalogues of South African and international university libraries, Sabinet as well as the World Wide Web, provide little evidence of studies conducted into the influence of gross motor development on the scholastic achievement of learners from rural disadvantaged multi-grade environments. Internationally, a critical and analytical review of the literature revealed:

- A focus on the multi-grade education milieu;
- studies that addressed motivation through movement; and
- theories that analyse the motor development concept.

1.6.1 The Multi-Grade Education Environment

Multi-grade education environment refers to the practice of teaching more than one grade at the same time in one classroom (Hyry-Beihammer & Hascher, 2015:104-113). This study will contribute to the question of how a marginalized rural multi-grade environment influences the lives of learners who participate in a gross motor development programme.

Benveniste and McEwan (2000:33) supplemented by (Hyry-Beihammer & Hascher, 2015:104-113) state that multi-grade schools are commonly advocated as a mean of providing primary education to learners in the rural areas of developing countries where one teacher has to teach several grade levels. These schools are common in impoverished, low population settlements such as remote areas and small villages. Berry (2001:8) and Juvane (2007) report that there is evidence that multi-grade schools can be positive places for learners when constraints exist such as: lack of parental interest in education, poor nutrition, marked discrepancies between home and school culture, poor supply of teaching materials and infrastructure, and inappropriately trained and unqualified teachers. Despite the prevalence and persistence of multi-grade schools, government education systems continue to be organised according to a mono-grade norm. This norm needs to be challenged because curriculum needs to be developed according to differentiation within specific school contexts (Joubert, 2013).

A survey conducted by the Nelson Mandela Foundation (2005:103) 'Emerging Voices', found that teachers are often insufficiently trained and ill-equipped to meet the extraordinarily high expectations of the curriculum, and that inadequate resources and support hampered them in their work. Learners frequently experience their classrooms as authoritarian rather than democratic spaces in which there is little learning and less understanding. Parents and teachers often regard corporal punishment as a normal way to discipline learners; whereas learners consider it as abusing their fundamental rights within education. Potgieter (2010:4), in her critique of multi-grade schools in the Western Cape, states that teachers are in most cases, neither qualified to provide nor capable of presenting, education to learners.

Potgieter (2010:4) further states that multi-grade schools account for 30% of all primary schools in South Africa, with an estimate of more than 3 million learners located in these schools. Multi-grade education is most prevalent in the context of the primary school environment in rural areas. Poverty-stricken communities populate these areas; with a low incidence of government support for learning and training.

An important aspect of education is the presence or absence of the physical education component in the curriculum. The physical education component, which has been de-emphasized by South Africa's Department of Basic Education, has significant ramifications for scholastic achievement for learners. In the next subsection, the concept of gross motor development is discussed to underscore its importance as part of a holistic development within education.

1.6.2 Gross Motor Development

The concept of gross motor development describes the movement of large muscle groups. With reference to this study, the influence of gross motor development upon the lives of learners from a rural marginalized multi-grade environment is the focus of research.

Fundamental motor skills are movements that have exact visible patterns. They include:

- Loco-motor skills such as running, jumping, hopping, galloping, rolling, leaping and dodging;
- Manipulative skills such as throwing, catching, kicking and striking;
- Stability skills such as balance, twisting, turning and bending.

(The Australian Council for Health, 2009:4).

A fundamental motor skill involves the principal elements of a specific movement. It does not highlight the combining of a selection of fundamental motor skills into multi-faceted skills. Each fundamental motor skill is measured in relative isolation from the others. Fundamental motor skills are part of a movement continuum that begins before birth and continues throughout life. The exposure to movement experiences teaches fundamental motor skills that are refined through rehearsal, instruction and modelling (The Australian Council for Health, 2009:4).

The South African Curriculum and Assessment Policy Statement (CAPS) for life skills Grades 4-6 refers to motor development as follows; developing a learner's physical welfare and knowledge of movement and safety. During engagement in this study area, learners developed motor skills and participated in a variety of physical activities (South Africa. Department of Basic Education, 2012:10-15). Numerous studies pertaining to the development of motor skills and self-esteem among young learners focus on the improvement of motor skills through physical activity, and the relation to self-esteem (Corbin, 2002:128-145). Participation in physical education is deemed to nurture positive attitudes and inculcate values that assist learners to be physically fit, mentally alert, emotionally balanced and socially well-adjusted. Learners who directly experience the benefits of such participation are better able to understand the importance of a physically active lifestyle. During movement activities teachers address the development of other skills such as relationship skills, problem-solving skills and the enhancement of self-esteem.

According to Miyahara & Wafer (2004:281-301), there is an active interaction between motor skill competency and self-esteem among young learners : the results of numerous studies support this statement (Rose & Larkin, 2002:127-141; Eime et al., 2013:1; Hardman et al., 2014:84).

1.6.3 Scholastic Achievement

The scholastic achievement of learners is intrinsic to the school context: in this research it is important to note that examination in context is imperative. The three schools where the research was conducted were all in the agricultural centre of the Western Cape of South Africa; an area which exhibits a low socio-economic status, poor access to school, high numbers of learners with Foetal Alcohol Syndrome (FAS), and a lack of parental interest. The concept of achievement refers to the fact that the subject is not merely executing a task without assistance but trying to perform well with the aim of eliciting positive reinforcement for demonstrated competence in the task. Scholastic achievement means achievement made by a learner at school; measured by his marks in the examination, which is the criterion for the performance of the learner (Malathi & Subbiah, 2013). In the South African society, scholastic achievement is considered as a key criterion to judge a learner's total potentialities and capacities; this includes the wealthy through to the rural poor.

Scholastic achievement occupies an important place in education as well as in the learning process. Conventional wisdom suggests that academic achievement should be related to general self-esteem (Abruzzi et al., 2016:22). According to Goodman and Young (2006), the higher the student's academic performance, the higher their self-esteem should be and vice versa. Therefore, academic self-concept is the perception that learners have about themselves regarding their academic performance, abilities, and achievement" (Maser, 2007:11). Achievement is influenced by personality, motivation, opportunities, education and training. Similarly, the concept of level of aspiration is one of the major factors that influences learning among learners at all levels.

1.6.4 Centre for Multi-Grade Education (CMGE)

The CMGE was approved as a self-governing and funded entity of the Cape Peninsula University of Technology (CPUT). The establishment of an international centre for the development of frameworks and policies, good practices for quality instruction and learning in multi-grade education in developing countries was based on design-based research distributed and supported through Information Technology.

The main aim of this research project is to undertake curriculum developmental interventions to improve access/quality and equity in multi-grade education through transformational pedagogy and the planning of the curriculum. The work of the centre is based on the fact that it will occur through a specific intervention, which was driven by a design research approach. The intervention improved instruction in multi-grade schools and consists of a programme and several projects that are interconnected.

1.7 Contribution to Field of Study

Much research on youth sports has examined how sport enhances aspects of learner social development. Specifically, research has examined how gross motor development contributes to development of social competence, the ability to relate to, and be accepted by, peers, family members, teachers, and coaches; and, self-esteem, the extent to which an individual believes him/herself to be capable, significant, successful and worthy. Gross motor development school programmes have become essential in providing learners with positive behaviours.

Gillespie states that physical education provides a fundamental and significant place in the provision of physical activity experiences. Physical activity becomes a context for learning, through and about movement. Through this teaching and learning process, the value of physical activity is explored and experienced (Gillespie, 2005). With these programmes, learners learn how to study and increase their grades, how to stay in school, how to stay off drugs, and how to resist peer pressure. Learners who actively participate in sport gain positive reinforcements and help where they most need it. This study contributes to general motor programmes and multi-faceted programmes in addressing the differentiated needs of the complex South African multi-grade school. Multi-faceted programmes have, because of their composition, the ability to bring stability to the lives of thousands of learners faced with challenging socio-economic environments. These programmes improve the fitness and self-image of the learner.

This research adds to the complex field of the marginalized rural learner. Educational policy-makers may draw on the information from this research to make informed decisions about curricular design for the future.

1.8 Conclusion

Much research has taken place into the influence of gross motor development on the positive attitude of children. The majority of research in this broad and active area of study agrees that movement education has a positive influence on the attitude of active learners. Kalogiannis (2006:1) refers to the abundance of research that has proven the positive correlation between participation in programmes of physical activity and higher levels of physical self-esteem and global self-concept. In this Chapter, an overview of the main aspects of the dissertation was provided.

1.9 Outline of the Thesis

Chapter 2 – Literature review – Part 1 – Challenges for Multi-grade Education

The researcher introduces the challenges of the multi-grade education environment and describes the main ideas and focus areas that contribute to the gross motor development and the attitudinal/motivational milieu that these learners encounter every day.

Chapter 3 – Literature review – Part 2 – Gross Motor Development

The researcher introduces the concept of gross motor development in Chapter 3. Gross motor development in all fields is analysed and its relevance is explained.

Chapter 4 – Methodology

The researcher explains how the method for this research project was devised, how the research took place and the process that was followed to answer the research questions.

Chapter 5 – Results and Discussions

The researcher answers the research questions in this chapter: How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school? The study, which is a mixed method design, explains the following two questions for the quantitative and qualitative aspects respectively:

1. What are the physical changes in learners from the implementation of a GMD programme, and why?
2. What are the motivational, attitudinal and self-esteem changes among learners from the implementation of a GMD programme, and why?

Chapter 6 – Recommendations and Conclusions

The researcher reveals the recommendations and conclusions of the research to the reader, based on the result and discussions from Chapter 5 and the background the Literature review contained in Chapters 2 and 3.

Appendix CD (Appendix G) – The attached Appendix CD at the back of the soft copy will include the following material: IMAD+ Programme, Photos, Supersport – Broadcast material – Let's Play, IMAD+ promotional video, and video material from IMAD+ seminar.

CHAPTER 2: LITERATURE REVIEW, PART 1: CHALLENGES FOR MULTI- GRADE EDUCATION



A Typical South African Multi-Grade Classroom (Photo Credit: G.F. Joubert).

2.1 Introduction

The experiences of the rural poor in South Africa are not well understood, and are not currently fully appreciated in terms of the processes of education policy development (Nelson Mandela Foundation, 2005:1). A large amount of research points in the same direction: poverty, and the hardships that accompany poverty, pose the greatest risk factors for poor academic and other negative outcomes (Spaull, 2015c; Wilkinson, 2016). For poor learners living in a community with concentrated, systemic poverty, the risks are even greater. The environment can be either an enabling or disabling foundation for their development potential. Jensen (2009) indicates that the disabling foundation can be divided into the following four categories: Emotional and Social Challenges, Acute and Chronic Stressors, Cognitive Lags, and Health and Safety Issues. A key factor that impinges upon academic achievement is the motivation to succeed.

In poor communities, in which feelings of helplessness may often prevail, such attitudes may militate against the will to succeed. In South Africa, especially in socio-economically disadvantaged schools, the negative effect of poverty on school success and motivation is evident. One particularly neglected type of education in South Africa is the multi-grade classroom. Given that there are currently no systematically developed multi-grade curricula forthcoming from the Department of Education, and that the same department has drastically reduced the physical education syllabus (to a few exercises in Life Skills), this research has a specific interest in demonstrating how the implementation of a structured gross motor development programme could improve the lives of a set of children from multi-grade classes in rural schools in the Western Cape. Several strategies have been implemented by education researchers to improve student motivation: such as an improved school environment that includes a context-based interpretation of the academic curriculum, social responsibility awareness, self-directed learning and numerous self-actualizing interventions.

As far back as 1995, a comprehensive review by Keays & Allison suggested that daily, moderate to vigorous physical activity produced positive outcomes for learners' performance and scholastic achievement (1995:62-66). More recent research (Fraser-Thomas, Côté, Deakin, 2005; Lopes et al., 2013) supports such claims and suggests that more research is needed in this specific field of research.

Other researchers (Portela, 2007; Lopes et al., 2013) suggest that the introduction of physical sports programmes may create motivation, and shape positive attitudes among school-going children, which can flow over into all other aspects of their schoolwork. Taras argues that physical activity may increase feelings of self-efficacy and self-esteem, which can improve class behaviour. Furthermore, it has been demonstrated that children, who participate in physical activity that promotes cooperation, sharing, and respect for rules, learn skills that transfer to classroom settings (Taras, 2005:214-218).

In this chapter the state of multi-grade education internationally and in South Africa is discussed, and in particular, how poverty and multi-grade education in Western Cape rural schools intersect. To describe the context in which the study was conducted, the scholastic achievement of the sample schools (using the Annual National Assessments (ANA) will be discussed. This literature review is extended into the next chapter in which the implementation of gross motor development in the lives of learners in rural multi-grade education environments is reviewed.

2.2 Characteristics of Multi-Grade Schools

Multi-grade schools are a common means of providing primary education to learners in the rural areas of developing countries. One teacher has to teach several grade levels (Benveniste & McEwan, 2000:33; Aksoy, 2007:218). Such schools are common in impoverished, low population settlements in remote areas and small villages in developing countries.

Definitions of multi-grade education are diverse, and are interpreted differently among multi-grade researchers and education practitioners (Brown, 2008:4), as seen in the terminology used to refer to the same phenomenon: multi-grade, non-graded, multi-level, split grades, vertical grouping, family grouping and multi-age grouping (Horsman, 1997:9). A workable explanation is proffered by Berry (2010:1) who refers to multi-grade teaching as a form of “teaching, which occurs within a graded system of education when a single class contains two or more learner grade levels.” For the purpose of this study, multi-grade teaching is regarded as “a situation in which one educator has to teach learners of two or more grade levels during one time-tabled period usually in the same classroom” (Pridmore, 2007:1). This study was conducted in three schools in rural areas in the Western Cape.

A study by UNICEF (2012) indicates that the nature of the households that children are born into dramatically affects the development and life outcomes of an individual. The general environment which a child faces during the early-life years (up to age 8) is particularly important for developing skills and capabilities. Health, nutrition and physical activities influence the development of the motor skills of children, which can in turn determine the positive or negative outlooks of children towards schooling, peers and others in the environment.

2.3 The International Multi-Grade Environment

At the time of writing, multi-grade teaching is receiving attention internationally as a model that is likely to provide viable opportunities for educational delivery in remote rural areas. Juvane (2007:1) contends that multi-grade teaching if implemented imaginatively has the potential to improve the quality of teaching. Little (2005:4) sketches diverse school contexts in which the concept of multi-grade teaching applies. Some multi-grade education occurs in inaccessible, low population areas with low enrolments and one or two teachers.

Multi-grade education can take place in under-resourced schools where a group of classrooms are spread out across different locations with some as multi-grade and some as mono-grade, or in areas of decreasing learner and teacher numbers where teachers travel between schools, or in schools with high teacher absenteeism, or where school administration has purposefully arranged multi-grade classes for sound pedagogic reasons.

The incidence of poverty and illiteracy, especially in Africa, forms the background in which multi-grade schools are considered a primary educational tool that can help teachers in contexts where there is a shortage of teachers, an inadequate budget and other hindrances. Despite the high prevalence and persistence of multi-grade schools, however, government education systems continue to deny or ignore the existence and peculiar curricular demands of multi-grade education. Government education departments seem to recognise mono-grade education alone as the norm: anything else is below the norm and to be ignored until it approaches the form of mono-grade tuition. This prejudice needs to be challenged because curriculum should to be developed according to the differentiation within specific school contexts (Berry, 2001: 357-552).

In England and Wales, 40% of the schools surveyed reported an increase in multi-grade groupings and in Canada one out of every seven classrooms is a multi-grade class. Wolf & Garcia (2000:39) and supported by Juvane (2007) claim that multi-grade schools are common in rural areas throughout the world. In Peru, there are approximately 21,500 primary multi-grade schools; 95% of which are located in rural areas. South Africa is no exception.

Multi-grade schools are not likely to disappear (Wolff & Garcia 2000:39; Cornish, 2006). Such a scenario is a challenge for all developing nations, including South Africa. High levels of illiteracy are found in rural areas; often as a result of poverty and deprivation, compounded by problems of child and maternal health, and a greater vulnerability to HIV and AIDS. Recognizing this dire situation in rural areas, in 2002 the Food and Agriculture Organization (FAO) and UNESCO launched the global Education for Rural People (ERP) flagship partnership during the World Summit on Sustainable Development (WSSD) in Johannesburg.

From a European perspective, there has been insignificant research on teaching and learning in small rural schools over the last twenty years (Kvalsund & Hargreaves, 2009:140-149), and support on the prevalence of multi-grade teaching is difficult to find (Mulryan-Kyne, 2007:501-514). Little (2001) indicates that most research on multi-grade teaching has focused on its impact on students' learning. The debate over multi-grade teaching has frequently tackled the question of whether students' learning results are better in single-grade classes or in multi-grade classes, but studies have generally not found significant differences between these two forms (Åberg-Bengtsson, 2009; Lindström & Lindahl, 2011). Berry (2001:8) suggests that multi-grade schools may be effective in promoting the reading progress of low-achieving learners; partly because of differences in the approach to instruction in multi-grade and mono-grade classrooms. Collingwood (1991:2-3), more than 35 years ago, proclaimed the same as Juvane (2007); that multi-grade classes in various countries experienced reduced instructional time for teachers, short-term curriculum materials, a lack of self-instructional material and teaching resources, untrained teachers, a diverse range of abilities and interest levels in one class, neglect of children since teachers focus more on examination candidates, and overcrowding; conditions that still prevail in the South African multi-grade environment today.

Little (2001, 2005) maintains that, despite its prominence in many educational systems, multi-grade teaching remains institutionally invisible. She argues that the needs of multi-grade teachers, classes and schools must be attended to urgently and realistically. An active commitment must be made to removing educational disparities. Little confirms this standpoint by stating that learners should not face any prejudice's regarding access to learning opportunities (Little, 2001:481).

This lamentable reality is faced by approximately 30% of all primary schools in South Africa, and affects nearly 3 million South African learners who may never be able to compete equally with their peers in urban areas, never receive tertiary education or become part of the mainstream economy.

2.4 The Influence of Poverty on the South African Multi-Grade Environment

South Africa is worlds apart characterized by two parallel economies, the First and the Second. The marginalized form the Second Economy that is characterized by underdevelopment, contains a large percentage of the black population, incorporates the poorest of our rural poor, is structurally disconnected from both the First and the global economy, and is incapable of self-generated growth and development (Mbeki 2003:14). The metaphor of two worlds is extended into South Africa's dual education 'systems'. The second school system enrolls the vast majority of poor and working-class children, whose health, economic and community difficulties concomitant with equally deficit schools produce learners that read mostly at the functional level, write without fluency or confidence and use inappropriate concrete techniques with numeric operations (Fleisch, 2008:2).

Poverty affects learners the hardest. It creates an environment that is damaging to learner development in every way: mentally, physically, emotionally and spiritually. Alleviation of poverty can begin in the classroom with learners. The well-being of learners is a yardstick for measuring national development. Indeed, the ultimate criterion for gauging the functional integrity of society, or the international community, for that matter, is the way it treats learners, particularly those in the poorest and most vulnerable areas (CMGE 2011:6). The best start in life is critical in a learner's first few years; not only for survival but for their physical, intellectual and emotional development.

Educational deprivations greatly hamper learners' ability to achieve their full potential, contributing to a society's cycle of endless poverty and underdevelopment (UNICEF, 2000:1). Learners in remote rural areas across South Africa experience many barriers to participating fully in school. The Nelson Mandela Foundation (2005:64) refers to such obstacles as patterns of daily life, which include the following: household chores such as minding animals, collecting wood and water, receiving social grants, cooking and cleaning, and looking after siblings, all of which are made necessary by dire domestic economics. Sub-economic domestic economics rely on learners participating in activities that help raise funds necessary to pay school fees and put food on the table.

Rural geographies and lack of basic services such as sound roads and transport systems result in learners having to walk long distances to school. The inability to pay school fees, to afford school uniforms or to cope with hunger means that the experience of schooling is associated with shame and humiliation. Ill-health, (HIV/Aids) and teenage pregnancy form part of the daily lives of such learners. Learners' patterns of schooling are not gender-neutral and are exacerbated in the case of learners with special needs.

Potgieter (2010:4) states that socio-economic considerations such as the lack of parental interest in education, poverty, poor nutrition and the differences between home and school culture prevent learners from developing in a holistic manner. Murmane (2007) writes that learners living in poverty are in most cases bundled together in under-achieving schools with under-educated teachers. Some of the factors related to poverty which place learners at risk of academic failure are: very young, single or poorly educated parents; unemployment; abuse and neglect; substance abuse; dangerous neighbourhoods; mobility; and exposure to inadequate or inappropriate educational experiences (Pellino, 2007).

The study of education has formed an integral part of the discourse around poverty traps and social mobility. Many researchers have argued that education is one of the principal mechanisms for promoting social mobility (OECD, 2010), as well as dismantling poverty traps (Perry et al., 2006; Knight, Shi & Quheng, 2010; Van der Berg, et al., 2011).

Lewin (2007:3) further explains that these links are especially important in developing countries: “modernizing societies use educational access and attainment as a primary mechanism to sort and select subsequent generations into different social and economic roles.” Multi-grade schools in the South African context can therefore be aligned with what the FAO states: that poverty cannot be seen as a separate entity with regards to the multi-grade predicament of many South African schools. The Food and Agricultural Organization of the United Nations (FAO) (2007:1) describes the model of poverty menace as follows: “most people in rural areas work in agriculture, and in the most cases for low rates of compensation. The access to services the government provide are generally inappropriate and of poor quality.” This statement resonates with the assertion of Hemson, Meyer and Maphunye (2004:3) that it is an unfortunate reality that multi-grade schools form the most neglected part of the education system. In ethnic communities populated by groups with a low socio-economic status, access to and availability of facilities and resources play a large role in the amount of vigorous and recreational physical activity that occurs (ODI, 2009).

Education funding, according to the South African annual National budget, has increased with every budget and funding allocations have favoured previously disadvantaged schools. It has been estimated that the poorest 40% of households received 49% of the education spending in 2009 (Van der Berg, 2009:15), largely because poorer households generally contain more learners. Although the institutions enforcing the racial divide were abolished and public spending was targeted towards poor schools, the divergence in quality between the former white and black parts of the system continues. The research sample of this study is located in rural schools, in which all of the learners are either black or coloured.

Branson and Zuze (2012:72) report that the South African education system has among the highest variations in education outcomes: schools from the lowest income quintile of the poverty distribution markedly underperform relative to schools in the top quintile. Citing data obtained from the National Department of Basic Education, they indicate that in close to half of the schools in the lowest quintile, 95% of learners attained a score of less than 35% on the annual national assessment; whereas only 6% of schools in the top quintile reflected such poor performance (Branson & Zuze, 2012:70).

Several studies indicate that poverty and its associated challenges militate against academic achievement and other successes (Taylor & Yu 2009; Spaul 2015b; Wilkinson 2016). Poverty also negatively affects motivation and produces a sense of despair and helplessness, therefore, both internationally and locally, communities with dire poverty have environments that are disabling to the intellectual, physical, and emotional and social development of poor learners' and increased risk to their health and safety (Jensen, 2009). Studies in North America found that children from home contexts that experience high levels of poverty are at risk of low achievement in literacy (Grigg et al., 2003).

Jariene and Razmantiene (2006) conducted a longitudinal study in Strasbourg using the following variables as indicators of pupils' socioeconomic status (SES): the number of books at home; the number of books owned by the pupil; educational resources at home (e.g. dictionaries, encyclopaedias, computers, access to the Internet); amount of pocket-money received from parents each week; whether pupils participate in free breakfast programmes for disadvantaged pupils at school; parents' employment status and educational backgrounds. A strong correlation was found "between a pupil's socio-economic background and his or her achievements in reading and writing skills: pupils with higher SES achieve better results" (Jariene & Razmantiene, 2006:5). Thus the difference in the learning and life experiences of children from poor SES and those of middle to upper income impinges upon their literacy outcomes.

Studies in various countries support the idea that SES influences literacy outcomes. In South Africa, however, "history has ensured that SES is distributed along racial lines" (Taylor & Yu, 2009:5). The "institutionalized inequality" perpetuated by apartheid policy is well understood as a prime determinant of the country's present societal hierarchy. Given that the aftereffects of apartheid still affect where people live, which schools children attend, educational backgrounds of parents, the types of work people do, and access to particular privileges like higher education and even municipal services, it is foregrounded that race and class are inevitably linked to socioeconomic status, access to education and hence varying levels of learner achievement in literacy.

This is compounded by the type of family structure prevalent in African communities, especially in low SES homes. Thirty one percent of black children aged 10-12 years live in a household with no parents, 41% live with a single parent, and 28% with both parents. In contrast 89% of Indian children and 80% of white children of the same age group lived with both parents (General Household Survey, 2006 cited in Taylor & Yu, 2009:6). This inevitably influences the educational inputs into the lives of affected children with corresponding ramifications for the type of educational outcomes.

Poor children on the margins of South African society suffer a myriad of health problems and the link between poor health and learning failure is strong. The key health problem is malnutrition, which is likely to result in irreversible damage to children's intellectual development (Zere & McIntyre 2003). Others include the high rate of stunting (weight: height ratio); micronutrient deficiencies, hunger, parasite infections, hearing loss, asthma, foetal alcohol syndrome, HIV/Aids, lead poisoning, mental-health problems, domestic violence and poor vision. These health problems impact directly on their school achievement. Poor children learn a restricted set of practices that do not adequately prepare them for success with 'school codes'. Peers in advantaged settings enjoy quality pre-primary education and access to a book culture in the home.

Evans & Wachs (2009) summarize poverty eloquently: 'Poverty means insufficient money for school fees and books, and having to stay out of school for several weeks until funds can be found to purchase shoes and school uniforms. Poverty means children being left at home by parents who must leave for work before they wake up, with the children getting themselves up on their own and out to school without breakfast.' Taylor and Yu (2009) examine the effect that learner Socio-Economic Status (SES) has on reading ability; using the Progress in International Reading Literacy Study (PIRLS) 2006 test results.

They conclude that SES is an important determinant of reading ability and explains much of the overall variance in Grade 3 reading achievement. They find that learners attending low SES schools have great difficulty in overcoming their own socio-economic disadvantages.

The 2011 PIRLS results showed that learners from remote, rural areas achieved a language test score that was more than one standard deviation point lower than that of their urban peers (Howie et al., 2012). The same trend is visible in learners' mathematics test scores. The inferior outcomes from South Africa's education system are not only gauged by comparing former non-white schools to their privileged counterparts, but manifest stark differences when compared internationally. Van der Berg et al. (2011) report that in two separate international achievement tests (one involving grade 8 learners and testing mathematics; the other testing literacy among primary school learners), South African learners achieved the lowest scores in both. The 2003 Trends in Mathematics and Science Study (TIMSS) results showed that while former white schools performed at the international mean level, former black schools performed at less than half of that level. These results were echoed in the TIMSS 2011 results (Reddy et al., 2012).

Given that equalization of funding between the schooling sub-systems has occurred, these differences in educational outcomes (poor performance relative to peer countries as well as failure to advance within the domestic education system) stem from other sources. Lam et al. (2011) estimate a regression model to determine the relative importance of factors associated with grade advancement. It is important, however, to bear in mind that the impact of socio-economic background can take place through a variety of channels. The work of Van der Berg et al. (2011) suggests that much of this negative impact may occur via the association between socio-economic background and inferior schooling in South Africa. In a cross-country comparison, Van der Berg et al. (2011:8) report that learners in other African countries who are as impoverished as South African learners on average, outperform South African learners on Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) tests.

This discrepancy is interpreted as evidence that the socio-economic gradient does not merely capture household or society influences, but that in South Africa a significant share of the observed socio-economic penalty is related to dysfunctional schools in poor communities (Van der Berg et al., 2011). Hemson et al. (2004:3) and the Food and Agricultural Organization (FAO, 2007:1) agree that poverty has an endemic hold on rural areas and that poverty has a substantial influence on the global spectrum of development.

Agriculture and poverty evidence a strong connection in the literature, which can be compared with the Wake Country School System (WCRSS, 1999:20). The WCRSS alleges that while an investigation of poverty in American schools was undertaken, in schools with above-average poverty rates, the poverty level of the school influences the development of all learners, including those from more advanced families. Low-income learners at high-poverty schools experience a double risk. Easton et al. (1999:151) report that this finding may easily be applied to most rural schools. Acker and Gasperini (2009:4) state that rural citizens are an overlooked majority of the world's poor population because of the prevailing westernized industrial models of development that give greater priority to urban industrial and services sectors as the engine of national economic development.

The FAO (2007:1) describes the problems this western model faces by focusing on education leaders who deal with rural development programmes. They state that the greatest challenge in serving rural populations is providing ready access to quality education and training for all age groups, at all levels of the education system. Senior government representatives from 11 African countries reiterated the need to address gross inequities that marginalized rural people, and in particular prevent access to education for girls and women, working learners, individuals in inaccessible and remote areas, nomadic and pastoral communities, ethnic minorities, the disabled, refugees and displaced persons (FAO, 2007:1). What should be understood is that attitudes involve what learners think about, feel about, and how they would like to act toward an attitude entity. Behaviour is not only determined by what people would like to do, but also by what they have more often than not done: habits, and the expected consequences of actions (Triandis, 1971:14; Seibold & Roper, 2017). Unequal access to quality-differentiated education is one of the major inequalities affecting the rural poor. However, the rural nature and content of these challenges are often overlooked.

2.5 Quality of Education in the South African Multi-Grade Environment

The South African government spends 20% of its budget on education, or 6.4% of Gross Domestic Product (considerably more than many other emerging market economies) and yet performs dismally in international comparisons. The World Economic Forum's competitiveness index for 2012–2013 ranks South Africa's overall education system at 140 out of 144 countries, and its mathematics and science

education at 143 out of 144 (Department of Basic Education, 2012; Klinck, 2013; Van der Berg et al., 2011). The pre-PIRLS study of 2011 showed that large linguistic inequalities exist: of those learners whose language of learning and teaching was Xitsonga, Tshivenda or Sepedi, one in two (50%) could not read by the end of Grade 4 compared to one in ten (11%) English and Afrikaans learners (Howie & Van Staden, 2012).

The latest available Southern and Eastern Consortium for Monitoring Educational Quality (SACMEQ, 2010) data of 2007 highlighted large geographic inequalities in the country: 41% of rural Grade 6 learners were functionally illiterate compared to only 13% of urban learners in the same grade. Local Grade 6 learners performed more poorly than learners in many poorer African countries such as Kenya and Tanzania, even after accounting for non-enrolment and higher dropout rates in those countries (Spaull & Taylor, 2015). South African primary school teachers generally exhibit poor subject knowledge in language and mathematics, and consequently an incomplete understanding of both the requirements of the curriculum and how to enliven lessons in their classes. There are many signs that show that there is a crisis in South African education. With higher enrolment rates each year, and increasingly poor Grade 12 outputs, it is clear that urgent attention needs to be focused on the quality of education. The improvement of our education does not merely lie within improved Grade 12 pass rates annually, but rather in the quality of academic performance, knowledge and skills (especially reading, writing and calculating skills) of the individual learner when leaving formal educational institutions. What is urgently needed is “reconstructive” education for our learners, especially during their early years (Grade R and Grade 1). Reconstructive education implies building and/or rebuilding an education foundation for learners.

Marginalization is used as a term to describe situations of acute and persistent disadvantage in education (Harttgen & Klasen, 2009:135). Once a learner is in school, s/he only has one chance out of three to complete his/her primary education. Thus the majority of the learners in South Africa are by definition forced out of the educational system by circumstances beyond their control. Virtually all research points in the same direction: poverty and the hardships that follow poverty pose the greatest risk factors for poor academic outcomes. In general, there is a linear relation between academic success and income.

Statistics indicate that poor learners easily fall prey to the following five dangers:

- Chemical and toxic products being used on farms and dangerous waste at dumping sites
- Exposure to chronic stress
- Exposure to substandard cognitive development
- Foetal Alcohol Syndrome
- Poor parental support

Quality education can be defined as the acquisition of the knowledge, skills and values that society deems valuable, usually as articulated in the curriculum. Whilst it is difficult to garner reliable information as to whether learners are acquiring appropriate values at school, there is considerable information on the extent to which they are acquiring the knowledge and skills expressed in the curriculum (Spaull, 2015a). The researcher argues that the extent of knowledge and skills expressed in the curriculum with reference to gross motor development lacks depth and sustainability due to the numerous changes in curriculum over the last two decades and mono-grade subject implementation by the Department of Basic Education.

Although there is widespread agreement in the literature that negative attitudes and perception toward the multi-grade classes prevail, yet a review of the research reveals inconsistent results regarding the effectiveness of either group in terms of scholastic achievement. The two major components of the multi-grade classroom that contribute to good achievement are: first, according to Johnson and Johnson (1994) and Lai (2011), the family-like atmosphere that reduces the incidence of social isolation and encourages risk-taking that is associated with meaningful learning; and second, the dynamic of returning older learners (who have more classroom and educational experience) engaging in interactions with learning activities.

Learners are better off in multi-grade areas where attitudes toward school, self-concept, personal adjustment and social adjustment are present (Veenman, 1995:367; Kadivar et al., 2005:169). Similarly, Miller's (1999) summary of research on multi-age grouping practices disclosed that, among thirteen studies he reviewed, only three revealed significant differences between sub-test scores for the two groups.

Mason and Burns (1996) challenged Veenman's and Kadivar's conclusion; claiming that multi-grade classes have a small, negative effect on achievement. They asserted that the reason for low achievement may lie in the more complex and difficult teaching situation that exists in multi-grade classes: as for example, in terms of greater workload, need for preparation time and better management skills (Vincent, 1999a:34; (McClelland & Kinsey, 2004). On the other hand, the studies support the premise that there is a significant benefit in the affective domain for learners enrolled in a multi-age class. Learner experience increased self-esteem, improved attitudes toward school, reduced discipline and anti-social problems, and allowed learners to be better adjusted socially and emotionally (Vincent, 1999b:12-14; McClelland & Kinsey, 2004).

2.6 Cognitive Skill Development

There is considerable evidence that learners from poverty-stricken backgrounds are more likely to have impaired exposure to critical enrichment factors; resulting in sub-standard cognitive skills. Here are some differences between those learners facing poverty and those from middle- and upper-income homes:

- Parents from environments of poverty use different vocabulary every day; both fewer and less complex words than those heard in families of greater income (Hoff, 2003).
- Poor learners are more likely to have parents who are less likely (by a factor of three or four) to initiate conversation to maintain social contact or build vocabulary (Hart & Risley, 1995; Jensen, 2012).
- Learners from affluent communities have more books in their homes than low-socio-economic status learners had in all school sources combined (Korat & Haglili, 2007).
- Low socio-economic status parents are half as likely to read to their children as compared to high-income learners (Coley, 2002).

Infants and toddlers from low-income families have lower quality nutritional intake: something which is linked to lower cognition levels (Frank et al., 1996; Jensen, 2009).

These issues are highly relevant because, for example, while learners from poverty-stricken backgrounds typically have cognitive deficits, their performance at school can be improved with specific skill-building programmes in reading, writing, mathematics and problem-solving.

2.7 Parental Involvement

The lack of parental involvement in rural families is the cause of substantial socio-economic problems. Besides the social structure, parental involvement in children's education increases the rate of scholastic achievement (Furstenberg & Hughes, 1995:580-592; Luang-Ubol, 2010). Relations between gender and scholastic achievement of learners have been debated for decades (Eitle, 2005:177-195). A gap between the achievement of boys and girls has been found; with girls showing better performance than boys in certain instances (Chambers & Schreiber, 2004:327-346). Krashen (2005:16-19) concludes that learners whose parents were educated score higher on standardized tests than those whose parents were not educated.

Educated parents can better communicate with their learners regarding schoolwork, activities and information being taught at school. They can better assist learners in their work and participate at school (Fantuzzo & Tighe, 2000; Farooq et al., 2011). Theory of Educational Productivity by Walberg (1981) determined three groups of nine factors based on affective, cognitive and behavioural skills for optimization of learning that affect the quality of academic performance: Aptitude (ability, development and motivation); instruction (amount and quality); environment (home, classroom, peers and television) (Roberts, 2007). Educational factors are often not tangible and difficult to measure because they result in transformation of knowledge, life skills and behaviour modifications of learners (Tsinidou, et al., 2010).

There is no commonly agreed upon definition of quality that is applied to the education field because the definition of quality of education varies from culture to culture (Michael, 1998:377-404; Slade, 2017:1). The environment and the personal characteristics of learners play a crucial role in scholastic achievement. School personnel, members of the family and communities provide help and support to learners regarding the quality of their scholastic achievement. This social assistance plays a crucial role in achieving performance goals for learners at school (Goddard, 2003:59-74).

The home environment affects scholastic achievement of learners. Educated parents can provide an environment best suited for academic success of learners. School authorities can provide counselling and guidance to parents for creating a positive home environment for improvement in learners' quality of work. The scholastic achievement of learners heavily depends upon parental involvement in academic activities (Henderson, 1988; Shumox & Lomax, 2001; Barnard, 2004).

2.8 Multi-Grade Schools in the Western Cape

Multi-grade schools in the Western Cape exhibit numerous educational backlogs and do not receive sufficient guidance and support from state officials (Joubert, 2006:1). Other problems include the fact that policy documents of South Africa's Department of Basic Education make no mention of multi-grade schools. Curriculum, learning materials and teacher training are all geared towards single-grade classrooms. The remoteness of many rural schools and the prevailing socio-economic conditions that exist in many of these areas further contribute to negative attitudes among teachers.

The widening educational gap between urban and rural areas is distancing the hope of egalitarianism: it is, in many demonstrable ways, the direct result of theoretical inconsistencies in the initial conceptualization of constructivism in both these post-colonial situations. In both India and South Africa, for a range of historical reasons, the education system is now split into two separate camps, which are ethically, politically and financially apart. This apartness has replaced apartheid in one country and stratification aligned with caste structure in the other. Democratization of national education has failed in both countries because educational theorists were reluctant to integrate and take into account inalienable political components of pedagogical theory in their operating models for national education (Chetty et al., 2017). Zhang (2006) reviews a number of quantitative studies on urban-rural gaps in performance of learners in Africa and concludes that the reasons for the disparities are multi-levelled and complex.

While the provision of quality resources is essential to reducing disparities in outcomes, improving school processes, approaches to learning and teaching and home support are also indispensable. Zhang (2006:602) concludes that, "[r]aising the levels of learning outcomes for all students requires an integrated rather than a piecemeal approach, one taking into account all sources of inequality."

2.8.1 Under-Qualified Teachers

Potgieter (2010:4), in her critique of multi-grade schools in the Western Cape, states that teachers are in most cases not qualified to provide quality education, or capable of doing so. The Report of the Ministerial Committee on Rural Education advocates the development of guidelines to build capacity to organize multi-grade classes and teaching. The Minister of Basic Education, Angie Motshekga emphasizes the need for teacher development and support in multi-grade teaching. Teacher development is a priority area for the department, as indicated in the Medium Term Strategic Framework (South Africa. Department of Planning Monitoring and Evaluation, 2009) and the Ten-Point Plan.

Minister Motshekga called for in-service teacher training to be targeted where it is most needed, and in particular to improve teachers' subject content and pedagogic content knowledge related to specific curriculum areas; including the requirement to provide multi-grade teachers with focused support to interpret the curriculum, and to plan for and manage learning for their special circumstances.

The Centre for Multi-Grade Education emphasizes the fact that no specific training has so far been provided for teachers in multi-grade schools, and that there is a lack of policy guidance for these teachers (Joubert, 2010:58). Joubert suggests that two issues need to be addressed. First, there must be a total transformation of the pedagogic practices in the classroom (from continuous education by the teacher to self-directed and self-supporting learning by the learners); second, the prescribed national curriculum should be adapted to the needs of the methodology of multi-grade school learners. By having a totally differentiated approach to education in multi-grade classes, teaching in remote and rural areas can be greatly improved.

2.8.2 Access to Quality Education

One of the most serious aspects of the plight of the rural poor is unequal access to quality education: something which is important for their social and economic development. Reductions of poverty, food security as well as provision of basic education form the core of the new discourse of development aid. In rural areas, these challenges are often overlooked (Joubert, 2010:59). Privileged learners have already acquired the codes by which to decipher meanings of cultural goods in the family.

They have a ‘readiness’ for school that learners from lower classes do not possess because the latter are less exposed to the dominant culture taught in school. Pre-school education and early childhood development are of fundamental importance to life outcomes for learners (Heckman, 2006; Gertsch, 2009).

The context of the above paragraph is relevant because the three sample schools in this research all come from rural, multi-grade environments chained by poverty and unequal access to quality education. Inequalities that are already present from birth persist and grow, as learners mature. Vandell et al., (2010:737-756) found in America that the effects of early child care (birth to 4.5 years) on cognitive achievement were evident in mid-adolescence; more than 10 years later. In South Africa, fewer than 30% of learners in the poorest 75% of schools have attended two years of pre-school or more; in comparison to 60% of learners from the wealthiest 25% of schools (Spaull, 2013: 436-447). These early inequalities proceed, and arguably cause to some degree, the large inequalities that are evident later on in learners’ schooling careers (Shonkoff & Phillips, 2000; Heckman, 2006).

Table 2.1: Populations in urban and rural areas according to demographic grouping (CMGE, 2009a).

	Black	Coloured	Asian	White	Total	Percentage
Metropolitan Areas	613,549	1,318,002	21,782	526,654	2,479,988	62,2%
Urban Areas	248,143	684,214	2,742	156,282	1,091,381	27,4%
Rural Areas	28,580	347,380		40,344	416,304	10,4%
Total	890,272	2,349,596	24,525	723,280	3,987,673	100%

In Table 2.1 above a profound difference can be observed between demographic numbers in metropolitan or urban areas, and rural areas where multi-grade schools in the Western Cape exist. In rural areas only 10.4% of learners are to be found. An accumulated percentage of 89, 6% live in urban and metropolitan areas combined.

According to Table 2.1, coloured learners are the dominant ethnic group in the rural multi-grade environment in the Western Cape. In most instances, the mother tongue language spoken is Afrikaans. All correspondence, literature, lectures and the material developed for the research were in Afrikaans.

Table 2.2: Population in agricultural areas according to ethnic group (CMGE, 2009a).

	Population living in agricultural households	Percentage	Population defined as farm workers	Percentage
Black	128,947	(19.1%)	37,873	(17.5%)
Coloured	496,515	(73.6%)	162,565	(75.1%)
Asian		(0.0%)		(0.0%)
White	49,529	(7.3%)	16,072	(7.4%)
Total	674,991	(100%)		(100%)

Table 2.2 indicates that the prevailing demographic population in the rural multi-grade environment in the Western Cape when compared to agricultural households will be Coloured 73.6%, 19.01% Black, and White 7.3%.

2.8.3 FAS and FASD

Research conducted in South Africa has contributed to the understanding of the patterns of neuro-cognitive and motor (specifically fine motor) deficits (May et al., 2000; Adnams et al., 2001) and to the development of classroom interventions involving language and literacy training. A significantly high prevalence of Foetal Alcohol Syndrome (FAS): a physical disorder that appears in rural areas of the Western Cape. The concept and use of the term Foetal Alcohol Spectrum Disorders (FASD) was developed in 2004 (CDC, 2005).

FASD is an umbrella term describing the range of effects that can occur in an individual whose mother imbibed excessive amounts of alcohol during pregnancy; in particular due to binge drinking (Rendall-Mkosi et al., 2008:7). These effects may include physical, mental, behavioural and/or learning disabilities with possible life-long implications.

All of the FASD conditions could be completely prevented by abstinence from alcohol at the time of conception and during pregnancy (Rendall-Mkosi et al., 2008:8). This disorder has a profoundly negative effect on the environment of rural multi-grade education in the Western Cape of South Africa, with specific reference to brain and nervous system abnormalities and dysfunctions (Rendall-Mkosi et al., 2008:8). FAS is characterised by growth retardation, facial and neural abnormalities as well as malformations of organ systems. Maternal risk for giving birth to a child with FAS is known to vary substantially by population grouping and the risk varies between individuals, (NICUS, 2008). Effects include partial FAS (PFAS), alcohol-related neuro-developmental disorder (ARND) and alcohol-related birth defects (ARBD).

Specific characteristics of a child afflicted by FAS are: small and low-set ears, small and wide-set eyes with epicanthic folds, a short, upturned nose with a flat philtrum (i.e. no groove on the area between the nose and upper lip) and a low nasal bridge, thin upper lip, cleft lip or cleft palate, and a chin that is recessed, and limited joint movement (Rendall-Mkosi et al., 2008:8). Although no specific tests or medical diagnosis of FAS was undertaken in the study sample, the researcher's observation and experience indicated that some children were presenting symptoms of FAS; so that the prevalence of the affliction could not be ignored.

The prevalence of FAS in the sample schools has been inferred by the researcher through observation of FAS criteria in the sample schools: stunted growth, diminished head size according to age and deficits in intelligence, accompanied by behavioural problems. Directly relevant to researcher observations were the following characteristics described by Rendall-Mkosi et al. (2008:9): mild to moderate mental retardation, delay in developmental milestones, poor eye-hand co-ordination (e.g. catching a ball), delayed development of fine motor co-ordination (e.g. picking up an item with his/her fingers) and gross motor co-ordination (e.g. running), irritability and hyperactivity. These characteristics helped the researcher identify children in the study afflicted by FAS.

2.8.4 Brain and Nervous System Abnormalities and Dysfunctions

In South Africa, especially in poorer communities, the most common time for a child with FAS to be identified as having serious disabilities is in Grade 1. It may be that the class teacher observes the learning difficulties and behavioural problems and

refers the child to the Educational Clinic. Due to poor resources, even if the psychologist, therapist or remedial teacher identifies the particular difficulties of the child, the on-going remedial support required is not available unless the child is placed in a special school (Nutrition Information Centre (NICUS), 2008). In the public school system, where classes are large (officially up to 40 or more learners to one teacher in a classroom), the needs of the learner with FAS are difficult to accommodate.

The model used in South African schools to support learners with special needs is to assign a learning support teacher per school and try to design a learning support strategy. Ideally this should be done one-on-one, but because of the shortage of qualified learning support teachers, it occurs in groups and once or twice per week. Class teachers should be equipped to scale down the work according to the child's abilities, focus on his or her strengths, and provide an emotionally nurturing environment for the child rather than focus on scholastic achievement alone (NICUS, 2008). The child who appears physically normal, with an average IQ but who has behavioural difficulties, is more likely to be judged harshly than a child with intellectual impairment. Such a child is more prone to anger and frustration resulting from unrealistic expectations of parents and teachers who do not recognise or understand the neurological origins of the problematic behaviours. This chronic frustration is likely to result in depression and/or aggressive behaviour. School-aged children will usually be referred because of learning problems, especially in reading and mathematics, or with behavioural abnormalities (Canadian Paediatric Society, 2002).

Schooling tends to be a negative experience for children with FAS. Such children are over-active, distractible, and "flighty", have poor fine motor coordination, attention deficit, and poor short-term memory. With or without low IQ they require special educational assistance. Teachers experience them as uncooperative, difficult to manage and disruptive in class. Because of their small stature, they are easy targets for bullying by schoolmates. The average IQ of a person with FAS is about 80, and the average IQ of a person with ARND is around 90. However, almost all of these learners suffer neuro-cognitive impairments: low social skills, emotional immaturity and memory deficits; most need continued close supervision and support services (Streissguth et al., 1997:25-39; NICUS, 2008).

Many children with FAS and FASD do not legally qualify as “mentally retarded” (usually defined as an IQ < 70) and therefore have difficulty accessing appropriate grants or social services.

2.9 The Sample Schools

2.9.1 Context and Challenges

Although there is widespread agreement in the literature that negative attitudes and perceptions toward multi-grade classes prevail, a review of the research reveals inconsistent results as to the effectiveness of either group in terms of scholastic achievement. Some research indicates that learners in multi-age classrooms demonstrate more positive attitudes toward school, greater leadership skills, self-esteem, increased pro-social attitudes and fewer aggressive behaviours, compared to learners in traditionally graded schools (McClelland & Kinsey, 2004; Joubert, 2013). Vincent (1999a) and Kinsey (2001) and Juvane (2007) assert that the reason for this small negative effect on achievement may lie in the more complex and difficult teaching situation that exists in multi-grade classes. A consistent factor that shows positive achievement outcomes for multi-age learners over same-age learners is the use of a developmentally appropriate approach to teaching, including team, cooperative group work, integrated curriculum and encouragement of interactions among learners. In light of the research reviewed and diverse findings, this research study examines what the case is in the rural schools sampled.

A structured programme, which is the gross motor development skills approach, was implemented and its influence on learner’s self-esteem, attitudes toward school, discipline and antisocial problems, and motivation, was investigated. Lack of support for educators seems to be the main problem in the implementation of the multi-grade strategy in classrooms. The result corroborates the statement by McClelland (2004) and several other researches that show higher scholastic achievement in multi-age classes. This research confirms many findings on the importance, and close relation between, scholastic achievement and gross motor development concerning the learning process of learners today. Learning is a progressive, constantly changing process that serves to enrich and expand understanding throughout life (Boon, 2007:8).

2.9.2 Socio-Economic Status (SES) and Learners' Home Context

Socio-economic status is one of the most researched and debated factors among educational professionals that contributes toward the scholastic achievement of learners. The preponderance of scholarly opinion is that the socio-economic status of learners affects the quality of their scholastic achievement (Farooq, et al., 2011). Above and beyond other demographic factors, the effects of socio-economic status are still prevalent at the individual level (Capraro et al., 2000; Åberg-Bengtsson, 2009; Lindström & Lindahl, 2011). The socio-economic status can be deliberated upon in a number of different ways; it is most often calculated by looking at parental education, occupation, income, and facilities used by individuals separately or collectively. Parental education and family socio-economic status levels have a positive correlation with the learner's quality of achievement (Mitchell & Collom, 2001; Jeynes, 2002; Farooq et al., 2011). Socio-economic status forms a significant part of this equation. Learners raised in poverty rarely choose to behave differently: they are faced daily with overwhelming challenges that affluent learners seldom have to confront. Learners from backgrounds of poverty adapt to sub-optimal conditions in ways that undermine good school performance. They face:

- Emotional and social challenges.
- Acute and chronic symptoms.
- Cognitive lags.
- Health and safety issues (Jensen, 2009:1).

The combination of these elements presents an intimidating challenge to academic and social success. The severity of these elements does not preclude success in school or life but a better understanding of these challenges points to action educators can take to help less-advantaged learners succeed. There is considerable evidence that learners from backgrounds of poverty are more likely to have impaired exposure to critical enrichment factors; resulting in sub-standard cognitive skills (Attar, et al., 1994; Jensen, 2009). Recent advances in the study of brain development show a particularly sensitive period when the brain is most able to respond to, and grow from, exposure to environmental stimulation. This window for optimal brain development extends from the pre-natal period to the first years of a learner's life.

While all learners are potentially vulnerable to a number of risk factors that can impede brain development during this sensitive period, a disproportionate number of learners in poverty are exposed to such risk factors (Yeung, et al., 2002). Poverty often drastically decreases a learner's chances of success in school. A learner's home activities, preferences and mannerisms should align with the immediate social world. In the case of rural areas of poverty such alignment does not occur: these learners are at a disadvantage in the school and, most importantly, the classroom. It is safe to state that learners who live at, or below, the poverty level have far less success educationally than learners who live above the poverty line (Van der Berg, 2003). Learners with high levels of socio-economic status tend to perform better than middle-class learners; middle-class learners perform better than learners with low levels of socio-economic status (Garzon, 2006; Kahlenberg, 2006; Kirkup, 2008).

The achievement of learners is negatively correlated with low socio-economic status of parents and hinders the individual in gaining access to sources and resources of learning (Eamon, 2005). Low socio-economic status levels strongly affect the achievement of learners, dragging them down to a lower level (Sander, 2001). It is observed that, economically, parents are less able to afford the cost of education of their learners at higher levels and consequently they do not work at their fullest potential (Rouse & Barrow, 2006).

The argument arises that a low socio-economic status has negative effects on the scholastic achievement of learners because the basic needs of learners remain unfulfilled and hence they do not perform better academically (Jensen, 2012). Learners living under poor socio-economic conditions often struggle to acquire positive attitudes due to limited access to social aspirations and mobility, and resources (Jensen, 2009). Such learners are part of a culture in which they are often left to be dependent on themselves for physical and emotional needs. According to Ali (2013:91) socio-economic considerations such as poverty have a negative influence on the holistic development of learners: something which has a detrimental impact on a learner's gross motor development. This study is located in a rural context (low SES) where poverty is rife.

In urban areas, especially amongst affluent parents, mercantilism and neo-liberalism with its fiscal imperatives are the drivers of exclusionary practices and marginalization – schools are competing for students whose parents are willing to pay high fees to schools who can promise ‘100% matriculation passes’.

Schools are reluctant to admit children at risk of ‘failure’ to the school. In order to keep their places in the league tables of ‘good’ schools, high schools are becoming exclusive in their selection processes. In rural areas the lowest quintile level schools cannot meet the social, educational or financial prerogatives presented. The gap between urban and rural marginalized multi-grade areas is widening. Rural learners whose educational establishments suffered the most under apartheid, were promised the greatest recompense but have in fact received the least and been the most neglected under a dispensation of hope (Chetty et al., 2017).

2.9.3 The ANA results of the Three Schools

Table 2.3: Annual National Assessment achievement scores in the three models schools for 2013.

SCHOOLS	Numbers of learners in sample	ANA		Grade Percentage	Total Percentage
		ANA 1 Home Language	ANA 2 Mathematics		
SCHOOL ONE	n=12	36.25%	19.45%		
	Grade 5 n=6	41.50%	18.60%	30.05%	27.85%
	Grade 6 n=6	31%	20.30%	25.65%	
SCHOOL TWO	n=22	36,10%	28,21%		
	Grade 5 n=12	40.80%	37.36%	39.08%	32.15 %
	Grade 6 n=10	31.40%	19.06%	25.23%	
SCHOOL THREE	n=16	34.85%	28.61%		
	Grade 5 n=10	37.50%	34.07%	35.78%	31.73%
	Grade 6 n=6	32.20%	23.15%	27.67%	

The detailed Annual National Assessment Interpretation for 2013 can be viewed in Appendix E.

As Table 2.3 illustrates, it is apparent that School 1 (n=12) has a significantly lower total percentage score (27.85%) on the ANA scores in comparison with School 2 (n=22) at (32.15%) and School 3 (n=16) at (31.73%). Table 2.3 further illustrates that School 1 has a significantly lower percentage score for Mathematics (19.45%) compared to School 2 at (28.21%) and School 3 at (28.61%) but has quite similar Home Language percentage scores at (36.24%) compared to School 2 at (36.10%) and School 3 at (34.85%).

School 1 (n=12)

Home Language was calculated at 36.25% and Mathematics at 19.45%. The overall percentage for both Grade 5 and 6 for Home Language and Mathematics combined percentage score was calculated at 27,85%.

School 2 (n=22)

Home Language was calculated at 36.10% and Mathematics at 28.21%. The overall percentage for both Grade 5 and 6 for Home Language and Mathematics combined percentage score was calculated at 32.15%.

School 3 (n=16)

Home Language was calculated at 34.85% and Mathematics at 28.61%. The overall percentage for both Grades 5 and 6 for Home Language and Mathematics combined percentage score was calculated at 31.73%.

School 1 (n=12) showed a significantly lower total percentage score 27.85% on the combined ANA scores in comparison with School 2 (n=22) at 32.15% and School 3 (n=16) at 31.73%. School 1 showed a significantly lower percentage score for Mathematics 19.45% compared to School 2 at 28.21% and School 3 at 28.61% but has quite similar Home Language percentage scores at 36.24% compared to School 2 at 36.10% and School 3 at 34.85%. The ANA results appear to support the assertions in the literature that low SES and poor socio-economic conditions are related. Given the compounded problems of such areas, this study seeks to investigate whether a gross motor skills development programme can affect the motivation and produce positive attitudes among the participants, with a contention that positive attitudes and motivation may influence scholastic achievement and a positive outlook on life.

2.9.4 Access to Schools

Physical access to school remains a problem for many learners in South Africa, particularly those living in more remote areas where public transport to schools is lacking or inadequate and where households are unable to afford private transport for learners to get to school (Branson et al., 2014). A number of rural schools have closed since 2002, making the situation more difficult for learners in these areas. Nationally, the number of public schools dropped by 9% (over 2,000 schools) between 2002 and 2013, with the largest decreases in the Free State, North West and Limpopo. Over the same period, the number of independent schools has risen by 426 (37%) (Gustafsson, 2011). Close to three quarters, 72% of South Africa's learners walk to school, while 8% use public transport. Only 2% report using school buses or transport provided by the government. The vast majority, 84%, of white learners are driven to school in private cars, compared with only 11% of Black learners (Hall et al., 2016:24-28). These figures illustrate a pronounced disparity in child mobility and means of access to school.

Access to schools and other educational facilities is a necessary condition for achieving the right to education and breaking the cycle of poverty. A school's location and distance from home can pose a barrier to education. Poor roads, transport that is unavailable or unaffordable, and dangers along the way, hamper access to schools.

Risks may be different for young learners, for girls and boys, and are likely to be greater when learners travel alone. For learners who do not have schools near to their homes, the cost, risk and effort of getting to school can influence decisions about regular attendance, as well as participation in extramural activities and after-school events. Those who travel long distances to reach school may have to wake very early and risk arriving late or physically exhausted, which may affect their ability to learn. Walking long distances to school leads to learners being excluded from class or makes it difficult for them to attend school regularly (Hall et al., 2016).

2.10 Conclusion

In South Africa, there is still no formally recognised multi-grade teaching curriculum. Multi-grade learners have to be taught within the confines of the national curriculum of mono-grade schooling. Learners are expected to use the same textbooks used in mono-grade classes.

In South Africa, as in many other countries, the national curriculum is graded and lacks both flexibility and integration. The teacher is the key factor in the determination of the success of multi-grade teaching. As such there is a need for special educator training for multi-grade teaching.

However, in South Africa the researcher is not aware of any training specifically designed for multi-grade teaching except the Advance Certificate of Education course offered by the Cape Peninsula University of Technology and a short course in Multi-grade Teaching Methodologies and Assessment in Schools at the University of South Africa. Only mono-grade educators are currently receiving structured tuition: assuming quite incorrectly that such educators will automatically be able to teach in multi-grade schools. No undergraduate teacher education programmes specifically for multi-grade education are offered at any institution in South Africa.

CHAPTER 3: LITERATURE REVIEW, PART 2: GROSS MOTOR DEVELOPMENT



Learners Running and Clearing Agility Hurdles (Photo Credit: G.F. Joubert).

3.1 Introduction

Motor skills are motions carried out when the brain, nervous system and muscles work together. Fine motor skills are defined as small movements, such as picking up objects or holding a spoon, that depend upon use of the small muscles of the fingers, toes, wrists, lips, and tongue. Gross motor skills are larger movements, such as rolling over and sitting, that depend on large muscles in the arms, legs, torso and feet. Gross motor development comprises the improvement of the coordination of these muscles for efficient movement: e.g. writing and drawing (Joubert, 2011:21).

Development of fine and gross motor skills is important for childhood growth and play. Along with social and cognitive skills, developing fundamental motor skills facilitates building a foundation of healthy habits such as regular physical activity, release of emotional stress and scholastic achievement (Engle & Black, 2008). Fine and gross motor skills are essential for healthy development. Studies suggest that learners in lower socio-economic status families present a delay in the enhancement of such essential motor skills and are at risk of poor motor skill development.

Research indicates that low socio-economic families are more likely to produce learners who experience stunted development; sometimes due to poor prenatal care, substance abuse, inadequate nutrition, high exposure levels and insufficient access to health care (Bradley & Corwyn, 2002:371-399; Jensen, 2009). Delays in development contribute to substantial achievement disparities in school readiness that often occur in low SES learners when compared to socio-economic status peers (Welsh et al., 2010:43-53). Engle and Black (2008:243-256) demonstrate that achievement gaps created in early childhood tend to persist and are even exacerbated over time. This pattern suggests that development of fine and gross motor skills is vital in fostering academic success, cognitive development and social skills. Providing essential physical activity and motor development opportunities to learners of all SES can help to improve their motor function and development. This is significant as learner's physical development can impact cognitive development and future academic success (Sprague et al., 2013:1).

Removing play from early childhood classrooms may actually undermine intended achievement-oriented outcomes. Play enhances attention, memory, self-regulation, and overall academic achievement throughout childhood (Castelli et al., 2007). Learner's motor development has been found to be a powerful predictor of cognitive abilities in the elementary years (Piek et al., 2008). Early gross motor abilities (but not fine motor skills) have been associated with several cognitive processes that are fundamental for academic learning. The most predominant theory is that movement facilitates the development of new networks (synapses) among brain cells and the overall organization of the brain (Rakison & Woodward, 2008).

Learners who engage in frequent and high quality play including active motor play on the playground, have been found to be advanced in memory, information processing and other cognitive abilities necessary for learning (Piek et al., 2008). Some research shows a direct connection between play and achievement in mathematics and reading in the elementary years (Castelli et al., 2007). Such an argument should cause school personnel to rethink the strategy of reducing play to increase passive learning.

Typically, low socio-economic status learners have less developed motor skills and are at risk of delays in other aspects of development. Lejarraga et al. (2002) examined the psycho-motor development of 3,573 boys and girls, aged 1-6 years in Argentina. Results indicated that higher social class and educational levels of parents, especially regarding the mother, were related to better psychomotor performance in learners over 1 year of age. The researchers noted that the observed phenomenon of lower social class correlation to better scores in developmental tests during infancy was caused by indigenous child upbringing practices that have a positive influence on development, such as nursing and close contact between an infant and its mother. It is believed that a permissive, accepting family environment contributes to a learner's successful motor development. Learners from lower social classes perform more poorly than those from the middle classes when tested in motor development assessment batteries (Giagazoglou et al., 2005). A number of explanations for the lower class learner's poor performance may be offered.

Gross motor problems are related to poor pre- and post-natal nutrition, which affects the central nervous system. Not only nutrition retards growth. Deprived, non-stimulating environments and Foetal Alcohol Syndrome (FAS) (in some cases) can be determining factors as well.

The United Nations Inter-agency task force on sport for development and peace agrees that the practice of sport is vital to holistic development of learners; fostering their physical and emotional health and building valuable social connections (WHO, 2010; Hardman et al., 2014:84). Sport offers opportunities for play and self-expression, beneficial especially for those young individuals with few other opportunities in their lives. Not only do physical education programmes promote physical activity but there is evidence that such programmes correlate to improved scholastic achievement (WHO, 2010).

Despite recognition of the positive impact sport has on education and child development, physical education is being increasingly marginalized in the South African education system. This includes a decrease in the amount of time allocated to physical education, the number of specially trained staff, the amount of training for physical education teachers and spending on resources needed to participate in sport, physical activity and games in school. The state of South African schools and the relation between physical/academic activities can be held accountable in the complex social South African school community.

Lack of trained physical education teachers and exclusion of physical education from the school curriculum over the last 20 years has had a substantially negative physical influence on state learners in South African schools.

3.2 State of Physical Education in South African Schools

Generally, there are two schools of thought around the status of Physical Education. The first school of thought holds the view that Physical Education should form an essential part of the core curriculum. The other is that Physical Education, while important to the child's development, is regarded as being of secondary importance to the core curriculum, especially when an institution aims to improve its poor academic performance (Gabbard, 2000:19; Joubert, 2011). Elimination of physical education programmes is one of the factors that contributed to the reduction in physical activity among the youth.

Serious and sustained efforts were made to offer the subject in the pre-apartheid era. But, due to the apartheid legislation that privileged only a white minority, the largest section of the population received little to no finance, equipment, facilities or well-trained teachers to teach physical education (De Ridder, 2014).

De Ridder (2014) asserts that physical education is in an unacceptable state and neglected in South African schools generally. He declares that for the future, the shortage of finance, human and physical resources will offer the greatest challenges: a situation further complicated by decreasing budget provisions and the education crisis in South Africa. Well-considered programmes of physical education can positively contribute to the health, social and economic environment of the country and its people. De Ridder (2014) argues that physical education is an important investment in the field of health: in the long-term it can strongly influence the lives of children in this country. During apartheid the physical education curriculum was perpetuated by race, class, gender and ethnicity.

Ever since 1994, due to increased pressure to increase student achievements, the opportunities for children to engage in physical activity at school have dwindled. Therefore the two models used to date in South African schools, pre- and post-apartheid, were not successful. McGee and Richgels (2003) assert that a particular combination of factors produces children who are at most risk – in particular, if the child is of a minority status, and from a low socioeconomic context where his home language is different from the language of instruction in school. Therefore the communication and understanding between learner and teacher is imperative with regards to the understanding and know-how of commands given by the teacher in Physical education lessons. The situation of physical education teaching in South Africa has reached a point beyond crisis. There are historical reasons for this situation that are largely ignored by policy shapers (Cleophas, 2014:1).

After the termination of the apartheid education system, Physical Education, a stand-alone school subject, was reduced to a learning outcome of Life Orientation. The process had a political, as well as an educational undercurrent. With the latest curriculum reform efforts, it is again an issue of Physical Education not being granted the status of a stand-alone subject. The way forward would seem to be a combined effort between the Department of Basic Education and Higher Education Institutions, as well as other stakeholders in South Africa (Van Deventer, 2011:824-841).

It is disastrous to reveal that the Department of Education does not have the capacity to deal with the situation regarding appropriately qualified teachers for Life Orientation in all the grades of the National Curriculum Statement. Various factors, such as politics and finances, could have hampered the process of training existing teachers to become specialised in teaching all the learning outcomes of Life Orientation (Van Deventer, 2011:144). The result was bad practice, and in most cases no practice at all. Many government initiatives tried to intervene but neglected to focus on the curriculum. Of course, poor curriculum development goes hand in hand with bad teacher training and poor curriculum delivery in the classroom (or sports-field or gym) (Cleophas, 2014).

Children in low income families also are found in print deficient environments, and their parents are also less likely to promote book reading or have the types of communication that facilitate literacy development as required by schools (Hoff, 2006:68-78). Willenberg (2007:20-28) also asserts that much of a child's literacy develops before she enters formal schooling, and those nascent literacy skills at school entry are often clear indicators of literacy in the later years as well as the level of academic achievement. Given that the low literacy levels are regarded as the product of context, environment, or socio- economic background, it can be argued that the children under these influences may be powerless, have very limited choice to change the situations they are in, or not even aware of the factors which impinge upon them. Thus, research in most cases, is examining the phenomenon of low literacy after the fact, that is, a posteriori. The effort to improve the child's literacy appears to fall squarely on the shoulders of the teacher once the child enters school (Chetty et al., 2017).

3.3 The Key Motor Foundations of Learners

The motor foundation model for learners with regards to movement can be illustrated as follows by Figure 3.1. The four foundation elements of movement are: Bio Motor, Gross Motor, Psycho-Motor and Ideo-Motor. Gross Motor movement forms the main focus for this research. The following model illustrates how these four foundations work together.

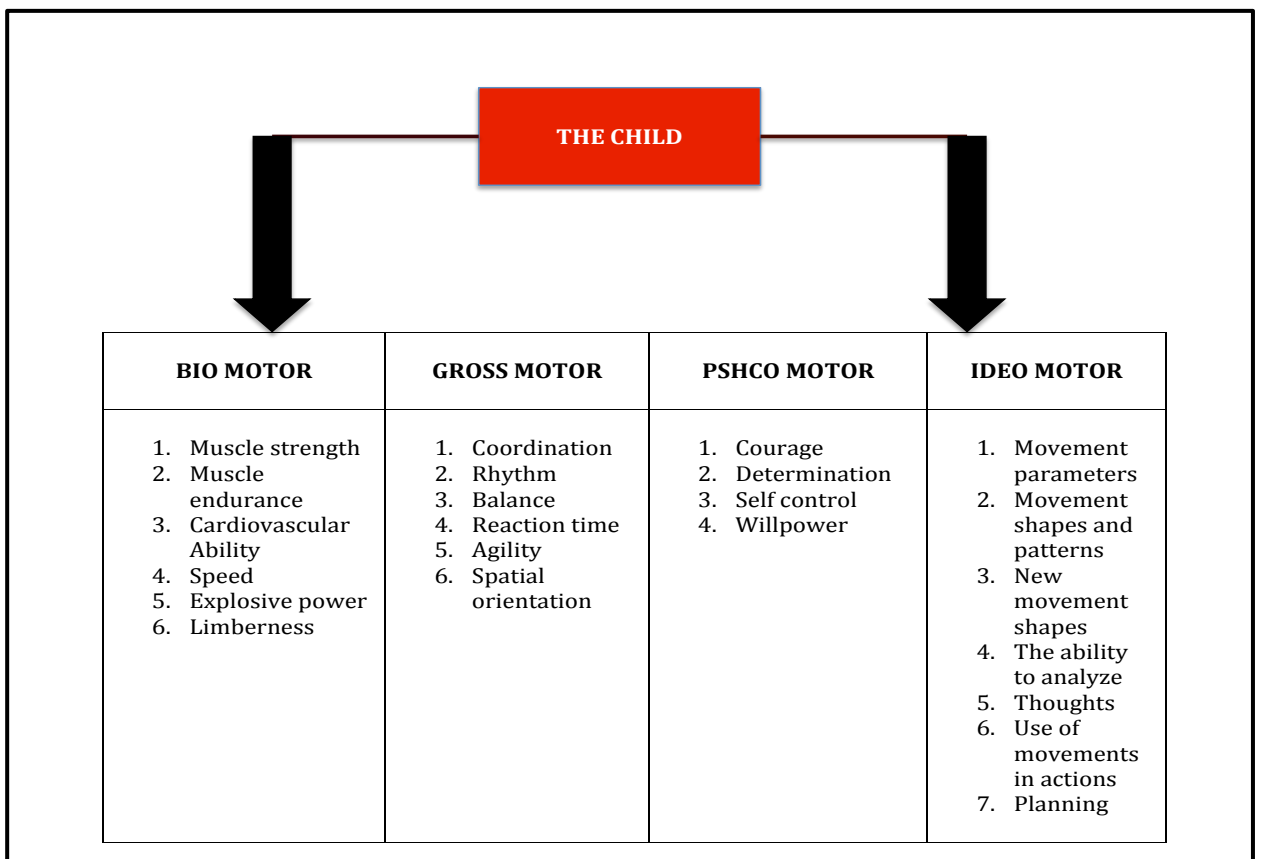


Figure 3.1: The Motor Foundation Model for Learners with regards to Movement.

3.3.1 Bio-Motor Foundation

The law of specificity states that there is a specific response to the nature of a training load. This specific response tends to emphasise one or more of the abilities that make up overall physical fitness. These abilities are basic and respond well to training. Since these abilities affect how the body moves, they are termed bio-motor abilities.

3.3.2 Gross Motor Foundation

Gross motor foundation can be divided into the following six areas: coordination, rhythm, balance, reaction time, agility and spatial orientation.

i. Coordination

Motor coordination is a combination of body movements created with the kinematic (such as spatial direction) and kinetic (force) parameters that results in intended actions.

Motor coordination is achieved when subsequent parts of the same movement, or the movements of several limbs or body parts, are combined in a manner that is well-timed, smooth and efficient with respect to the intended goal. This harmony involves integration of proprioceptive information detailing the position and movement of the muscle and skeletal system with the neural processes in the brain and spinal cord, which control, plan and relay motor commands. The cerebellum plays a critical role in this neural control of movement. Damage to this part of the brain or its connecting structures and pathways impair coordination, creating a condition known as ataxia (Haefner, 2010:7).

ii. Rhythm

Rhythm denotes periodicity; in other words, a pattern repeated regularly in time (Patel, et al., 2006; Patel, 2006).

iii. Balance

Balance is considered to be a fundamental gross motor skill, since all gross motor skills require some element of balance. Proper development of static and dynamic balance skills is considered essential in development of gross motor skills (Du Toit & Pienaar, 2001:51-62).

Knight and Rizzuto (1993:1296) and Breytenbach (2013) define dynamic and static balance as follows:

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.'

iv. Reaction Time

Reaction time is the elapsed time between presentation of a sensory stimulus and subsequent behavioural response. Reaction time indicates how fast the thinker can execute the mental operations needed for the task. The behavioural response is typically a button press but can equally be an eye movement, a vocal response, or some other observable behaviour (Haefner, 2010:8).

v. Agility

Agility is rapid whole body movement with change of velocity or direction in response to a stimulus (Sheppard & Young, 2006:919-932).

vi. Spatial Orientation

Spatial awareness is the ability to work within one's own space, an area one-arm's length around in all directions. This skill affects handwriting and all gross and fine motor work: it combines with hand-eye coordination and centre-line skills to influence all copy work (Haefner, 2010:10). A learner's development is founded upon various related domains; all of which are influenced by biological, social and environmental factors that are vulnerable to favourable or adverse situations.

3.3.3 Psycho-Motor Foundation

Psycho-motor foundation focuses on multi-part physical and cognitive skills acquired in coordination with each other. As a result, it consists of physical, emotional, cognitive and social aspects of learning. The major goal of this foundation is to promote development of psychomotor skills for all circumstances. The five phases of the process of learning are fundamental and useful:

1. Obtain knowledge of what should be completed: why, in what order, and how.
 2. Accomplish the actions, in order, for each part of the procedure.
 3. Transfer power from the eyes to the kinaesthetic or other senses.
 4. Automate the skill and talent (through repetition).
 5. Generalise the skill to wider application and purpose.
- (Reigeluth, 1999:1; Lee, 2011:1-2).

3.3.4 Ideo-Motor Foundation

A framework for action planning, termed ideo-motor foundation, suggests that perceptible effects represent actions: any activation of the effect, either endogenously or exogenously, triggers a corresponding action (Kyoung et al., 2010). Bradley et al. (2001) extend that general idea; stating that those situations seem to have greater impact during the first few years of postnatal life.

Those first years mark intense biological maturation and behavioural change, especially in motor behaviour (Adolph & Berger, 2006; Piek, 2006). Attraction to this area of research is due in large part to acknowledgement that the specific level of motor development is a critical factor in learner behaviour (Adolph & Berger, 2006; Schonner & Thelen, 2006; Spencer et al., 2009). For example, research indicates that certain aspects of motor ability are associated with cognitive ability (Murray et al., 2006; Piek et al., 2008). To illustrate, Murray et al. (2006) identified a significant linear relation between age of learning to stand and adult categorization. The earlier the attainment of the milestone, the better was the categorisation. The authors argue that there is a perceptible link between early gross motor development and adult executive function.

Constant motor development stimulation can aid and promote motor improvement. Motor development programmes can enhance underdeveloped motor performance and stimulation of gross motor development concerning bio-motor, gross motor, psycho-motor and ideo-motor development (Nel, 2002:5). Among young learners, those factors exert a greater influence than community facilities such as libraries or parks (Klebanov et al., 1998). Pagani et al., (2010) state that findings in their research suggest that motor skills make a unique contribution to later learner literacy (reading and writing) and overall academic performance.

Finally, research showed that certain cognitive (e.g. number knowledge), behavioural, and motor skills in kindergarten were positively associated with later classroom and school engagement in Grade 4. By contrast, hyperactive behaviours predicted lower levels of classroom and school engagement in Grade 4. Piek et al., (2008) studied whether information obtained from measurement of motor performance taken over a four-year period in infancy and early childhood predicted motor and cognitive performance of learners once children reached school-going age. The researchers found a strong positive relation between early gross motor ability and later school-aged cognitive development, especially processing speed and working memory.

Complementing those findings, it has been suggested that early motor development may act as a 'control parameter' for further development, in that some motor abilities may be a prerequisite for the acquisition or practice of other developmental functions such as perceptual or cognitive ability (Adolph & Berger, 2011).

Motor behaviour of the developing infant is shaped by a combination of environmental, organisational, physiological and genetic factors. Of the various factors comprising the environment, few would disagree that the home is a primary agent for learning and developing the foundation for positive life-long behaviours, especially during the early years (Son & Morrison, 2010 & Iltus, 2006). Numerous studies pertaining to development of motor skills and self-esteem among young learners focus on improvement of motor skills through physical activity, and the relation between physical performance and self-esteem (Corbin, 2002:128-145). According to Rose & Larkin, (2002:127-141), there is an active interaction between motor skill competency and self-esteem in the young child (2 to 10 years): the results of numerous studies support this claim (Miyahara & Wafer, 2004:281-301; Joubert, 2011).

Major studies designed to assess general characteristics of the home and the relation to later behaviour have reported that one of the most notable and consistent findings has been availability of stimulating play materials as a predictor of future mental behaviour. Abbott et al. (2000) conclude that the home environment is primary within the host of sub-systems that contribute to infant motor development.

3.4 The Health and Cognitive Benefits of Gross Motor Development and Physical Activity

Engaging in gross motor development programmes has multiple health benefits: as illustrated in Figure 3.2. Physical activity can reduce the risk of dying prematurely from non-communicable diseases as well as developing illnesses ranging from cardiovascular diseases, cancer and diabetes to stress, anxiety and depression. Physical activity prevents and reduces hypertension, controls body weight, prevents and controls osteoporosis and manages chronic pain (WHO, 2010).

While it is critical that everyone regularly participates in sport and physical activity, regardless of age, ability, gender or background, physical activity provides additional benefits to certain groups, for example:

- Among young individuals, physical activity contributes to the growth and maintenance of healthy bones, efficient heart and lung function, and improved motor skills and cognitive function.

- Among women, physical activity helps prevent hip fractures and reduces the effects of osteoporosis.
- Among older individuals, physical activity enhances functional capacity, helping maintain quality of life and independence. Recommended levels of physical activity should be established (United Nations, 2003:14, WHO, 2010).

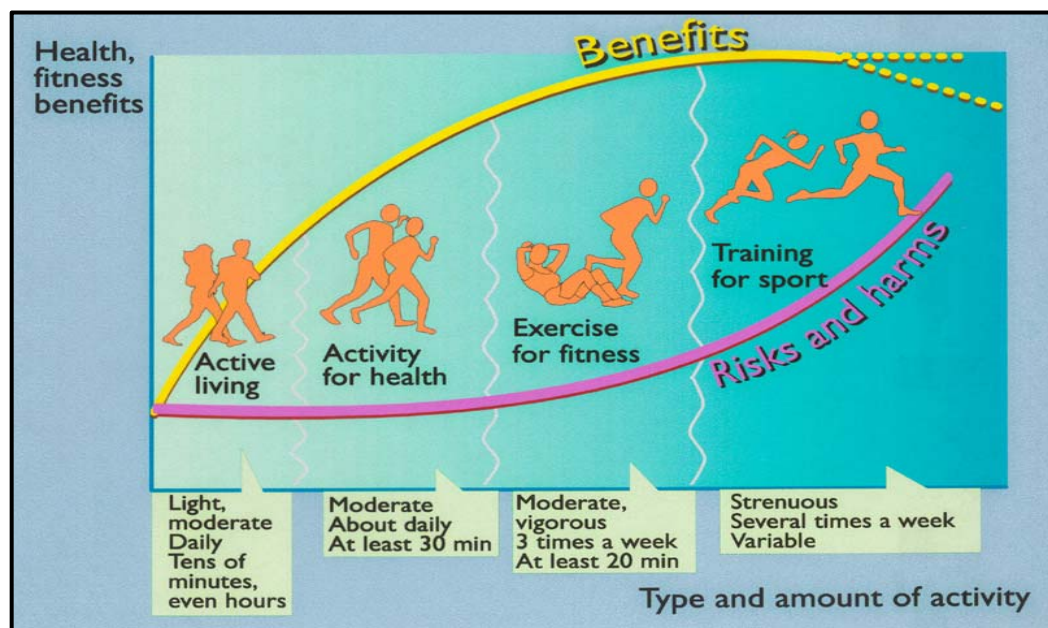


Figure 3.2: The Type and Amount of Activity Model (United Nations, 2003:14).

Longitudinal studies into pre-school learners found a relation between early gross motor skills and later cognitive function (Son & Meisels, 2006; Piek, Dawson, Smith & Gasson, 2008), suggesting that early school gross motor skills assessment may increase the predictability of later achievement and the probability of identifying learners at risk of school failure (Son & Meisels, 2006). The relation between physical activity and physical fitness with scholastic achievement has been thoroughly explored (Grissom, 2005; Coe et al., 2006; Etnier et al., 2006; Ahamed et al., 2007; Castelli et al, 2007; Carlson et al., 2008; Trudeau & Shephard, 2008; Chomitz et al., 2009; Eveland-Sayers et al., 2009; Fox et al., 2010).

Motor skill development of learners combines many body systems, including muscular-skeletal, cardio-respiratory, neurological and sensory systems (Dwyer et al., 2009), as well as the learner's aptitude to interact with the environment (Riethmuller et al., 2009).

The status of gross motor skills at younger ages relies on current and future aids associated with the acquisition and maintenance of motor proficiency (Lubans et al., 2010). Consequently, the study of a learner's gross motor development is a prerequisite for the full understanding of the learner's whole development. An appropriate gross motor skill level is important for resilient general physical development, as well as for health, psycho-social development and well-being (Piek et al., 2008; Haga, 2008).

Childhood is a critical period for development of these skills, which are considered building-blocks for more complex movements (Clark & Metcalfe, 2002) and represent a key factor in the promotion of life-long active lifestyles (Clark, 2005; Stodden et al., 2008). Of late, the debate has re-emerged around possible relations between physical activity, physical fitness, gross motor skills and cognitive development (Tomkinson & Olds, 2007; Knuth & Hallal, 2009 and Niederer et al., 2011), as well as about the pressure of schools and parents to improve cognitive performance (Ertl, 2006; Chomitz et al., 2009).

3.5 Gender Differences in Gross Motor Development

Substantial debate exists in the literature concerning the manifestation and importance of gender differences in gross motor skills among learners (Venetsanou & Kambas, 2011). Males are consistently reported as more physically active than females; regardless of age or measure. Often, this difference results in females being identified as under active and at risk of long-term poor health outcomes (Hands et al., 2016:3). Results of numerous studies show marked differences between genders in gross motor skills of learners (Lejarraga et al., 2002; Hallal et al., 2012:245-257).

These authors argue convincingly that boys generally prove to be superior in skills requiring strength and speed, while girls are often superior in balance and certain coordination skills. In contrast several researchers report no significant differences between preschool boys and girls (Pollatou et al., 2005; Venetsanou, 2007; Kourtessis et al., 2008; Waelvelde et al., 2008; Kirk & Rhodes, 2011). Reasons for gender differences are mainly considered to be related to environmental factors and biological composition (Barnett et al., 2009). The nature of play and the social style that boys and girls engage in tends to be stereotyped.

Gender differences in motivation and attitudes, combined with varied parent expectations manifest as a range of play and activity patterns among children (Barbu et al., 2011; Goble et al., 2012). Boys' games are generally more boisterous and involve speed, strength, endurance, and aggression. On the other hand, girls play less vigorously and are more likely to compete relationally, engage in play parenting (Byrd-Craven & Geary, 2007) and focus on turn-taking, orderly sequences, partial involvement or solitary activities. Gender differences exist in the benefits of different levels of physical activity specific to a range of poor health outcomes and therefore the differences in response to physical activity may be explained by biological differences between males and females (Hands et al, 2016).

Research reports that socio-economic and cultural differences play a significant role in children's motor development (Hadders-Algra, 2000; Uys & Pienaar, 2010). Studies found that children from impoverished socio-economic circumstances usually receive quantitatively less stimulation than children do from more privileged social backgrounds and that this distinction contributes to poorer development (Hadders-Algra, 2000; Goodway & Branta, 2003). Since the primary sports in South Africa are ball sports played predominantly by males (rugby, soccer and cricket), this traditional preference could influence gender differences in the gross motor skills of young learners in this country.

However, the identification of motor performance differences should only be the first step. Its application in education is the second and perhaps the most vital one. Movement skills assessment is critical for the educational process, providing valuable information in order for the movement activities to be planned according to the individual needs and capacities of each child (Venetsanou & Kambas, 2011).

3.6 Conclusion

Assessment and evaluation in the education and health fields are interlinked. Given that the South African National Department of Basic Education is under pressure to achieve academic success for all learners, identifying key indicators of educational achievement and health may permit educators and policy makers to make informed decisions (Lloyd et al., 2010).

Better understanding of the interdependent relations between gross motor development, scholastic motivation and attitudinal changes that develop when learners are actively involved in gross motor development programmes is imperative for ensuring the appropriate assignment of resources as well as the conduct of programmes to advance learners' health-related behaviours.

CHAPTER 4: RESEARCH METHODOLOGY



Purpose of the Idea (Photo Credit: G.F. Joubert).

4.1 Introduction

Research design refers to the whole methodical strategy of how a particular research project is to be completed; from data collection to analysis. According to Jalil (2013) research design refers to the logical structure of the research plan which explains the purpose of the research, states the research questions and describes how information is to be obtained; including the expected limitations of the methodology. This study investigates the question: 'How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school?'

This study relies and draws upon elements from design research combined with a transformative approach. The first output associated with design research comprises high quality interventions (such as programmes, products and processes) designed to solve complex educational problems. The second output of design research is the accompanying set of well-articulated design principles (Van den Akker, 1999; Linn et al., 2004) that provide understanding in the following areas:

- Purpose/function of the intervention;
- Key characteristics of the intervention (substantive emphasis);
- Guidelines for designing the intervention (procedural emphasis);
- Implementation conditions; and
- Theoretical and empirical arguments for the characteristics and procedural guidelines.

The quantitative and qualitative sections of this research study employed a transformative mixed method design with a pre- and post-test for measurement of change (Gross motor development changes). A quantitative study was used because the researcher had to collect data from the IMAD+ battery. The second part consisted of a qualitative study that was conducted in order to explain the concepts exposed in the quantitative section of this study. Using a transformative, mixed method design (which acknowledges that knowledge is not neutral) allows the researcher to explore and explain the phenomenon identified in the quantitative section of this research study. The researcher used reflective journals, observations and face-to-face interviews to gather qualitative data from three schools selected for this study.

The study was located in the rural Western Cape of South Africa and examined the effect of gross motor development on lives of learners from a rural multi-grade environment. The following key research question was asked: **How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school?**

4.2 Mixed-Method Research

The fundamental purpose of mixed methods research is to test a certain research question from any significant viewpoint; making use, where suitable, of previous research and/or more than one kind of investigative viewpoint. Occasionally, specified as multiple methodology, mixed methodology, or multi-methodology research, mixed methods research combines the best of both worlds. In-depth, contextualized and natural elements of qualitative research, though more time-consuming, are combined with the more effective but less rich or convincing predictive power of quantitative research. These mixed methods are more inclusive than attacking a problem from one viewpoint only. Development of fresh approaches and more advanced tools for mixing these different types of data permit a range of interdisciplinary possibilities (Lieber & Weisner, 2010:559-579).

4.2.1 Definition of Mixed-Method Research

A mixed methods research design is a procedure for collecting, analysing and mixing both quantitative and qualitative research and methods in a single study to understand a research problem (Creswell et al., 2011).

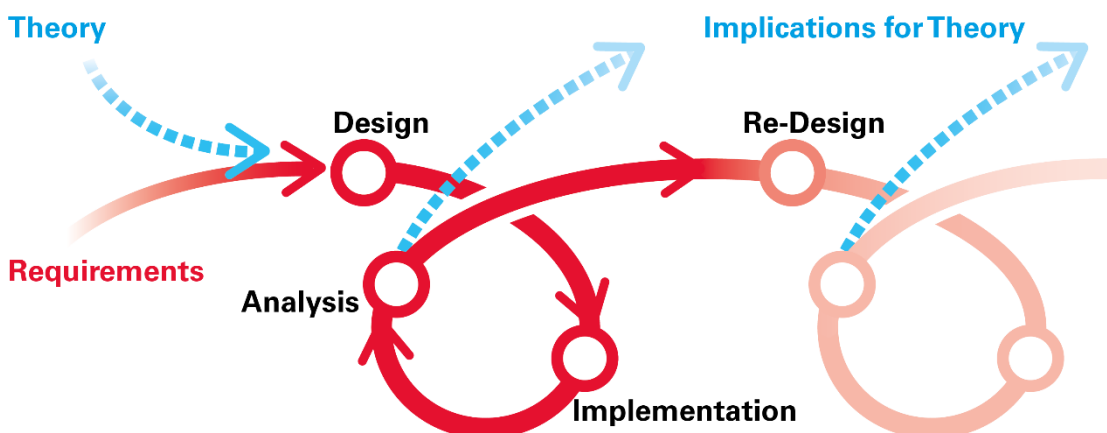


Figure 4.1: Design based research as an ongoing process of innovation (Fraefel, 2014).

4.2.1.1 The Transformative Research Paradigm

The transformative paradigm represents a worldview, and its supplementary philosophical indices that have been established from the writings of academics of diverse ethnic and racial groupings. Evaluators work in a challenging domain laden with diverse values and associated with real-life implications for resource allocation (Mertens et al., 2009).

These characteristics of the evaluation landscape differentiate it from traditional social science research and at the same time connect it with the work of transformative scholars. The transformative paradigm's basic beliefs are that knowledge is not neutral: human interests influence it. All knowledge reflects power and social relations within society (Mertens et al., 2009). This philosophical understanding of the nature of knowledge invites a fuller understanding of the predicament of multi-grade education: appreciating socio-economic-historic factors that have produced an achievement lag of almost two years for a number of learners in rural schools; the sites relevant to this research. Medical issues such as poor health, weak eye-sight, decayed teeth and malnutrition are common problems.

Most of the learners in rural schools are from underprivileged backgrounds, and have no transport to school; a right available only to those who live more than 5 kilometres away from school. For young learners, this regulation causes hardship; particularly during cold and wet winter where illness and absence are more frequent. Absence from school contributes to being suspended from school by the school authorities, further worsening a lack of understanding of subjects taught at school, and contributing to failure and the need to repeat a grade. Joubert (2009) asserts that almost 25% of learners in rural disadvantaged multi-grade environments in South Africa may be identified with a learning disability, which seriously compounds the problem. A transformative design is appropriate to such social contexts and issues being researched in this investigation.

A design that goes beyond the basic mixed methods approach forms when researchers conduct mixed methods research using a theoretically based framework, such as in a transformative worldview. A transformative-based theoretical framework advances the needs of underrepresented or marginalized populations.

It involves the researcher in taking a position, being sensitive to the needs of the population being studied, and recommending specific changes as a result of the research to improve social justice for the population under study (Creswell et al., 2011). Some researchers discount ideological perspectives as a criterion for classifying mixed methods designs. They argue that mixed methods design relates more to the content purpose of the study than the methods or designs of the study (Tashakkori & Teddlie, 2003). Other scholars, however, have included transformative designs among the major mixed methods designs. Greene & Caracelli, (1997) and Mertens et al., (2009) specifically discuss ways in which a transformative perspective influences every stage of the research and design process. We seldom find researchers planning and naming their designs in ways that reflect the importance that they place on the use of a transformative perspective.

4.2.1.2 Challenges in Using Transformative Design

Transformative design shares procedural challenges associated with the corresponding basic mixed methods designs. In addition, the transformative design has further challenges. There remains little guidance in the literature to assist researchers with implementing mixed methods in a transformative way. One way to proceed is to review published mixed methods studies that employ a transformative lens (Sweetman et al, 2010). To justify the use of the transformative approach, explicit discussion of the philosophical and theoretical foundations is undertaken as part of this study proposal and report.

4.3 Transformative Mixed-Method Design Matrix

Figure 4.1 explains a transformative mixed-method design matrix used by the researcher in this study: as illustrated by this schematic description of the methodology. Fifty participants were sampled for this study (to be elaborated under 4.3.1). The researcher collected pre- and post- IMAD+ gross motor development scores and Annual National Assessment (ANA) results for each of the 50 samples. The ANA results were used only as an indicator for where these schools find themselves with regards to home language and mathematics in comparison to the Western Cape and the rest of South Africa. Face-to-face interviews have been included in the qualitative section of the research to grant more depth to the attitudinal and motivational changes that occur after completion of the IMAD+ gross motor development programme.

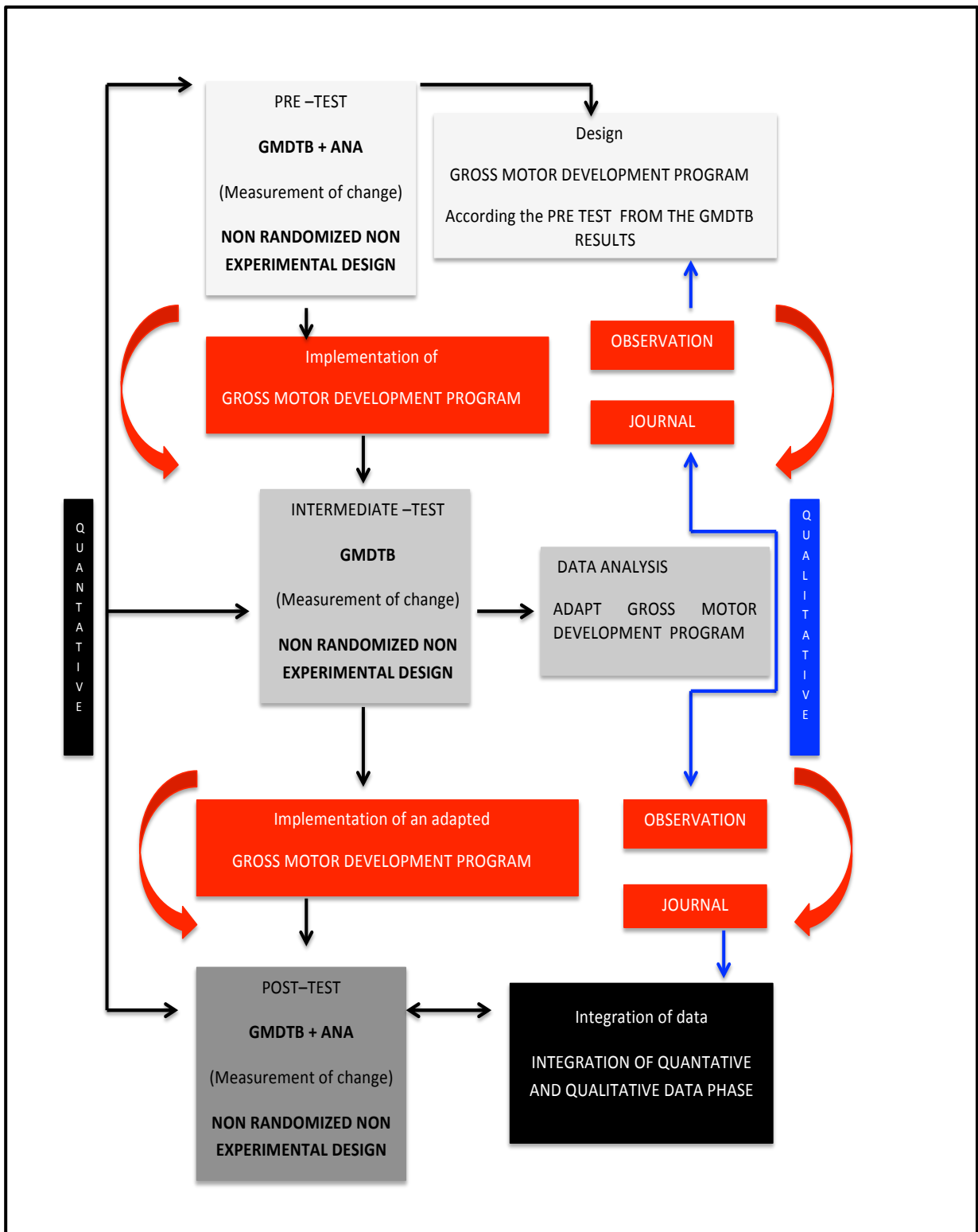


Figure 4.2: Transformative Mixed-Method Design Matrix (Own Illustration).

4.4 Quantitative Research Phase

The quantitative section of this research study used a transformative, mixed-method design for the pre- and post- test measurement of change (Gross motor development changes and scholastic achievement changes). It comprises a Gross Motor Development Test Battery (IMAD+) (refer to Appendix C) Annual National Assessment (ANA - 2013). The purpose of this section is to discuss the instruments, the statistical analysis and description of the descriptive statistics.

4.4.1 Sampling

Theoretical or purposive sampling is a set of procedures by which the researcher manipulates data generation, analysis, theory and sampling activities interactively during the research process, to a much greater extent than in statistical sampling (Cohen et al., 2011:4). A purposive sample was used to select all learners in Grades 4-6 in the three marginalized multi-grade schools. Purposive sampling was used because it allowed selection of a specific number of schools and testing of all learners in those selected schools (Cohen et al., 2011:5). Data were collected from one school from each of the three Western Cape rural educational districts that border the Cape Metro.

In all three schools the CMGE had an academic research/training and support partnership that made access to the schools easier for the researcher. The three districts included the West Coast (Hopefield), Cape Winelands (Wellington) and Overberg (Grabouw). All 50 respondents were in grades 4–6. All 3 of these schools operate from the same milieu: a multi-grade educational environment. All learners in the three Grades were chosen and identified purposefully. Since this was a multi-grade class, all three grades were in the same class.

4.4.2 Populations of Learners in Sample Schools

Table 4.1: Populations of Learners in Sample Schools (Grabouw, Wellington, Hopefield).

SCHOOLS	Numbers of learners in sample	Gender		Age Range In years	Area
		Boys 30	Girls 20		
SCHOOL ONE	12	8	4	9 -13	Grabouw
	Grade 4 6	6	0	9 -12	
	Grade 5 6	2	4	11-13	
SCHOOL TWO	22	13	9	9 -15	Wellington
	Grade 4 12	6	6	9 -15	
	Grade5 10	7	3	10 -13	
SCHOOL THREE	16	9	7	8 -13	Hopefield
	Grade 4 10	6	4	8 -10	
	Grade5 6	3	3	10 -13	

Total: n=50

Exploratory Analysis of Sample Schools

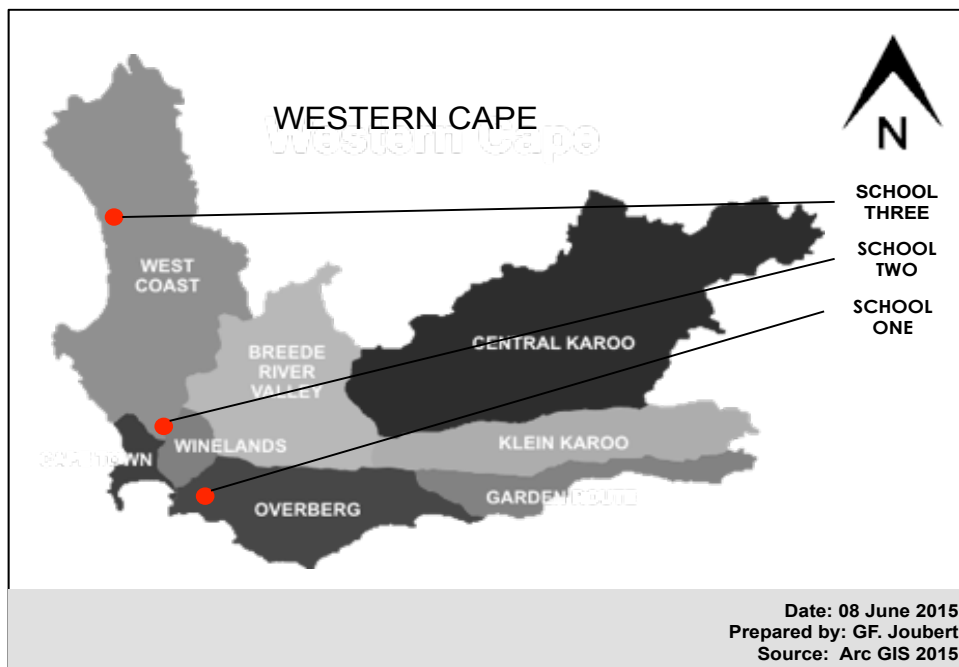


Figure 4.3: Geographical Location Map 1 for Schools One, Two and Three.

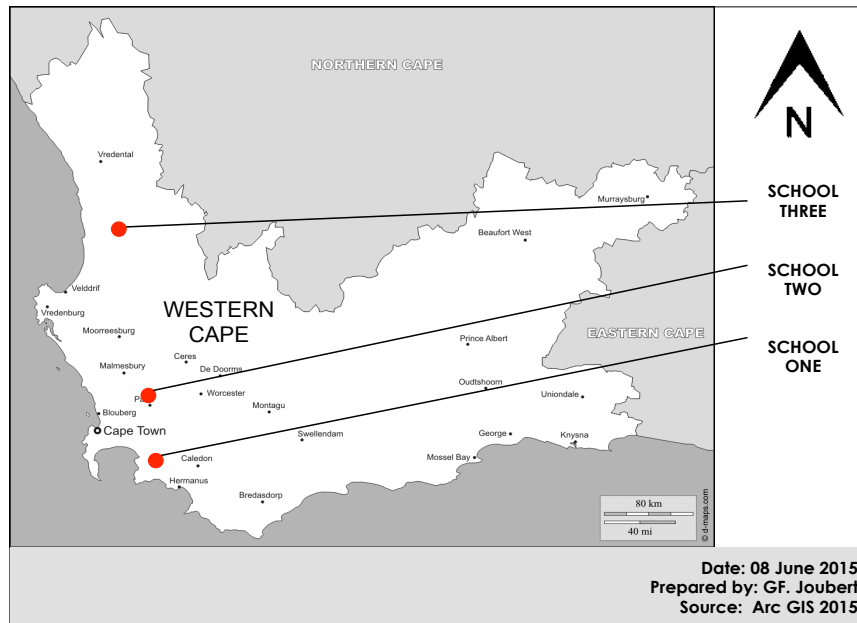


Figure 4.4: Geographical Location Map 2 for Schools One, Two and Three.

School 1



Figure 4.5: GIS Area Location Map of School One.

Table 4.2: Exploratory Analysis of School One.

Geographical location	South Africa – Western Cape – Oudebrug Farm – Grabouw
Communication Language	Afrikaans
Education District	Western Cape Education Department (WCED) Overberg
Principal	Principal 1
Project 4 - coordinator	Coordinator 1
Schools participation in organized sport activities.	School 1, is situated on a commercial apple farm about 2,5km from the town of Grabouw. The school has access to a hard netball surface and 2 grass rugby fields. The school does not have any transport available (except the teachers' vehicles). The only organised sport activities these learners embrace are one to three rugby and netball matches per year. No organised physical training takes place at school 1.
PROJECT 4	
Involvement - School	The school opened its doors for this research project. Although their doors were open, the researcher struggled to communicate and receive updated journals from the Project 4 coordinator. The coordinator was replaced after 2 months into the 18 month project. The problem was resolved.
Community	There was a positive reaction from the community towards Project 4. Most of the learners that attend School 1 live on the farm. The school is situated next to their homes; thus parents and grandparents witnessed the session; encouraging the learners in their sessions.
Dedication	The Project 4 coordinator travelled every Monday and Thursday from Stellenbosch to Grabouw to follow the IMAD+ programme with the learners.
General Participation	The Grabouw area is known for apple and pear cultivation; almost all of the learners' parents work on these farms. In the non-harvest months, many workers move to other parts of the country to work. Therefore a lot of learners change schools, accompany their parents, and enrol at a different school. The learners who remained in the Grabouw area, participated throughout the programme.

School 2

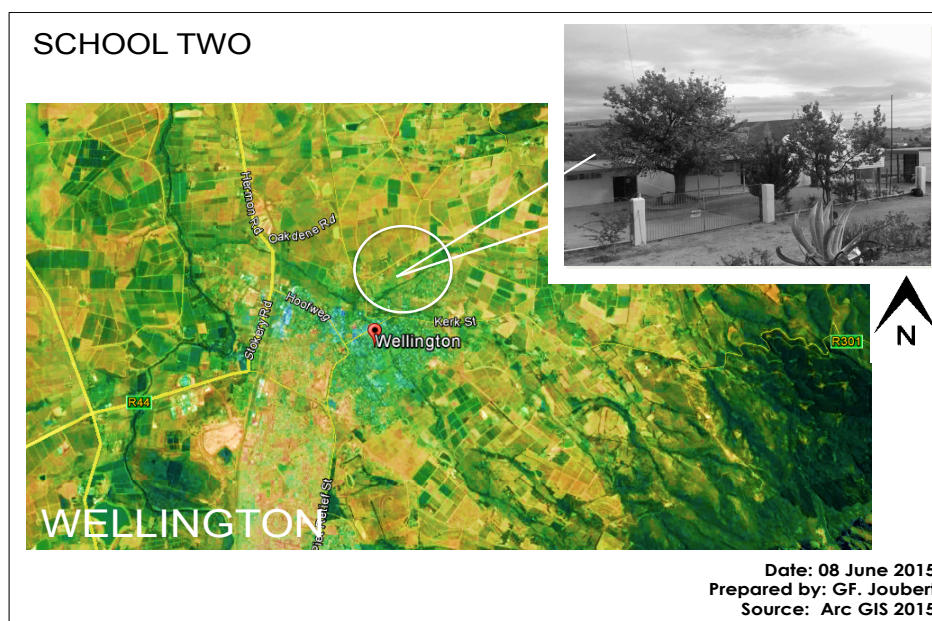


Figure 4.6: GIS Area Location Map of School Two.

Table 4.3: Exploratory Analysis of School Two.

Geographical location	South Africa – Western Cape – Wellington
Communication Language	Afrikaans
Education District	Western Cape Education Department (WCED) Cape Winelands
Principal	Principal 2
Project 4 - coordinator	Coordinator 2
Schools participation in organized sport activities.	School 2 is situated next to a commercial wine farm about 2km from the town of Wellington. The school does not have any facilities available for physical training. The school does not have any transport available (except the teachers' vehicles) thus the only organised sport activities these learners partake in is 1-5 rugby, netball matches per year. The principal is involved with Boland cross-country and gives the opportunity for a few learners to take part in cross-country races. No organized physical training takes place at school 2.
PROJECT 4	
Involvement - School	School 2 embraced the opportunity to work hand-in-hand with Project 4. The Project 4 coordinator appointed was a provincial long-distance athlete and understood the importance of involvement in physical activity for all learners.

	The principal shifted the school programme to make sure that learners first had something to eat (State Feeding Scheme) before physical activity commenced.
Community	There was a positive reaction from the community towards Project 4. Most of the learners that attend School 2 stayed on farms in a 5-kilometre radius from the school. Most farmers bring the learners to school with a pick-up or truck in the morning and pick them up again in the afternoon. Many learners walk to school. Parents started walking with their learners to school. They wanted to interact with the Project 4-coordinator and find out what was planned for their learners for that day.
Dedication	School 2 started to participate in Boland Athletics meetings and Boland Cross Country meetings. The Principal and Project 4 coordinator arranged transport to and from these meetings. Parents attended these meetings, where they previously did not attend any of the meetings in which their children participated: not known to happen in this school milieu before. The Project 4 coordinator started to train some of these learners before school. Seven of these learners received provincial Cross Country colours.
General Participation	School 2 participated extensively in the 18-month research period. The commitment from the whole school, community, learners and principal was extraordinary taking into consideration the wet Boland winter months and lack of any formal facilities.

School 3



Figure 4.7: GIS Area Location Map of School Three.

School 3

Table 4.4: Exploratory Analysis of School Three.

Geographical location	South Africa – Western Cape – Hopefield
Communication Language	Afrikaans
Education District	Western Cape Education Department (WCED) West Coast
Principal	Principal
Project 4 - coordinator	Coordinator 3
Schools participation in organised sport activities.	School 3 is situated next to a commercial wheat farm about 24 km from the town of Hopefield. The school lacks any facilities available for physical training. The school does not have any transport available (except the teachers' vehicles): the only organised sport activities these learners partake in are rugby, netball matches per year. No organised physical training takes place at school 3.
PROJECT 4	
Involvement - School	School 3 embraced the opportunity to work hand-in-hand with Project 4. The principal shifted the school programme to ensure that learners first had something to eat (State feeding scheme) before physical activities commenced.
Community	There was a positive reaction from the community towards Project 4. Most of the learners that attend School 3 stayed on farms in a 10-kilometre radius from the school. Most farmers bring the learners to school with a pick-up or truck in the mornings and pick them up again in the afternoons. Many learners walk to school.
Dedication	The Project 4-coordinator travelled every Monday and Thursday from Moorreesburg to School 3 and back, a total of 44 km per day.
General Participation	School 3 participated extensively in the 18-month research period. The commitment from the whole school, community, learners and principal was extraordinary; taking into consideration the wet Boland winter months and lack of any facilities.

Despite many disadvantages, the multi-grade environment offers a unique opportunity for learners from different grades, of different ages and both sexes and ages with contrasting scholastic capacity to interact and learn from each other in one class. This unique opportunity required specific kinds of data gathering mechanisms:

- Differentiated Gross Motor Development Test Battery (IMAD+ Test Battery) with regards to age and sex are used in the research.

- Differentiated Gross Motor Development Programme (IMAD+ programme) with regards to age, sex and school environment needs to be followed in the research.
- Class attendance in rural multi-grade schools is not a certain phenomenon due to several socio-economic circumstances: distance from school to home, poor transport systems, non-academic/school culture and illiteracy.

4.5 Project 4 – Innovative Motor Ability and Development (IMAD+) Gross Motor Development Programme

4.5.1 The Centre for Multi-Grade Education

The Centre for Multi-grade Education (CMGE) was established in 2009 through a grant from the Royal Netherlands Government to enhance the development of multi-grade education solutions and to develop the capacity to make a significant difference in the chances of success for rural primary school learners. The CMGE was approved as a self-governing and self funded entity of the Cape Peninsula University of Technology (CMGE, 2009b). The researcher had the privilege to be involved actively at the CMGE through a research grant. The project 4 – Innovative Motor Ability and Development was one of the projects launched by the CMGE in the rural multi-grade environment of the Western Cape of South Africa. The main aim is to undertake Curriculum developmental interventions to improve access/quality and equity in multi-grade education through transformational pedagogy and planning of the curriculum.

The CMGE expects researchers to reconsider and reconceptualise the manner in which the South African education curriculum is delivered in terms of pedagogical strategies (CMGE, 2009b). Transformative educational practices in these classes can positively influence learners by creating learner-centred pedagogic, personal or individualized learning programmes. This socially responsive approach changes the role of the teacher as manager or facilitator of learner investigations. In order to do the latter, a completely different approach to orthodox educational structures is needed. The policy question for the CMGE is not whether multi-grade schools should be closed and learners accommodated in mono-grade schools (CMGE, 2009b).

The question is how multi-grade schools can be supported to offer innovative learning opportunities for all in situations where the alternative is no access to education. Rarely does research into multi-grade teaching in developing countries arise as part of a discussion about pedagogy. Cost savings often feature in the discussion. The CMGE presents multi-grade teaching as a strategy for cost savings. There is a need for systematic research into multi-grade teaching and an intensification of the dissemination of good policy and practice in multi-grade teaching, especially in developing countries (CMGE, 2009b).

4.5.2 The Aim for the Project 4 – IMAD+ Programme

The main aim of this project is to undertake curriculum development research to improve gross motor understanding in the multi-grade milieu, and further the quality and equity in multi-grade education through developing a multi-grade teaching methodology and planning of the curriculum through professional development of Project 4 coordinators (CMGE, 2009b). The researcher, together with the Project 4 Coordinator, had the task of developing and implementing the outcomes and objectives of this project.

4.5.3 The Outcomes for Project 4 – IMAD+ Gross Motor Development Programme

The researcher had to develop supervisory staff that are well acquainted with teaching methods for multi-grade classes and have the capacity to advise, support, inspect and generally perform their duties on the basis of criteria peculiar to multi-grade teaching methods (CMGE, 2011). The researcher appointed Project 4 coordinators at each of the three selected schools at which the research was conducted. The criteria for determining how schools were selected are explained in Table 4.8 under Phase 4. Coordinators required the following skills in a multi-grade setting that relate specifically to their teaching environment:

1. Gain a better understanding of the challenges and advantages of gross motor development in multi-grade teaching and a more positive attitude towards teaching in these settings.
2. Plan and design learning progression in all gross motor areas, and develop relevant learning and teaching moments.

3. Demonstrate the skills to repack gross motor principles in order to provide an effective teaching and learning programme for all individual learners who comply with the IMAD+ gross motor development programme.
4. Construct a suitable timetable for the class to provide an effective teaching and learning environment for a multi-grade class.
5. Arrange and organize instructional resources and the physical environment in order to facilitate learning, independence and interdependence.
6. Prepare, select and manage appropriate instructional and learning resource material that can be used independently by different grade groups.
7. Choose and use appropriate tools for assessment and evaluation to assess and evaluate all aspects of a learner's movement and keep records of the movement that provides reliable evidence of all aspects of their attainment.
8. Demonstrate a range of teaching methods that can be used in a multi-grade classroom and make use of a range of organisational strategies that will make teaching and grouping in multi-grade classes more effective.
9. Demonstrate strategies for organising group learning activities across and within grade levels especially those that develop interdependence and cooperation among learners.
10. Planning, developing and implementing instructional strategies and routines that allow for a maximum of cooperation and self-directed learner learning based on diagnosed learner needs.
11. Organise the activity area to facilitate good management; use effective strategies and techniques to motivate learners and foster positive attitudes to learning.
12. Demonstrate instructional methods that improve the quality of instruction and especially those that develop interdependence and cooperation among learners.
13. Apply approaches that involve the community in the life of the school (CMGE, 2011).

4.5.4 The Objectives for Project 4 – IMAD+ Gross Motor Development Programme

The researcher, in conjunction with the Project 4 Coordinator and the CMGE board, compiled the following objectives, which the research project should embody. These objectives have been constructed to embrace and support the research project of the researcher and help answer the research question: How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school?

Objective 1:

Development of effective resource material for gross motor development in a multi-grade education environment.

Objective 2:

1. Testing and improvement of a gross motor model and material.
2. On-line support to monitor and evaluate programme implementation. The design and presentation of training to various groups in the establishment of quality instruction in CMGE.

Objective 3:

1. Build partnerships with communities, government and relevant organisations in the field of gross motor development.
2. Identify and appoint Project 4 coordinators
3. Training and support of Project 4 coordinators

Objective 4:

Effective planning and organising of the Gross Motor development Seminar for national policy fabricators and relevant contributors (CMGE, 2011).

4.5.5 The 10 Phase Implementation model for the Project 4 – IMAD+ Gross Motor Development Programme

4.5.5.1 Phase 1: Development of the Project 4 – Innovative Motor Ability and Development – Gross motor development programme and equipment.

After a sifting process, the researcher identified four different gross motor programme possibilities that could merge to form the Project 4 gross motor development programme.

1. **FITNESSGRAM** (Plowman & Meredith. 2013)

Fitness-gram is a comprehensive educational, reporting and promotional tool used to assess physical fitness and physical activity levels for learners. It is the most widely used health-related physical fitness assessment for learners. The researcher bought the total Fitness-gram programme to study the core idea of the programme and find possible options to use in the Project 4 gross motor development programme.

2. **IAAF Kids Athletics Programme** (IAAF, 2006)

IAAF Kids' Athletics is one of the largest grassroots development programmes in the world of sports. Created in 2005, the programme by the end of 2011 had reached a cumulative audience of 1.5 million learners across 100 territories.

The researcher visited the author of the IAAF Kids Athletics programme, Elio Locatelli, in 2011 in Monaco to gain insight into the fundamentals of the IAAF programme.

3. **Fiksheidsevaluering/Fitness Evaluation** (Nel, 2003)

4. **Joubert (2011), Unpublished Master's in Education**

The researcher developed the Innovative Motor Ability and Development (IMAD+) programme based on the 4 combined programmes above. The programme was constructed to satisfy the CMGE outcomes and include all the skills outlined by the Project 4 research.

The programme needed to be constructed for the specific needs of the rural marginalized multi-grade environment. The programme was sufficiently adaptable to be moulded by the Project 4 coordinators at each of the 3 selected schools. The programme was designed to be used in a multi-grade, -sex, -age and ability environment. While constructing this programme, it needed to be taken into account that the following challenges faced many learners: the presence of foetal alcohol syndrome, Down Syndrome, malnutrition and physical abuse.

While these four programmes were studied by the researcher, possible equipment that could be used was sourced. The researcher found that the milieu to be operated in during the research is limited in terms of equipment and facilities. Therefore the equipment needed to be portable, light and easy to construct; cheap and easy to be replaced. All the activities and lessons included in the Project 4 – IMAD+ programme were designed with this equipment in mind.

The coordinators were responsible for the equipment and had to ensure that the wheelie bin was kept securely at the school. The equipment was to be used solely for the Project 4 – IMAD+ programme and no other school activity at all.

The programme (content and sequence) and different combinations of equipment was tested on a sample school. These sample test were conducted on the following model:

- The school had the same geographical area as main testing;
- Same age range 9 – 15 years;
- Boys and Girls;
- Different age classes;
- Multi-grade environment;

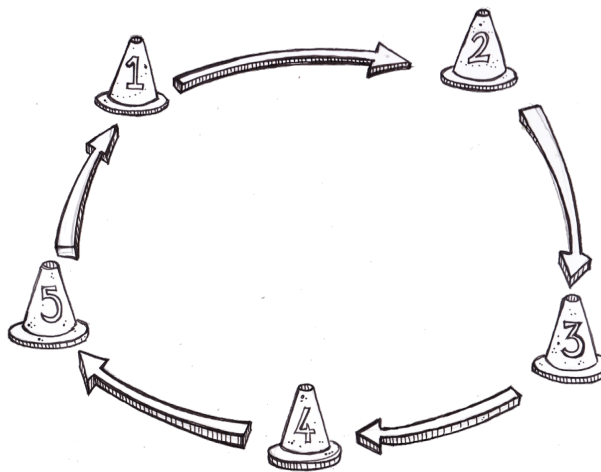
PROJECT 4 – IMAD+ PROGRAMME: (EXAMPLE LESSON)

LES 1

Skool : _____

Koördineerder : _____

Datum : _____



Lewensles vir die dag : Ek moet myself en ander mense motiveer en 'n positiewe invloed hê op die mense om my.

You don't have to be a fantastic hero to do certain things – to compete. You can be just an ordinary chap, sufficiently motivated to reach challenging goals. – Edmund Hillary

Les 1

- Deel die groep in 5 ewe groot spanne of die groep roteer saam na elke stasie. **Beheer is belangrik!!!**
- Opwarming – 5 minute wat bestaan uit ligte draf en strek.
- Die verloop by elkeen van die 5 stasies beloop 8 minute, waarna die groep na die volgende stasie beweeg.
- Afwarming – 5 minute wat bestaan uit ligte draf en strek.

Figure 4.8: IMAD+ Example lesson one.

STASIE 1

Hand muur gooi

Verduideliking – Uitleg van die oefening

- Gooi groot bal teen muur met onder arm aksie.
- Kinders staan 3 meter van die muur af.
- 4 tot 8 kinders kan langs mekaar staan teen 'n reguit muur.(hang van die lengte van die muur af)
- Gooi 10 keer met regter hand en vang met linker hand.
- Gooi 10 keer met linker hand en vang met regter hand.
- Kinders roteer tot die 8 minute verby is.
- Kinders moet onderarm gooi en mag nie die bal bo-oor aksie gooi nie.



Progressie/Verbetering

1. Kinders wat sukkel:
 - Staar nader aan die muur en vang eers met albei hande.
 - Beweeg verder weg soos wat daar verbetering plaasvind totdat kind gemaklik is om met een hand te gooi en vang.
2. Kinders wat dit maklik regkry:
 - Staar verder van die muur en probeer die gooi en vang aksie vinniger uitvoer.

STASIE 2

Touspring

Verduideliking – Uitleg van oefening

- Elke kind kry 30 sekondes om te kyk hoeveel spronge hy/sy kan doen.
- Kinders help mekaar waar swakker kinders in die groep is.
- Maak seker die oefening word korrek gedoen.
- Een voltooide touspring aksie is wanneer die tou van agter die kind bo-oor sy kop na vore geswaai word en waartydens die kind met albei voete in die lug spring en sodoende die tou weer onderdeur sy/haar bene swaai.
- Hou aan met oefening tot die 8 minute verby is.

Figure 4.9: IMAD+ Example lesson two.

(Refer to **Appendix D and G**)

PROJECT 4 – IMAD+ WHEELIE BIN



Figure 4.10: IMAD+ Wheelie bin.

(Refer to **Appendix G** for photos)

IMAD+ WHEELIE BIN consists of the following equipment:

1. 12 Agility poles
2. 12 Steel rods (Agility poles)
3. 1 Steel Hammer
4. 10 Small Hurdles
5. 10 Tall Hurdles
6. 50m Measure Tape
7. Stopwatch
8. Whistle
9. 50 Small Cones
10. 2 Stepping Ladders
11. 10 Skipping ropes
12. 50 Golf balls
13. 10 Hoola-Hoops

14.4 Soccer Balls

15.20 Tennis Balls

16. IMAD+ Programme

The following equipment was used in combination with the IMAD+ gross motor development programme and was assembled at each of the schools. This equipment was used to form part of the Wheelie Bin Equipment to conduct the IMAD+ programme.

- 2 Pull-up Bars
- 2 Throwing nets and Brackets
- Hand-Wall Toss lines



Figure 4.11: Throwing nets.



Figure 4.12: Hand wall toss lines and Pull-up bar.

(Refer to **Appendix G** for all photos)

4.5.5.2 Phase 2: Identification of Three Suitable Schools

The researcher selected a cluster of schools to represent three geographically adjacent 3 rural education districts of the Western Cape province of South Africa: each school represented one of the districts: West Coast, Cape Winelands, Overberg. All 3 of these schools operates from the same milieu: a multi-grade educational environment. Since this is a multi-grade class, all three grades are in the same class.

4.5.5.3 Phase 3: Identification of Three Suitable Project 4 – Coordinators

The researcher, together with the principal at each of the 3 schools, used data recovered from the CMGE baseline study to develop criteria to appoint these coordinators. The criteria included the following attributes. Each co-ordinator had to have the following:

- A valid Matric/Gr12 certificate
- Grown up in the community
- Sport interest/background
- An Afrikaans-speaking background
- Time to attend a structured 4-weekend training course in Wellington.

The principals recommended three possible candidates each that would work for an 18-month period at the schools. The CMGE was responsible for the salaries of these Project 4 coordinators. The principal and the researcher interviewed the three candidates. The most appropriate candidates were appointed at the 3 schools.

4.5.5.4 Phase 4: Training of the Project 4 – Coordinators

The Baseline Study (CMGE, 2009a) detected an indifference towards rural people amongst officials, resulting from a strong urban bias on the part of politicians and policy makers. Officials in most district offices are poorly informed and trained regarding multi-grade pedagogies. This lack of understanding causes severe difficulties in dealing with multi-grade circumstances and teachers. For this reason, school districts fail to provide the pedagogical and administrative support that would enable multi-grade teachers to exploit the advantages of multi-grade education in innovative and productive ways. Many of the officials view their job solely as obliging schools to fill in forms and comply with policy.

For the above reason, the CMGE invited the Project 4-coordinators for 4 weekend training courses in Wellington to find a neutral training environment. Attention was paid to sustainable in-service training for coordinators; to enable them to cope with the challenges they were to face. The Project 4 coordinators responsible for teaching the gross motor development programme in the rural multi-grade schools were trained to become rural multi-grade specialists. These coordinators ensured that the intended implementation of gross motor strategies was sustainable. They had to identify, recognize and disseminate good practices and support, and give guidance where needed.

The results of the baseline study emphasize the training of coordinators who have been involved in a multi-grade environment. The report indicates that thorough knowledge of multi-grade tuition must be conveyed to coordinators. Urgent attention was paid to differentials between grade, age and sex, and with reference to motor development composition. The training is structured in such a manner that coordinators are prepared for level differentiation and grade differentiation. Training programmes include multi-grade coordinator and learner guidelines, as well as learning material and available resources for multi-grade schools.

4.5.5.5 Phase 5: Gross Motor Development – Baseline Testing

The researcher, together with the Project 4 coordinators, tested the learners in each of the schools. The testing took place according to the sex and age of the learners. Data were captured after each attempt (Refer to **Appendix C**).

4.5.5.6 Phase 6: Implementation of the Project 4 – Innovative Motor Ability and Development – Gross Motor Development Programme

After the assessment took place with reference to the baseline testing, the researcher compiled the series of lessons the Project 4-coordinator needed to follow twice a week. The researcher visited the schools every 2 weeks and made use of Skype and telephone calls to remain in contact with the Project 4-coordinators.

4.5.5.7 Phase 7: Gross Motor Development - Intermediate Testing (NOT FOR STATISTICAL DATA - INTERN TESTING)

The researcher, together with the Project 4–coordinators, tested the learners in each of the schools. The testing took place according to the sex and age of the learners. The data were captured after each attempt.

The researcher compared the baseline testing to the intermediate testing results (Refer to **Appendix C**).

4.5.5.8 Phase 8: Implementation of the Project 4 – IMAD+ Programme

After the intermediate assessment took place, the researcher compiled the series of lessons which the Project 4 – coordinator needed to follow twice a week. The researcher visited the schools every 2 weeks and made use of Skype and telephone calls to be in contact with the Project 4 – coordinators.

4.5.5.9 Phase 9: Gross Motor Development – Final Testing

The researcher, together with the Project 4–coordinators, tested the learners in each of the schools. The testing took place according to the sex and age of the learners. The data were captured after each attempt. The researcher compared the intermediate testing results with the final testing results (Refer to **Appendix C**).

4.5.5.10 Phase 10: Seminar and Sports Day

This phase fulfilled objective 4 –the effective planning and organising of the Gross Motor Development Seminar for national policy fabricators and relevant contributors. A school sports day in Wellington for all Project 4 schools was also hosted.



Innovative
motor ability &
development

Verwysing
Reference : Seminar

Navrae
Enquiries : Cyril Lawless / Sors Joubert

Telefoon
Telephone : 021 873 7486 / 021 873 7843
www.imadplus.co.za

Dear Name

The IMAD + seminar on structured physical activity and motor development is an important forum for the dissemination of information that will contribute towards the evolution of theory into practice. Additionally, the seminar serves to promote cooperation between individuals involved in research and those who are responsible for the implementation of programs associated with engagement in physical activity. The key aim of the seminar is to gather experts from the above mentioned areas to present their perspectives so as to assist in the continuing development of research into the teaching and learning of motor skills. Delegates attending the seminar will have the opportunities to liaise with each other to both acquire new ideas and share current information in regards to future studies and improved practices in the area of motor skill development.

IMAD + are auspicious to have invited some of the most renowned experts in sport development, sport science and social upliftment all under one roof and we would value your attendance.

The following guest speakers will attend the seminar;

Gert Oosthuizen, Deputy Minister of Sport
Prof. Tim Noakes, Sport Science Institute Cape Town
Nadi Albino, Unicef South Africa – Chief of Education
Anneke van der Niet, Groningen University, The Netherlands
Sors Joubert, IMAD+
Jurie Joubert, Centre for Multi Grade Education – Wellington
Ashwin Willemsse, Ex Springbok Rugby player/TV Presenter

IMAD+ is hosting its 1st seminar on the 18 September 2012. You are invited to a discussion on structured physical activity and motor development in primary rural schools at Lemoenkloof, Guesthouse, Paarl at 9:30 am.

Please R.S.V.P before 31 August 2012

Best Regards
IMAD +

innovative motor ability and development



Figure 4.13: IMAD+ Seminar invitation.

Refer to **Appendix F** and video material in **Appendix G**.

Table 4.5: Date of IMAD+ Test Battery evaluation and ANA tests (Grabouw, Wellington, and Hopefield).

Pre- Test Date:	Fitness Test Battery Evaluation	CAPS - ANA
School One Grabouw	10 April 2012	September 2012 N/A
School Two Wellington	11 April 2012	September 2012 N/A
School Three Hopefield	12 April 2012	September 2012 N/A
Post-Test Date:	Fitness Test Battery Evaluation	CAPS - ANA
School One Grabouw	3 September 2013	September 2013
School Two Wellington	4 September 2013	September 2013
School Three Hopefield	5 September 2013	September 2013

The nature of the programme was to define whether a gross motor-based programme development and evaluation model provides a practical approach to understanding the how and the why of a given programme; providing insight into how to develop, refine, and improve it. This intervention programme model helps to identify various components of a programme in order to determine, through evaluation and attitudinal evaluation questionnaires, the basis for decisions about whether and how to modify the programme for further research.

4.6 Instrumentation

Identification of a Gross Motor Development Test Battery (IMAD+ Test Battery).

The following criteria were identified for the use of the gross motor development Test Battery:

- The IMAD+ Test Battery must cover all Gross Motor components;
- The IMAD+ Test Battery needs to be standardised;
- The IMAD+ Test Battery must be appropriate for Grade 4 learners from a multi-grade school;
- The IMAD+ Test Battery must be flexible towards the environment of the different schools.

The following were outcomes applicable for the IMAD+ Test Battery:

- Improvement of general fitness status.
- The active interest in physical development and state of learners.
- Motivation to improve physical fitness.
- Motivation towards a physically active lifestyle.
- Encourage learners to follow their own fitness programme.
- To construct an awareness of the value of gross motor development.
- Encourage learners who struggle with academic orientation.
- Measurement to track learners' personal advancement.
- Acceptance of personal status.

Table 4.6 (below) describes four different gross motor Test Batteries and how these models accommodate the following questions: Purpose, Level and Gender, Scope of the Gross Motor Ability.

Table 4.6: The Distinct Differences between Gross Motor Ability (GMA) Tests.

Fitness-Programme	Bruininks-Osertysky Test of Motor Proficiency 2 (Bruininks., 1978:92) BOT-2	Charlop-Atwell Test Battery (Nel, 2002:46) CAT	Fitness Evaluation (Nel, 2003) FTB	FITNESSGRAM (Plowman & Meredith. 2013) FG
Purpose	An individual administrated norm-referenced test that assesses motor functioning.	The Test Battery is designed to measure the motor ability of learners.	Enhancement of the total fitness state of the youth.	FITNESSGRAM is a physical fitness battery that includes health-related criterion-referenced standards.
Level and Gender	Learners and adults from 4 to 21 years of age.	Learners from primary schools aged 6 - 13	Learners from 8 to 18 years of age.	Learners from 5 to 17+ years of age.

Scope of the GMA test	Fine motor precision Fine motor integration Manual dexterity Bilateral coordination Balance Speed Agility Strength Upper-limb coordination	Half turn Linear forward movement One leg jump Toe Stand Pre-historical Animal movement. Star jumps	Chin ups Standing long jump 50m dash 2400m jog Push ups Abdominal curls Suppleness Hand wall toss Rope skipping Motor skill	PACER Skin-folds Curl-ups Trunk lift Push-ups
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4.7 Project 4 – IMAD+ Test Battery (Refer to Appendix C)

The following physical and gross motor abilities were included in the IMAD+ Test Battery (Pre - Post-testing):

Table 4.7: Project 4 – IMAD+ Test Battery.

Project 4 – IMAD+ Test Battery		
Test	Action	Description
Sub - Test 1.	Length/ Height	The body height of each learner was assessed by measuring the distance from the ground to the highest point (vertex) on the head with the use of a measuring tape mounted to a wall, accurate to 0.1cm. Learners were instructed to remove their shoes for this test item.
	Reach	The reach of each learner was assessed by measuring the distance from the ground to the highest point on the right hand, with the use of a measuring tape mounted to a wall, accurate to 0.1cm. Learners were instructed to remove their shoes for this test item.
Sub - Test 2.	Weight	The body mass of each learner was measured with the use of a scale. Learners were instructed to remove their shoes for this test.
Sub - Test 3.	Pull-ups	Learners were instructed to position their hands shoulder width apart. They had to grasp a horizontal bar, positioned in an in stretched hang. The learner's arms need to bend until the chin touches the bar. While in the hanging position, the body must be stationary. No swinging or kicking actions were allowed. The test administrator counts the number of times a learner's chin touches the bar.

Sub - Test 4.	Standing Long-Jump	Learners were instructed to stand with their feet a few centimetres apart with their toes behind the stepping board. Both feet had to stay in contact with the floor during the preliminary swings. The jump had to be executed with a two-foot take-off. Learners then jumped forward as far as possible, landing on both feet. The distance is measured from the nearest centimetre from the stepping board to the back of the foot or other body part closest to the stepping board. The best of two attempts was recorded
Sub - Test 5	Vertical Jump	Learners were instructed to stand with their feet a few centimetres apart with their toes behind the stepping board. Both feet must stay in contact with the floor during the preliminary swings. The jump must be executed with a two-foot take-off. The learners then jump vertically as high as possible, landing on both feet. The distance is measured from the nearest centimetre from the stepping floor to the highest mark on the measure board. The better of two attempts was recorded.
Sub - Test 6.	The 27,5 meter sprint	Due to the nature of the facilities within these schools, the 27.5-meter dash took place on a gravel road close to each of the three schools. The distance was measured correctly with a measuring tape. One learner participates at a time while using a standing start. Time is measured to within one tenth of a second. The better of the two attempts is recorded.
Sub-test 7.	The 800 meter run	Due to the nature of the facilities within these schools, the 800-meter run took place on a gravel road close to each of the three schools. The distance was measured correctly with a distance wheel. The time was measured in minutes to the nearest second. All the learners participated once in this exercise. Only one attempt was allowed.
Sub-test 8.	Push-ups	The number of push-ups a learner achieved in 60 seconds was recorded. Each attempt needed to be made with a straight back; the learner's head lifted up while looking straight ahead with outstretched arms. Arms should be a shoulder length apart. The test administrator lies flat on his stomach, square with the pupil, his arm stretched with his fist under the pupil's chest. The learner's body must be kept straight and knees may not touch the ground. Arms bend fully, until the learner's chest touches the test administrator's fist. Each complete extension is counted. Only one attempt is allowed.
Sub-test 9.	Sit-ups	The number of sit-ups a learner achieved in 60 seconds was recorded. The learner needs to be on his back with his arms crossed over his chest, with his right hand on his left shoulder and his left hand on his right shoulder. The elbows need to be flat against the chest. The test administrator holds the learner's legs just below the knees, with the learner's feet between his thighs. The learner's upper legs need to be square with his lower legs: parallel to the exercise mat.

		The learners must curl forward until the learner's elbows touch the administrator's thighs. The learner leans back onto the mat; with his shoulder-blades touching the mat before he can start the next attempt. The test administrator only counts the attempts where the elbows touched the thighs. The learner's hands are not allowed to move from the shoulders. The learner is allowed to pull his/her knees forward. The elbows are not allowed to be brought forward. The pelvis is not allowed to move from the mat. Only one attempt is allowed.
Sub-test 10.	Hand Wall Toss	Use a smooth wall. Draw a line two metres from the wall, and a line on the wall at 1.2 meters from ground level. The learner stands facing the wall with a tennis ball in his dominant hand. Feet must be behind the line. Extra balls are placed next to his/her dominant foot. On a count, the ball is thrown under arm towards the wall, and caught directly with the other hand. The ball is thrown at the wall by the hand that caught it in the same manner, and caught with the other hand. A different ball is used if the ball is not caught. The ball must be thrown underarm. The ball may not be pushed against the body. The learners may not step over the line. The number of successful catches in 30 seconds is noted. The test administrator counts the number of successful catches. The paramount figure of two attempts is noted.
Sub-test 11.	Rope skipping:	Number of skips in 60 seconds is noted. The learner needs to stay in one place, feet together and without a rebound while skipping. The test administrator keeps count of the successful number of skips.
Sub-test 12.	Throwing Motor test:	A throwing net is placed vertically alongside a wall. The learner stands three meters away from the wall. A tennis ball was used. The learner has 5 chances to throw the ball into the throwing net with his/her right hand and left hand. An overarm action is used. A test administrator counts the number of successful attempts.

4.8 Test Battery Procedures

The assessment was undertaken at each school in their respective districts: in the Overberg District at a small multi-grade school close to Grabouw; in the West Coast district at a multi-grade school in the farmlands between Hopefield and Malmesbury, and in the Cape Winelands district, on the outskirts of the scenic town of Wellington. At each school, the IMAD+ Test Battery was completed. Testing took place in the morning at each of the schools and was completed on, and with, the standardised Innovative Motor Ability and Development equipment. A sub-test 5, 27.5 m dash and a Sub-test 6, 800m run were conducted on flat gravel surfaces.

On the scheduled day of assessment, the researcher set up the required testing stations in correct order: for Sub-test 1 Height – Reach; Sub-test 2 Body mass; Sub-test 3 Pull-ups; Sub-test 4 Standing long-jump; Sub-test 5 The 27.5 meter dash; Sub-test 6 The 800-meter run; Sub-test 7 Push-ups; Sub-test 8 Sit-ups; Sub-test 9 Hand Wall Toss; Sub-test 10 Rope skipping; Sub-test 11 Throwing test.

The researcher, prior to assessment of the learners, informed all the learners verbally that their mother, father or guardian gave consent to complete these activities. Learners were informed that they needed to try to complete each sub-test to the best of their ability but that if they wanted to, they could stop at any time and would not be penalised in any way. The learners then followed the testing procedure as in the order set out by the researcher (as mentioned above): the tester explained in detail what was expected of learners at each activity. Learners were encouraged at all times to complete each task to the best of his/her capability. Learners were required to change into physical education kit supplied by the Lets Play Foundation at SuperSport (International sport broadcaster). They were required to remove shoes and socks and undertook the assessment barefoot.

4.9 Variations in Testing

Several challenges were experienced in conducting the IMAD+ Test Battery. The IMAD+ Test Battery was tested in April 2012 and September 2013. The continuing rain and absence of learners due to poor weather conditions made it difficult to negotiate the IMAD+ Test Battery and intervention programme successfully. Learners who were absent from the IMAD+ Test Battery pre- and post- test were given an opportunity on the next available day to complete the tests. The nomadic movement of seasonal workers in this agricultural hub of South Africa made the sample small; due to learners leaving and joining the programme from April 2012 to September 2013. The movement of workers according to the seasons had numerous social, emotional and educative consequences: in the case of this research project such parental movement weakened numeracy and literacy. The success of the testing sessions depends heavily on the amount of assistance provided by the Project 4 coordinator involved with the class from April 2012 to September 2013. Due to lack of facilities, the researcher had to make some adjustments so that the IMAD+ Test Battery could be completed correctly. The following adjustments were made:

- A portable pull-up bar was used at one of the schools; the permanent fixed pull-up bar was stolen prior to the test.
- The 800m tests had to be run on gravel roads. There were no adequate tracks: grass or synthetic. At one school this involved a steep gradient.
- The irregular timing of the government food scheme made the organisation and timing of each session demanding.

The researcher found it beneficial to be fully set up 15 minutes prior to the start of each testing and programme session. The schools' daily operations were disorganised. As a result, learners who were not participating in the programme interfered and disturbed the flow of the programme and testing sessions. Although it was positive to observe how interested these learners were, it was difficult to organise each test.

4.10 Annual National Assessment (ANA)

South Africa participates in a number of cross-national assessments of educational achievement, which makes it possible to compare the levels of learning and knowledge of learners in South Africa with those from learners in other countries. These assessments include PIRLS (Progress in International Reading and Literacy Study), SACMEQ (Southern and Eastern African Consortium for Monitoring Educational Quality) and TIMSS (Trends in Mathematics and Science Study). Although it may be tempting to rely on the matriculation results (Grade 12) or the Annual National Assessment (ANA) results (grades 1-9) to determine knowledge levels of learners in South Africa, it is inadvisable. First, the matriculation results reflect the performance of only half the learners who started schooling 12 years earlier: 50% of learners dropped out before reaching matriculation (primarily in grades 10 and 11) (Gustafsson, 2011:34-41). Second, the ANA findings are still in their infancy: the difficulty levels of these tests differ between years and across grades, yielding different scores that do not necessarily have anything to do with improvements or deteriorations in learner performance (Spaull, 2014:1).

This irregularity is in stark contrast to international assessments that are developed by psychometric experts across the world and are comparable over time. In September 2013 over 7 million learners in Grades 1-6 and Grade 9 in South Africa were assessed to determine their levels of competency in Literacy and Numeracy.

This was the third time since 2011 that an assessment of this magnitude has been conducted under the umbrella of the Annual National Assessment (ANA): an initiative of the National Department of Basic Education (DBE) to improve the quality of performance in the system (South Africa. Department of Basic Education, 2014). ANA was put in place by the DBE as a strategy to measure annual progress in learner achievement towards the 2014 target of ensuring that at least 60% of learners achieve acceptable levels in Literacy and Numeracy.

ANA is one of the initiatives that form the backbone of the DBE's Action Plan 2014: Towards the Realization of Schooling 2025. ANA targets Literacy and Numeracy because these crucial areas of learning have been found universally to contain key foundational skills for successful learning in other subjects at school and beyond. The tests are administered in all eleven official languages in the foundation phase and in the two languages of teaching and learning in the Intermediate and Senior Phase. Necessary adaptations are effected for learners who experience various kinds of learning disabilities; to ensure that each learner has the opportunity to demonstrate what s/he knows and can do in the assessment (South Africa. Department of Basic Education, 2014).

From 2012, assessment included all learners in Grades 1-6 and Grade 9 and was administered in the third quarter of the school year. The various ANA publications list numerous goals for the programme. These fall into two broad categories. The one set of goals aims to assist learners in the school system: learners, teachers, and school leader performance of individual schools are assessed for purposes of accountability and to track improvement in the system as a whole. These elements are distinguished in the literature as assessment for learning, and assessment of learning, respectively.

4.10.1 Purpose of Using the Annual National Assessment

This Annual National Assessment interpretation is no more than an indicator as to where these schools find themselves with regards to home language and mathematics in comparison to the Western Cape and the rest of South Africa.

4.11 Statistical Techniques Used for Analysis of Quantitative Data

Analysis of variance (ANOVA) tests the hypothesis that the means of two or more populations are equal. ANOVA assesses the importance of one or more factors by comparing the response of variable means at different factor levels. The null hypothesis states that all population means (factor level means) are equal while the alternative hypothesis states that at least one is different.

i. Analysis of variance (ANOVA)

The reason for conducting an ANOVA review in this research is to establish whether there is any difference between groups according to a particular variable. ANOVA allows the researcher in this study to break up the group according to the grades and then determine whether performance differs across these grades. ANOVA is available for both parametric (score data) and non-parametric (ranking/ordering) data.

ii. Non-Parametric and Parametric

ANOVA is obtainable for score or intermission data as parametric ANOVA. This is the kind of ANOVA undertaken from the regular menu options in a statistical package. The non-parametric type is typically found under the title "Non-parametric test". It is used for ranked or ordered data. Parametric ANOVA cannot be deployed when data lie below interval measurement. In the case of categorical data the ANOVA method cannot be employed. A researcher has to rely on Chi-square, which is concerned with interaction rather than about modifications between groups (Markham, 2001).

iii. How ANOVA is measured in the research

ANOVA examines the way groups differ internally versus the differences between them. To take the above example:

1. ANOVA calculates the mean score for each of the final grading groups (HD, D, Cr, P, and N) on the tutorial exercise figure - the Group Mean.
2. It calculates the mean score for all the groups combined - the Overall Mean.
3. Then it calculates, within each group, the total deviation of each individual's score from the Group Mean - Within Group Variation.

4. Next, it calculates the deviation of each Group Mean from the Overall Mean - Between Group Variation.
5. Finally, ANOVA produces the F statistic, which is the ratio Between Group Variation to the Within Group Variation.

If the Between Group Variation is significantly greater than the Within Group Variation, then it is likely that there is a statistically significant difference between the groups. The statistical package indicates whether the F ratio is significant or not. All versions of ANOVA follow these basic principles but the sources of Variation become more complex as the number of groups and the interaction effects increase.

4.12 Qualitative Research

In addition to the quantitative component of the empirical research, a qualitative study was conducted in order to explain the concepts exposed in the quantitative section of this study. Using a transformative mixed method design allows the researcher to explore and explain the phenomenon identified in the quantitative section of this research study. The researcher used reflective journals, observations and face-to-face interviews to gather qualitative data from the three schools in the study.

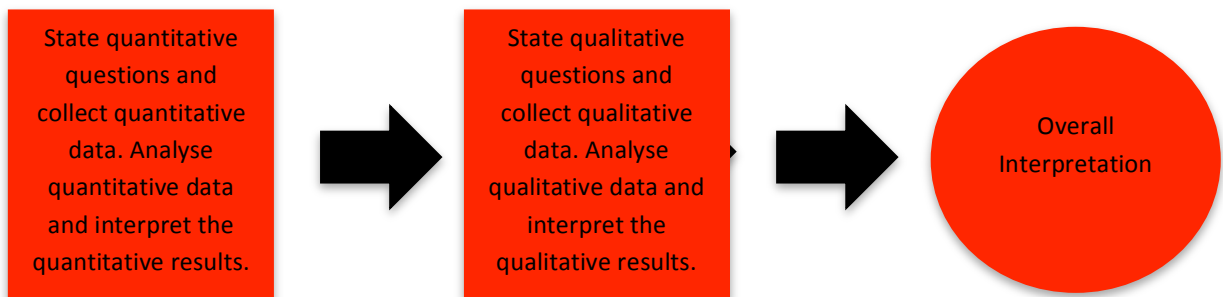


Figure 4.14: Examples of Quantitative and Qualitative Strands in a Mixed Methods Study (Own Illustration).

Figure 4.8 illustrates how the researcher used a mixed methods study; starts with a quantitative strand and then conducts a qualitative strand. As shown in figure 4.8, strands are often portrayed as boxes in the figures of this text. There were four key decisions involved in choosing the appropriate mixed methods design to use in this study.

The decisions were: (1) the level of interaction between the strands, (2) the relative priority of the strands, (3) the timing of the strands, and (4) procedures for mixing the strands.

4.12.1 Instrumentation

The instrumentation used with the qualitative data in this research comprised observations, reflective journals and face-to-face interviews. Keeping reflective journals is a strategy that can facilitate reflexivity: researchers use their journals to examine personal assumptions and goals, and to clarify individual belief systems and subjectivities (Russell & Kelly, 2002:2). Keeping and using reflective journals enabled me to make my experiences, opinions, thoughts and feelings visible, and an acknowledged part of the research design, data generation, analysis, and interpretation process. (Ortlipp, 2008:697) Keeping a reflective journal is a common practice in qualitative research; particularly reflexive research (Etherington, 2004:697). Face-to-face interviews comprise a data-gathering method when the researcher directly communicates with the participant in accordance with the prepared questionnaire. This method enables the researcher to acquire factual information, consumer evaluations, attitudes, preferences and other information that emerge during conversations with learners. The face-to-face interview method ensures the quality of the data obtained and increases the response rate.

4.12.2 Reflective Journals

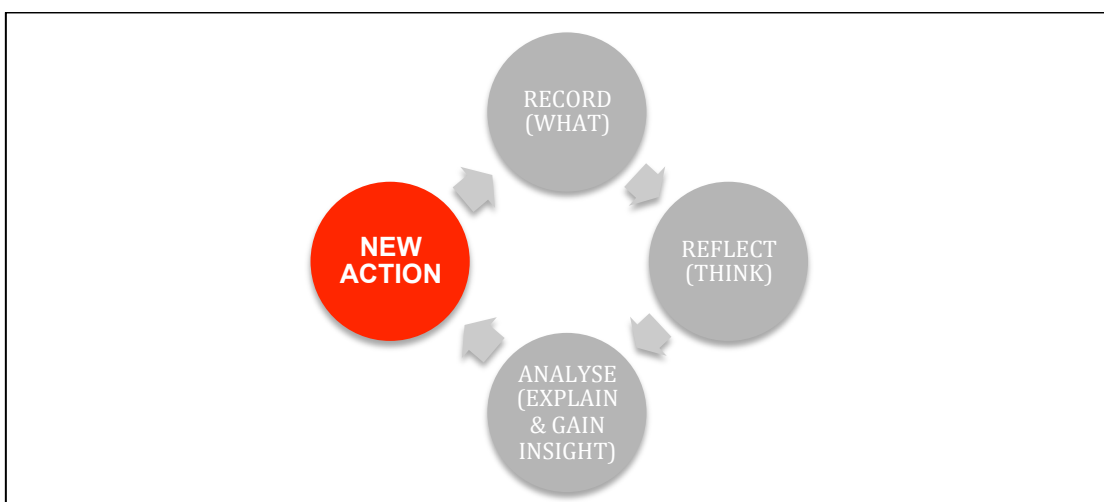


Figure 4.15: The Reflective Cycle (Study and Learning Centre, 2006).

Reflective journals in this research were recorded by the researcher with regards to all three schools involved in the research. The first step to a reflective journal involves recording (writing about) what happened, when it happened and who was involved, in order to understand the context. These four questions were asked frequently when the researcher recorded the journals.

1. What happened?
2. Who was involved?
3. What was his/her involvement?
4. When did it happen?

The second step the researcher took was to reflect. Reflection involves thinking about and interpreting the experience. Reflecting includes thinking about values, beliefs and assumptions. The reflection the researcher encountered aimed to show development of ideas from the start to completion of the research.

These questions prompt the researcher to ask when s/he first encountered the reflection in the journals:

1. Why did this happen in this way?
2. How could it be improved? How could I improve the way I did things?
3. How could the situation be improved?
4. What effects would these improvements have?
5. What values, beliefs, assumptions would explain this behaviour/incident/occurrence.

The third step that was taken was analysis of the reflective journal. The researcher undertook analysis of the journal content with an integration of theory. In the last instance a demonstration of improved awareness and self-development was observed.

The following questions were asked in commencing with analysis of the reflective journal.

1. What are the advantages/strengths/disadvantages/weaknesses?
2. How could the weaknesses/disadvantages be improved?
3. What are the similarities and differences between this phenomenon and theory?

4. How could this experience/theory contribute to improving this phenomenon?

(Study and Learning Centre, 2006).

4.12.3 Face-to-Face Interviews

The researcher conducted face-to-face interviews with the three multi-grade teachers responsible for the learners involved in the research project. The researcher conducted interviews with the principal of each of the three schools to allow observation of verbal and non-verbal data (Hiller & Di Luzio, 2004:411-426). Face-to-face interviews allowed the interviewer to observe facial expressions, gestures and other para-verbal forms of communication that enrich the meaning of spoken words (Carr & Worth, 2001:511-524). The researcher worked collaboratively with learners on the project to understand the phenomenon of interest; the researcher used interviews to stimulate conversations with learners about the meaning of their experiences (Schwandt, 2000).

4.12.4 Validity and Reliability

This study relies on valid, authentic and trustworthy methods of collecting and presenting information and interpreted understandings. Hammersley & Atkinson (1983:191) state that “data in themselves cannot be valid or invalid; what is at issue is the inferences drawn from them.” Maxwell (1992:284) supports this view by stating that validity is not an inherent property of a particular method but pertains to the data, accounts, or conclusions reached by using that method in a particular context for a particular purpose. Notions of reliability and validity in case-study research are difficult to conceptualise, much less quantify. The reliability of the research instrument deployed in this investigation was standardised and therefore reliability was constant with regards to the test instrument. The researcher referred to this part of the study in order to learn and understand issues around methodology so that the research would justify the decisions made. The relevance and suitability of the reflective writing process came to the fore regarding the way the research was conceptualized.

Tellis (1997:5) states that the protocols used to ensure accuracy and alternative explanations are called triangulation. The need for triangulation arises from the ethical need to confirm the validity of the processes. Tellis (1997:5) asserts that triangulation can occur with data, investigators, theories and even methodologies.

Tellis (1997:2) identifies the following four types of triangulation:

1. Data source triangulation: The researcher looks for data consistent in different contexts.
2. Investigator triangulation: Several investigators examine the same phenomenon.
3. Theory triangulation: Investigators with different viewpoints interpret the same results.
4. Methodological triangulation: One approach follows another to increase confidence in the interpretation.

By means of data source triangulation, the researcher in this study determined how respondents differ with regards to the validity and reliability of the criteria: such distinctions aid the researcher in identifying the strengths and weaknesses of the criteria (Tellis, 1997:2).

4.13 Ethical Aspects

Ethical considerations are critical in any research, more so when researchers are “attending to, inquiring into and representing participants’ experiences” (Clandinin et al., 2010:88). Furthermore, with narrative inquiry, researchers need to be particularly mindful, as the lives of respondents do not end with the research (Clandinin, 2006:5). There is therefore a responsibility that researchers have to work with care with the personal stories told by respondents. Cohen et al. (2007:52) argue that the foundation of ethical procedures is informed consent. They point out that the following principles are inherent in informed consent:

- Competence
- Voluntarism
- Full information
- Comprehension (Cohen et al., 2007:53).

The principles imply that respondents in a research study must be competent to participate, do so voluntarily on the basis of a full disclosure by the researcher and they must understand what the research is about. The process of informed consent is something that needs to be negotiated with respondents throughout the research study.

Other ethical principles that guided this research study included confidentiality, obtaining ethical clearance for the research, managing all data in a sound manner, and being sensitive to the respondents so that no harm was done to their well-being during their participation in the research project. According to McMillan & Schumacher (1989:197), ethics deal with beliefs about what is right or wrong, proper or improper, good or bad. A letter of permission was obtained from the Western Cape Education Department (WCED), approving the research to be conducted (Appendix A). After the letter of permission was granted from the Western Cape Education Department, the permission of the principal of each school was sought and obtained for them to become active learners in the study.

All three schools made the effort to be part of the research. The privacy of the learners and the confidentiality of the research were guaranteed by the researcher. Learners, parents, teachers and principals were assured that all information collected during the research would be treated as confidential. All learners completed a waiver and an indemnity form before any research commenced (Appendix B). David et al., (2001:347-356) state that researchers need to inform learners that they have the right to withdraw at any point in the research if they so choose to do.

School A, B and C were informed of the process and purpose of the research prior to each interview in an email communication with the letter of informed consent. To give effect to the principle of confidentiality, I requested each youth respondent provide a pseudonym to be used in the final report. The researcher highlighted that no major risks to the respondents were envisaged, and that they had the right to withdraw from the research at any stage, or refuse to answer questions that made them feel uncomfortable.

The researcher was very mindful that I did not wish the respondents to experience any psychological harm, secondary trauma or intense discomfort as a result of their participation in the IMAD+ programme. Respondents were also assured that the researcher would use all means to secure the data that was collected and that rules of confidentiality would apply to the transcriber of the data.

4.14 My Positionality

The researcher is part of the CMGE team that engages with the holistic development of marginalized rural learners in the Western Cape of South Africa; hence the study took cognisance of the principles guiding insider research (Costley et al., 2010:25-43). As researchers doing qualitative research, the stories that are shared with us, including how they are told, are influenced by our position and research experience in relation to the respondents (Greene, 2014:1). Insider research is a form of research where one studies an organisation or area of work where one is actively involved. However Greene (2014:2) argues that both insider and outsider researchers have to contend with similar methodological issues. She points out that there are differences in how each position may be regarded, how it affects the data gathered and how the data are analysed. She argues that insider research is 'complex', but that it has many benefits and opportunities (Greene, 2014:11). However, she maintains that although much has been written about insider research, there is insufficient documentation on how to do this form of research. Drawing on experiences of other researchers, Greene (2014:3) highlights the following advantages and disadvantages of insider research:

Advantages

- Insider researchers have intimate knowledge of the research environment and respondents.
- Insider research may be more natural than that of an outsider who has to become familiar with the research environment and respondents.
- Being an insider may mean easier access.

Disadvantages

- Insider research could be seen as too subjective.
- Insider researcher may be seen as "inherently biased".

Greene (2014:5) points out additional methodological issues with insider research with regard to how the data is gathered and analysed. These are:

- Objectivity may be difficult for an insider researcher as a result of his/her involvement in the research environment and the respondents.

- Again drawing on the work of researchers, and in particular Lincoln and Guba (1985), she points out that the inclination to “go native” may be as a result of prolonged engagement with the literature (Greene, 2014:5). “Going native” may therefore compromise the validity of the data.
- Gaining access could also be seen to be a problem, as the insider researcher could be seen as too much of an insider, and hence disclosure of information may not be too forthcoming.
- Confidentiality may be an issue.
- Power struggles could also be an issue.

Similarly, Costley et al. (2010:6) outline certain considerations when embarking on work-based insider research, such as the potential bias in researching one’s own practice, lack of impartiality, and a vested interest in a particular outcome of the research. However, despite the potential pitfalls, Greene (2014:7) argues that there are techniques and tools that can assist the insider researcher to deal with some of the methodological challenges. Brannick and Coghlan (2007:59) argue that within all streams of research, there is no reason why “being native” is an issue and that insider research is worth ‘re-affirming’. “Being native” can be of great benefit in research.

Breen (2007:163), while doing his PhD research, chose to consider himself as neither an insider nor an outsider. He argues that the insider/outsider dichotomy is too “simplistic” and that the distinction does not fully explain the role of all researchers. Instead, the role of researchers is better conceptualised as being on a “continuum”, and he considered himself in his research as somewhere in the middle (Breen, 2007:163). For him, rigour was enhanced through the data collection and analysis by employing triangulation, having a comprehensive audit trail, and providing detailed descriptions on the context within which the research took place.

4.15 Conclusion

This chapter helped to explain the methods employed by the researcher in answering the central research question: How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school?

CHAPTER 5: RESULTS AND DISCUSSIONS



Learners Doing Core Exercises (Photo Credit: G.F. Joubert).

5.1 Introduction

This chapter responds to the key questions set out in the study: what are the physical changes in learners from the implementation of a GMD programme and why do they occur? What are the motivational, attitudinal and self-esteem changes in learners from the implementation of a GMD programme, and why do they occur? The first question underpins the quantitative aspect of the study. The second question underpins the qualitative aspect of the study. Data are presented and analysed in the same order: quantitative analysis, and then analysis of qualitative data. This mixed method study was conducted to investigate how implementation of a gross motor skills development programme can enhance the lives of rural marginalized multi-grade primary school learners.

5.2 Quantitative Analysis

Table 5.1: Populations of learners in sample schools (Grabouw, Wellington, and Hopefield).

SCHOOLS	Numbers of learners in sample	Gender		Age Range in years
		Boys 30	Girls 20	
SCHOOL ONE Grabouw	n=12	8	4	9 -13
	Grade 5 n=6	6	0	9 -12
	Grade 6 n=6	2	4	11-13
SCHOOL 2 Wellington	n=22	13	9	9 -15
	Grade 5 n=12	6	6	9 -15
	Grade 6 n=10	7	3	10 -13
SCHOOL THREE Hopefield	n=16	9	7	8 -13
	Grade 5 n=10	6	4	8 -10
	Grade6 n=6	3	3	10 -13

In this section, test results are described, analysed and explained. Tests were set in the application of the IMAD+ and gross motor development with fifty grade 4 - 6 learners from three multi-grade schools in Grabouw, Wellington and Hopefield. This section corresponds to the first key research question:

What are the physical changes in learners after implementation of a GMD programme, and why do they occur? For the quantitative part of the study, the IMAD+ test battery was applied. In this section, results for those tests are described below, followed by analysis of trends and patterns. In the following section, results for the IMAD+ gross motor development scores for 2012 and 2013 in the three respective schools are presented. The sample consists of all learners who were active participants in the Project 4 – IMAD+ programme.

5.2.1 Gross Motor Development Analysis - IMAD+ Test Battery¹

The Year 1 administration of the battery took place in April 2012 and the Year 2 administration took place in September 2013. The total timeframe for the IMAD+ programme consisted of 18 months including all the school holidays within the above timeframe. Table 5.2 below reveals the overall gross motor development improvement of the various categories for the total sample of (n=50) that have been analysed in this research.

An examination of Table 5.2 indicates an increase in all categories tested on the IMAD+ battery from Year 1 to Year 2. A few salient categories from the above table are explained below: length, weight, pull-ups, push-ups, hand wall toss exercises and skipping.

Table 5.2: Overall improvement Year 1 – 2012 vs. Year 2 – 2013.

Overall improvement (Year 1 - 2012 vs. Year 2 - 2013)

Total (n=50)	Length	Weight	Reach	Pull ups	Standing long jump	27.5m sprint	800m	Push ups	Abdominal curls	Vertical jump	Hand wall toss	Rope skipping	Throw test	Vertical jump
Year 1 (Mean) 2012	1.367	30.690	1.692	1.240	129.680	4.987	3.831	13.020	22.100	21.620	6.200	59.060	5.740	1.908
Year 2 (Mean) 2013	1.459	38.280	1.837	3.180	156.640	4.494	3.392	23.400	31.740	29.540	18.160	88.420	7.240	2.132
Difference	0.091	7.590	0.145	1.940	26.960	0.493	0.438	10.380	9.640	7.920	11.960	29.360	1.500	0.224
Sig (95%)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F ratio	18.981	22.496	4.870	6.228	21.381	6.480	5.375	36.966	31.542	28.606	137.609	14.032	19.360	8.759
p-value	.000	.000	.030	.014	.000	.012	.023	.000	.000	.000	.000	.000	.000	.004

¹The IMAD Test battery scores for all the other categories are supplied in **Appendix E**.

Length (Height) and Weight

The table below is a section of Table 5.2 (above) and expands the first two columns, which show length and weight figures:

Table 5.3: Length (Height) and Weight Year 1 – 2012 vs. Year 2 – 2013.

Total (n=50)	Length	Weight
Year 1 (Mean) 2012	1.367	30.690
Year 2 (Mean) 2013	1.459	38.280
Difference	0.091	7.590
Sig (95%)	Yes	Yes
F - ratio	18.981	22.496
P - value	.000	.000

In both cases, of length and weight, it is observed that an increase occurred. Mean length (height) increased from 1.367 cm to 1.459 cm; mean weight increased from 30.690 kg to 38.280 kg. Although this improvement appears in the results of the IMAD+ gross motor development test results, the change in length (height) and weight cannot be attributed directly to the IMAD+ programme. The change in length may be the result of natural maturation patterns in adolescence between the ages of 10 and 16, where considerable increases in height occur over an 18-month period; known as the adolescent growth spurt.

Proper nutrition is essential for growth and increase in height and weight. Studies have reported that poor nutrition has led to stunted growth, and developmental lag in children (Kruger, 2006:28; Solorzano & McCartney 2010). Schools in the research were recipients of a government feeding scheme. Learners received a balanced meal every day. On numerous occasions, farmers brought some of their harvest (apples, grapes, oranges, naartjies, watermelons, beans, meat, amongst other items) to the school to supplement the feeding scheme.

The constant supplementation of such food to these learners whose home backgrounds are deprived of nutritious food may have had a beneficial influence. However it was beyond the scope of this study to determine scientifically the exact influence of the supplementary nutrition provided by the government feeding scheme upon height and weight of the learners.

Given that there was no control group (an unfed group) to ascertain this comparison and any ethical implications derived from it, any direct or incontrovertible attribution of the role of nutrition in this study on height and weight of the learners could not be made with certainty. It was observed, however, that children participated in the feeding scheme and were not starving. It is plausible that the nutrition scheme contributed positively to the overall increase in length and weight of learners in the sample. Future research could specifically examine the degree of nutritional supplementation and its effect on growth of learners

Pull-ups and Push-ups

A section of Table 5.2, which shows pull-ups and push-up figures, is expanded below:

Table 5.4: Pull-ups and Push-ups Year 1 – 2012 vs. Year 2 – 2013.

Total (n=50)	Pull-ups	Push-ups
Year 1 (Mean) 2012	1.240	13.020
Year 2 (Mean) 2013	3.180	23.400
Difference	1.920	10.380
Sig (95%)	Yes	Yes
F – ratio	6.228	36.966
P – value	.014	.000

A considerable pull-up improvement occurred (from a mean of 1.240 in Year-1 to a mean of 3.180 in Year-2: a difference of 1.940). This improvement accounts for the number of completed pull-ups per learner. Only one maximum attempt was allocated to the test battery. Prior to the programme, there were no resources in the schools for students to participate in this activity. At the start of the programme, permanent fixtures of two pull-up bars were constructed at each of the three schools. With the implementation of the programme and training on these pull-up bars, learner interest accelerated and spontaneous pull-up games developed before and after school, and during breaks. Informal competitions took place amongst learners to complete numerous pull-up exercises and games on the pull-up equipment.

The same type of challenge occurred for push-up exercises (which increased from a mean of 13.020 to a mean of 23.400 from year 1 to year 2, with a large difference of 10.380).

Structured exercises, and the interest exhibited by the trainee coordinators, and this researcher, provided a new interest for learners, and an incentive to participate in a new challenge or type of adventure. This finding aligns itself with research that indicates that the development and improvement of motor skills through physical activity are related to positive development of self-esteem among learners (Corbin, 2002:128-145). The competitive aspect of the structured exercise motivated learners to increase their performances: to determine whether they could outperform their peers. This healthy competitiveness comprised one of the reasons why there was a significant improvement in the number of pull-ups among both males and females.

Hand Wall Toss and Rope Skipping

A section of Table 5.2, which shows Hand Wall Toss and Rope Skipping figures is expanded below:

Table 5.5: Hand Wall Toss and Rope Skipping Year 1 – 2012 vs. Year 2 – 2013.

Total (n=50)	Hand Wall Toss	Rope Skipping
Year 1 (Mean) 2012	6.200	59.060
Year 2 (Mean) 2013	18.160	88.420
Difference	11.960	29.360
Sig (95%)	Yes	Yes
F – ratio	137.609	14.032
P – value	.000	.000

Observation indicated that spontaneous ball games developed before and after school, and during breaks. Learners constructed games and challenged each other constantly to improve their ability to throw, catch and skip. The hand wall toss test which consisted of throwing a ball against the wall with the one hand and catching it with the other hand, garnered great interest amongst learners. Learners normally played with a ball (in soccer, or by simply kicking a ball to one another and so on) but the hand wall toss exercise added a unique way to challenge the individual and develop group participation. Hand Wall Toss improved from a mean of 6.200 in Year-1 to a mean of 18.160 in Year-2: a difference of 11.960. It was observed that learners began to concentrate on coordinating how they tossed, caught and returned the ball. Their responses and demeanour indicated a sense of achievement and enjoyment during the exercises: a self-reinforcing exercise that produced the increase in results shown in the IMAD+ test battery.

The introduction of skipping produced a phenomenal, unprecedented increase; from a mean of 59.060 in Year 1 to a mean of 88.420 skips per minute in Year 2, a difference of 29.360. Rope skipping as a competitive sport in South Africa was introduced in 2002 by Maarten Goedeme from Belgium at the first workshop in Mitchells Plain, Cape Town and is now managed by the South African Gymnastics Federation (SAGF, 2013). Its popularity has grown in the Western Cape, especially in disadvantaged areas. This is because skipping requires minimum resources: a rope and some shoes. The exercise may be undertaken barefoot, as is observed in the schools in the sample. The easily accessible nature of this sport, and the limited equipment needed, produced a great interest in this sport by learners in all three schools sampled.

5.2.2 Overall Performance (2012 and 2013 combined): Comparison by Gender

Table 5.6: Overall performance (2012 and 2013 combined) Comparison by gender (males n=30; females n=20).

Overall performance (2012 and 2013 combined): Comparisons by gender

	Length	Weight	Reach	Pull ups	Standing long jump	27.5m sprint	800m	Push ups	Abdominal curls	Vertical jump	Hand wall toss	Rope skipping	Throw test	Vertical jump
Male (n=30)	1.399	34.092	1.719	3.433	147.533	4.584	3.364	21.117	28.983	26.883	13.017	60.083	6.800	1.988
Female (n=20)	1.434	35.075	1.833	0.375	136.600	4.975	3.982	13.850	23.825	23.625	10.925	94.225	6.025	2.069
Difference	0.034	0.983	0.114	3.058	10.933	0.391	0.618	7.267	5.158	3.258	2.092	34.142	0.775	0.081
Sig (95%)	No	No	No	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes	No
F ratio	2.190	.296	2.820	16.294	2.852	3.803	10.794	14.497	7.030	3.735	1.710	19.027	4.326	1.020
p-value	.142	.588	.096	.000	.094	.054	.001	.000	.009	.056	.194	.000	.040	.315

Table 5.6 shows overall performance (2012 and 2013 combined): compared by gender. In general, increase in scores for males was higher than that of females. There are several reasons for the difference: in terms of gender differences in the IMAD+ test results observed, two explanations are possible:

1. Physiological reasons. It is commonly accepted that there are physiological and morphological gender differences between males and females. Males

and females compete in their own events. There are certain sports where women are on a par with men, or can perform even better, such as in swimming or equestrian sports, shooting, or where balance or mental concentration is predominantly needed. Generally, however, athletic differences between men and women are the result of genetics and hormones, such as length (height), weight, muscle mass, body fat and aerobic capacity (Lee, 2014). Differences in achievements on the IMAD+ test battery are possibly due to physiological differences between males and females in the sample.

2. Socio-cultural reasons. In 1896, Baron Pierre de Coubertin, founder of the modern Olympics, asserted that no matter how tough a sportswoman appears to be, her entire being is “not cut out to sustain certain shocks.” Females were often regarded as being too weak for certain sports and this differentiation defined the degree to which women were allowed to participate and achieve. These stereotypes formed the basis of gender-discrimination in physical education and in other recreational and competitive sports (United Nations, 2007:2).
3. The reasons for a lack of achievement by females in sports are frequently regarded as a product of gender discrimination and unequal gender relations, disempowerment of women and lack of access to education and other resources. This phenomenon is often observable in patriarchal communities in which females are denied equal opportunities. According to Taylor and Francis (2015), African women generally are subject to patriarchy, poverty, sexual and domestic violence and lack of freedom and education. Girls in the region are generally socialised into domestic roles at a young age; obstructing female participation in sport. Scheffler (2014) found that the traditional patriarchal masculine and feminine ideology still exists and persists in a rural community of the Cape. The communities from which the samples have been drawn for this study are not dissimilar from those studied by Scheffler; remaining fundamentally patriarchal. These reasons provide plausible socio-cultural reasons for the reluctance of female learners to extend themselves beyond sports considered safe for females, such as skipping.

In male-conditioned societies, females are discouraged from taking excessive risks and this male dominance causes lower scores overall by females. Scheffler (2014) found, however, that a more recent discourse was emerging and being popularised; one that marked a shift towards more equitable gender relations and the possibility of change. Future research could focus on the qualitative experience of girls in sports in rural disadvantaged areas in the Western Cape.

Comparison in Length (centimetres) shows that males were slightly shorter than females with a combined mean Length of 1.399 compared to females with a combined mean Length of 1.434: a difference of (0.034) and a higher Reach (centimetres) of (M-1.833) compared to the male Reach (M-1.719). Females had higher combined Weight (kilograms) of (M-35.075) compared to the male combined Weight of (M-34.092); with a Difference of (0.938). Natural maturation gains in weight, length and reach occur in the above results.

The male sample was superior in both the 27.5m sprint (seconds - (M-4.584) and statistically significant in the 800m minutes/seconds (M-3.364, p-.001) compared to the female sample of (M-4.975) for the 27.5m sprint and (3.982) for the 800m. Differences of (0.391) for the 27.5m sprints and (0.618) for the 800m occur. The observation indicated that males were prepared to work much harder in the running exercises of the IMAD+ programme compared to the female sample. Martinović et al. (2011), in a Serbian study, found that the relation between girls and femininity to Physical Education is complex. The Physical Education curriculum is dominated by team sports, such as soccer, handball, volleyball and basketball. Therefore part of the fear of girls revolved around how they appeared to others; particularly to the opposite gender. Although girls were not directly interviewed about this aspect in this study, from observation it was noted that girls in the sample were more hesitant and self-conscious about participating than boys. This distinction arises from different socio-cultural expectations or norms for boys and girls in patriarchal societies, and provides a plausible explanation for consistently different scores between boys and girls on the Motivation scale for measurement of involvement in Physical Education.

A gender bias towards certain games played exclusively by boys (pull-ups, hand-tennis, rugby, and cricket) and skipping by females was observable in all three sample schools. This bias may have exerted an influence on the motivation towards the physical IMAD+ test battery. The superior hand-wall comparison of males to females appeared to have resulted from the practice that the male sample developed during spontaneous ball games; including cricket and hand tennis. Both these games used the same tennis balls that were used in the hand wall toss test: similar skill sets made it easier for boys to perform better than girls on the hand wall toss.

The comparison to hand wall toss shows that the male sample score was higher (M-13.016) compared to the female sample of (M-10.925): with a recorded Difference of (2.092). The overall performance comparison to skipping shows that the female sample was statistically significant (M-94.225, .000) and higher compared to the male sample of (M-60.083): with a recorded Difference of 34.142. Observation indicated that skipping rope exercises and rope games existed at all of the three sample schools, before and during implementation of the IMAD+ programme. Skipping exercises and games were played during class breaks. Since the girls were already used to this, the pedagogy and correct technique taught by the extensive skipping rope games and exercises that these female samples explored through spontaneous games during breaks, contributed to the explosive power and rhythm gains, indicating superior vertical jump compared to the males.

Statistically significant comparison occurs in Push-ups (.000). The male sample (M-21.117) was considerably higher than the female sample (M-13.885); with a difference of 7.267. The male sample had a superior abdominal curl (28.983) in comparison to females at (M-23.825) and a Difference of 5.158. The comparison to Vertical jump (centimetres) shows that the male sample was higher (M-26.883) compared to the female sample of (M-23.625) with a recorded Difference of 3.258. The observation indicated that the female sample was in certain instances reluctant to give their all at the vertical jump testing station. This hesitant behaviour was due to the landing surface that was gravel and sand in all three testing environments.

Gross motor skills development is an imperative dynamic that contributes to the holistic development of learners living in rural, marginalized environments. Positive correlations can be found in the entire test battery between female learners.

This result is in contrast to negative correlations among female motor competence and physical activity found by researchers such as Reed et al., (2004), Cliff et al., (2009) and Ziviani et al., (2009), signifying that gender may be an additional factor influencing development of gross motor development skills.

A possible reason for these conclusions is that females tend to be less active than males; it may be more challenging to identify changes in physical activity levels between high- and low-skilled females (Le Masurier et al., 2005). Test results indicate, however, that improved results shown by females in the sample are in contrast to the results obtained in the literature. Female learners who completed the 18-month IMAD+ gross motor program showed significant improvements. In general, male learners are more motor competent than female learners (Graf et al., 2004; Barnett et al., 2009; Lopes et al., 2011). This trend, which is less apparent in early childhood, increases through adolescence: although one study reports that girls are more motor competent than boys (Cliff et al., 2009). Such findings suggest the need to tailor physical education and physical activity programmes for youth specifically to increase self-efficiency and enjoyment of physical activity among girls (Dishman et al., 2005; Barr-Anderson et al., 2008; Butt et al., 2011).

5.3 Qualitative Analysis

In this section, data produced by the following key research question are analysed: what are the motivational, attitudinal and self-esteem changes in learners from implementation of a GMD programme, and why? The data are derived from three sources: journal reflections, observations (and field notes) and semi-structured interviews with 50 multi-grade learners from a rural marginalized environment in the Western Cape of South Africa.

5.3.1 Journal Reflections

The following section presents reflective journal interpretation undertaken by the researcher. The interpretation has been composed at each of the three schools in 2012 and 2013 and exhibits positive and negative reflections of each school. This interpretation connects the reader to the socially complex environment of these schools and explains attitudinal and motivational trends developed at each of the three sample schools while learners were actively participating in the IMAD+ gross motor development programme.

Children need to develop as total human beings. UNICEF (2007:2) states that: “material resources include income, food, access to education or health services, protection from health risks, such as, for example, those associated with hard physical work. Spiritual resources include stimuli, meaningfulness, expectations, role models and peer relations. Emotional resources include love, trust, a feeling of acceptance and inclusion, and the absence of abusive situations”.

In Table 5.7 below, summarised reflections for 2012 and 2013 are provided; indicating that a strong positive attitudinal and motivational trend developed at each of the three sample schools while learners were active participants of the IMAD+ programme.

Table 5.7: Summaries of reflective journal interpretations for 2012 and 2013.

SCHOOLS	SUMMARISED REFLECTIVE JOURNAL INTERPRETATIONS For 2012 and 2013	
SCHOOL1	2012	<p>Positive - Learners engaged in talks with reference to their physical well-being. The coordinator prepared well for his lessons. Spontaneous play emerged during breaks and after school. Learners interacted well with the coordinator. Learners showed clear signs of a positive attitude towards participations in the IMAD+ programme. Males and females in different grades interacted well while completing the lessons.</p> <p>Negative - Teachers at school 1 do not always allocate enough time for learners to complete their entire warm-up and cool-down sessions. Equipment was stolen on several occasions. Learners did not obey verbal commands from the coordinator at all times. No culture of physical well-being and exercise existed at the school prior to the research project. The feeding scheme at the school did not provide meals at the same time every day; forcing the coordinator to change the time of the lessons continuously. Seasonal workers migrate: creating the phenomenon that learners rotated extensively at school 1. Several mentally-challenged learners (FAS, Down Syndrome) were actively participating in the lessons, challenging the coordinator to organise and set the rhythm for the lessons. No community or parental involvement towards learner improvement or general well-being was observed.</p>
	2013	<p>Positive - Class attendance improved on the days the IMAD+ programme was followed. Learners started to encourage fellow learners in their physical efforts. Lesson preparation improved considerably from 2012. Coordinators improved their ability to communicate with the researcher; learner performance</p>

		<p>improved noticeably. Teachers started commenting on positive attitude changes among learners and improved discipline in classes. Learners started experimenting with their own interpretations of movement/techniques.</p> <p>The coordinator changed only non-applicable movements/techniques.</p>
		<p>Negative - The coordinator struggled to keep the mentally-challenged learners (FAS, Down Syndrome) engaged in the lessons. Attendance on rainy days was poor. The coordinator was absent on several days, on which the researcher had to lecture those days' lessons.</p>
SCHOOL 2	2 0 1 2	<p>Positive - Teachers embraced the research and were flexible and encouraging towards the researcher and the learners in their classes. Spontaneous play emerged during breaks and after school. The coordinator was always on time and prepared while enthusiastically lecturing the lessons. Good interaction occurred between males and females in different grades while completing the IMAD+ programme.</p>
		<p>Negative - Learners struggle to understand the explanations of the coordinator. Learners did not obey verbal commands from the coordinator at all times. Learners did not listen to verbal commands from the coordinator at all times. No culture of physical well-being and exercise existed at the school beforehand. Several mentally-challenged learners (FAS) and physically-challenged learners (Double Amputee) were active participants in the lessons; challenging the coordinator to organise and set a special rhythm for the lessons.</p>
	2 0 1 3	<p>Positive - Parental involvement, encouragement and influence grew. Comprehensive parental support at Provincial Athletics and Cross-country events was born. Lesson preparation improved substantially from 2012. Coordinators' ability to communicate between the researcher and the learners improved. Spontaneous play emerged during breaks and after school. A positive, competitive culture grew between learners. Class attendance improved on the days the IMAD+ programme was followed.</p>
		<p>Negative - The coordinator was absent on several days due to competing at provincial road running events: the researcher had to lecture on those days. Communication with the researcher was not that fluent.</p>
SCHOOL 3	2 0 1 2	<p>Positive - Learners were disciplined while completing the lessons. Principal and teacher provided comprehensive support and flexibility towards the coordinator. Spontaneous play emerged during breaks and after school.</p> <p>Generally, talented learners were included in the sample.</p>
		<p>Negative - The coordinator did not prepare that well for his lessons. No culture of physical well-being and exercise existed at the school. Several mentally challenged learners (FAS)</p>

		actively participated in the lessons, which challenged the coordinator to organise and set the rhythm for the lessons. No community or parental involvement concerning learner improvement or general well-being was observed.
	2013	<p>Positive - Lesson preparation improved from 2012. Communication between learners and coordinators improved with regards to explanations on technique and general commands. Spontaneous play emerged during breaks and after school. Class attendance improved on the days the IMAD+ programme was followed. Numerous examples occur where learners offered their help to set up and break down lessons equipment.</p> <p>Negative - The coordinator struggled to keep the mentally challenged learners (FAS) engaged in the lessons. Attendance on rainy days was poor due to the considerable distances these children had to walk to school and back. No community or parental involvement towards learner improvement or general well-being was observed in 2013.</p>

At School 1 the following positive attitudes and motivational trends were observed. Learners showed clear signs of a positive attitude towards participation in the IMAD+ programme. Males and females in different grades interacted successfully while completing the lessons. Class attendance improved on the days the IMAD+ programme was followed. Learners started to encourage fellow learners in their physical efforts. Teachers commented on positive attitude changes of learners and noted improved discipline in classes.

Negative components found in the reflective journal were mainly the result of the marginalized socio-economic environment that exists at School 1. There were a few learners who presented symptoms of FAS and Down Syndrome. The school itself was inadequately equipped to facilitate such children. These children were keen to participate, however, and the coordinators faced the additional challenge of organizing and setting rhythms for such children. This burden of specialised tuition produced a positive outcome, however, in that it tested the resourcefulness, patience and interpersonal communication of coordinators; an important aspect of teacher training and maturity of personality. A negative aspect of the programme was that no community or parental involvement towards learner improvement or general well-being was observed. Attendance on rainy days was poor, because no transport to school is provided for these learners.

At School 2, the following positive attitudes and motivational trends were found. Teachers embraced the research and were flexible and encouraging towards the researcher and the learners in their classes. Good interaction between males and females in different grades was observed while completing the IMAD+ programme.

The attitudes of learners changed for the better and parental involvement increased. Comprehensive parental support at Provincial Athletics and Cross-country events was observed. A positive, competitive culture emerged between learners. Class attendance improved on the days the IMAD+ programme was followed. The following negative components were noted. Several mentally challenged learners (FAS) and physically challenged learners (Double Amputee) actively participated in the lessons: which challenged the coordinator to organise and set a unique rhythm for the lessons.

At School 3, the following positive attitudes and motivational trends were discerned. Learners were disciplined while completing the lessons. This action can be related to the structure provided at each of the lessons that the IMAD+ coordinator presented to the learners. Comprehensive support and flexibility towards the coordinator were apparent. Teachers allowed for the time that the coordinator presented lessons to the learners. This extra time enabled the teacher to complete other administrative tasks that she struggled to finish due to the intimidating workload in the multi-grade classroom. Class attendance improved on the days the IMAD+ programme was followed.

Numerous examples occur where learners offered their help to set up and break down the lesson equipment. The following negative components were noted. Several mentally-challenged learners (FAS) actively participated in the lessons: challenging the coordinator to organise and set the rhythm for the lessons. No community or parental involvement towards learner improvement or general well-being was discerned. Attendance on rainy days was poor due to the distances these children had to walk to school and back.

5.4 Observations

Data from the observation sheets for the total time period of the IMAD+ programme indicate that learners' attitudes towards fellow classmates, test-administrator and teachers improved. Observation sheets showed that learners engaged in several conversations with the researcher about their socio-economic circumstances. This observation indicated that on several occasions learners showed positive attitudes towards classmates. Learners started to ask classmates to use their implements; rather than simply taking items without asking. On more than one occasion, a learner gave a reason to the coordinators and teachers for being absent from a session.

These indications of social etiquette showed the researcher that these students exhibited an interest in the programme that they were following. Observations indicated that learners became more punctual. When the IMAD+ programme started, learners took a longer time to get ready to start the session. Progressively, learners started to arrive on time and encourage other classmates to be ready on time. These observations led the researcher to conclude that some learners developed a sense of belonging and ownership towards what they were doing in the IMAD+ programme.

5.5 Semi-Structured Interviews

The researcher at each of the three sample schools conducted face-to-face interviews after the completion of the 18-month IMAD+ Gross Motor Development programme. Interviews were conducted with the principal and class teacher of each school. Sections 5.5.1, 5.5.2 and 5.5.3 present the summaries of these interviews.

5.5.1 School 1

Principal at School 1: "The IMAD+ programme had a profound effect on the scholastic structure of learners in my school, attitudes changed towards scholastic achievement and the way these children view themselves as human beings."

The principal at School 1 had a positive attitude towards the IMAD+ programme from start to finish in this research. The principal made reference to the attitudinal changes from learners in the previous 18 months: what he termed clear discipline rehabilitation occurred. Attitudes of learners and teacher relations improved. The programme contributed towards the extra time developed for teacher administration while the coordinator lectured the lessons.

Teachers had the opportunity to engage with coordinators to help them administer their classes. The principal referred to the community development evidenced by the appointment of a coordinator from the immediate environment to the school. The principal pointed out the positive developmental change of the coordinator at his school.

Class Teacher at School 1: "The IMAD+ programme made the kids concentrate much better in my classes."

The class teacher in School 1 referred specifically to the improved discipline of the learner with FAS and Down syndrome in her class. Learners were more easily organised in class; specifically after the IMAD+ lessons. Attention to detail among learners improved. The teacher mentioned that interaction between learners in different grades improved. Where previously older learners tormented younger learners, learners showed elements of understanding concerning their socio-economic environment.

5.5.2 School 2

Principal at School 2: "Our small school had realised that we could compete with any other school in the country, we aim as a community to improve ourselves and take quantum leaps of expansion every day."

The principal at School 2 is an active member of the primary provincial athletics community. He could not emphasise sufficiently the improvement among his learners: their physical ability in all track and field events over the last 18 months rose significantly. The learners at school 2, when the sample was tested in 2013 had arguably the most primary provincial cross-country candidates, for a school of fewer than 90 learners. The continuous development of the coordinator at school 2 and the effect on the learners showed through these results. The principal received positive correspondence from the class teacher that positive levels of discipline were attained in the class. The principal mentioned that an almost harmonious atmosphere currently existed at the school. Parental involvement exploded after the success of the track and field and cross-country athletes. Most parents at school 2, who are in almost all cases farm-workers, attended competitions and meetings to support their children. Parent meetings that were previously not important for parents, changed within 18 months, to become extremely significant.

Class Teacher at School 2: “[There were] enormous positive attitudinal changes occur in my class.”

Learners developed the ability to gauge the time for work and play. This made the teaching environment much more pleasant for me as the teacher. The learners started to reflect spontaneously on their dreams and abilities that could bring stability to their lives. The notion was clear that the learner found inspiration in the ability to perform in sport. They see themselves as equal to other children.

5.5.3 School 3

Principal at School 3: “Our school experienced a metamorphosis [...] in the last 18 months the learners in my school developed the ability to be humble but still assertive.”

Such learners do not consciously verbalise notions of self-improvement because their home environment precludes the language of social mobility. In the classroom discipline improved to new levels. Learner interaction with teachers was markedly more constructive. The principal states that to see the IMAD+ coordinator grow in stature over 18 months was particularly satisfactory for an educator: coordinators were able to conduct lessons with three grades; boys and girls between the ages 8-13. The principal stated that the IMAD+ programme, coordinator training and equipment made the programme a blessing to the school.

Class Teacher at School 3: “The learners in my class behave much better after their lesson with the IMAD+ coordinator.”

The teacher at school 3, participating in this research project, stated that communication between learners in different grades improved. Before the intervention of the project, older learners overpowered younger learners. Later, this bullying diminished. Learners showed clear signs of a more structured attitude towards their academic work. They were more focused and goal-oriented; trying to improve their academic marks all the time. Basic manners improved to a great extent and boys showed signs of treating girls in a more appropriate and respectful way than before.

The following Table, 5.8, summarises face-to-face interviews in two sections. The first section refers to attitudinal and motivational changes that occurred during the 18 months' IMAD+ programme. The second section indicates other beneficial contributions and community developments found in face-to-face interviews.

Table 5.8: Summarised Face-to-Face Interviews.

Face to face interviews	Attitude and motivational changes	Other beneficial contributions, community development.
SCHOOL 1		
Principal at school 1	1 - The principal made reference to the attitudinal changes from learners. 2 - Clear discipline rehabilitation, as he calls it, occurs. 3 - The atmosphere and vibe of the learner and teacher relations improved.	1 -The programme contributed towards the extra time developed for teacher administration while the coordinator lectured the lessons. 2 - Teachers had the opportunity to engage with the coordinators to help them administer their classes 3 - The principal referred to community development that took place after the appointment of a coordinator from the immediate environment to the school. 4 - The principal further pointed out the positive developmental change brought about by the coordinator at his school.
Class Teacher at school 1	1 - The IMAD+ programme made the kids concentrate much better in my classes 2 - Reference to better discipline; specifically the learner with FAS and Down Syndrome in her class. 3 - The learners were much easier to organise in class, specifically after the IMAD+ lessons.	1 - The teacher mentioned that interaction between learners in different grades improved; while previously the older learners tormented the younger learners. 2 - Learners showed elements of understanding towards their socio-economic environment. 3 - Attention to detail of learners improved
SCHOOL 2		
Principal at school 2	1 - We aim as a community to improve ourselves and take quantum leaps every day. 2 - The principal received positive correspondence from the class teacher proving that	1 – The principal could not emphasise enough the improvement of his learners' physical ability in all track and field events over the last 18 months.

	positive levels of discipline reconstruction took place in the class.	2 - Parental involvement exploded after the success of the track and field and cross-country athletes. 3 - The principal mentioned that an almost harmonious atmosphere existed at the school. 4 - Parent meetings that were previously not important for parents changed within 18 months; to become extremely significant.
Class Teacher at school 2	1 - Enormous positive attitudinal changes occur in my class. 2 - They see themselves as equal to other children. 3 - Learners started to spontaneously reflect on their dreams and abilities that could bring stability in their lives	1 - Learners developed the ability to gauge the time for work and play. This made the teaching environment much more pleasant for me as the teacher. 2 - The notion was clear that learners found inspiration in their ability to perform in sport.
SCHOOL 3		
Principal at school 3	1 - The learners in my school developed the ability to be humble but still assertive. 2 - Clear indication that in the classroom discipline improved to new levels.	1 – Learners’ interactions with the teacher improved markedly. 2 – Learner interaction with the teacher improved notably.
Class Teacher at school 3	1 -The learners in my class behave much better after their lesson with the IMAD+ coordinator. 2 - They are more focused and goal oriented, trying to improve their academic marks all the time. 3 - Basic manners improved to a great extent. We noticed that the boys showed signs of treating the girls in a more appropriate way.	1 - The teacher stated that the communication between learners in different grades improved, while before the older learners tormented younger learners. 2 - Learners showed clear signs of a better structure towards their academic work.

Positive motivation and attitudes serve as the principal motivating factor in conditioning a learner's orientation to learn and improve the use of prescribed skills and knowledge to be learnt. The above table indicates that learner attitudes towards fellow classmates, test-administrator and teachers improved.

Face-to-face interviews indicated that on several occasions learners showed positive attitudes towards classmates. For example, learners started to ask their classmates to borrow an implement rather than snatching it away without asking. On more than one occasion a learner politely apologised to the test administrator and teachers for being absent from a session. Face-to-face interviews indicated that learners became more punctual. When the IMAD+ programme started, learners took considerable time to get ready to start the session. Progressively, learners started to arrive on time and encourage other classmates to be ready on time.

5.6 IMAD+ and Academic Improvement

Several researchers indicate that a gross motor skills programme may have positive effects upon the academic improvement of learners (Keays & Allison, 1995; Fraser-Thomas et al., 2005; Lopes et al., 2013). In this study, the main focus was on how a GMD programme such as the IMAD+ may improve the lives of marginalized rural learners in multi-grade classrooms. To understand the context of the schools, the socio-economic circumstances were described and the ANA results were provided to develop a holistic picture of scholastic progress in these schools. The Annual National Assessment interpretation remains no more than an indicator of where these schools find themselves with regards to home language and mathematics in comparison to the Western Cape and the rest of South Africa.

ANA results have been criticized as misrepresenting the achievements of learners. They are therefore used cautiously by this researcher as the only general comparative measure that exists. As Spaul (2014:1 states, with reference to ANA tests that “any comparison is inaccurate, misleading and irresponsible; the difficulty levels of these tests differ between years and across grades, yielding different scores that have nothing to do with improvements or deterioration necessarily, but rather with test difficulty and the content that is covered.” Other researchers, such as Lund (2015:1), concur that ANA scores cannot be compared uncritically from one year to the next. Research acknowledges that foetal alcohol syndrome did manifest in the sample of each of the three schools. Reference to ANA results of the three sample schools in this research contextualized the marginalized multi-grade environment in the Western Cape of South Africa, where scholastic achievement in a rural multi-grade environment is generally low.

This micro-scale context provided the rationale for this researcher to investigate the influence of the IMAD+ gross motor development programme on the lives of learners in such contexts. Despite the debilitating socio-economic predicament of learners, it was salutary to witness the enthusiasm and pride with which these learners participated. Learners wanted to see progress and attended school more regularly than before. Due to the positive reception of the programme by the teachers and principals in the schools, and the total school community, the programme appears to have been suitable and rewarding. Learners become more positive toward physical activity if they are in a learning environment that makes them comfortable and self-assured (Hagger et al., 2002). It seems that providing learners with more chances to participate in a structured programme might contribute to learner numeracy and literacy proficiency; although more research is needed to explore this tentative claim further.

The current target-setting system has become a paper exercise in many schools, as principals declare openly. They explain how they push learners through to the next grade merely to meet their targets and avoid being labelled as a poor-performing school in the district. This situation becomes a senseless exercise, by which learners are failed repeatedly in a failing system. Learners are not meeting the requirements of the curriculum, but are sent up to a next grade with serious conceptual gaps in their knowledge. Ideally, the teacher holds the golden key to open the lives of learners to experience academic success and achieve their potential. The quality of teacher training needs to be improved before education standards can be improved in South Africa. To improve the quality of teaching, teacher training has to be improved. The basis of any good education system is the quality of its teachers and judging by the complete neglect of multi-grade training, teacher education needs to be improved substantially.

5.7 Conclusion

The scope for further research within the diverse field of gross motor development in physical education classes needs to be explored further; as well as the context and challenges that these learners face day-to-day, especially in rural marginalized contexts. Promotion of greater physical activity and quality physical education in the school setting is likely to result in psycho-socially healthier children who are more likely to engage in physical activity as adults.

Schools can play an important role in ensuring opportunities for physical activity for a segment of the youth population that otherwise may not have the resources to engage in such activity.

This research project confirms that if physical activity experiences and environments were once again structured into the daily school environment of children and adolescents, individuals' feelings of self-efficacy regarding physical activity would increase. As shown in the data, such programmes increase the motivation and enhance positive attitudes among learners. In marginalized contexts that are subject to debilitating socio-economic circumstances, sustained programmes such as IMAD+ can produce positive outcomes both in the physical and scholastic motivational and attitudinal contexts.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS



Overlooking the Process (Photo Credit: G.F. Joubert).

6.1 Introduction

The plight of multi-grade education in rural marginalized communities in the Western Cape has been described in the literature as lamentable and not sufficiently recognised, let alone addressed by the Western Cape Education Department (Starr & White, 2008:1-12). Such schools are characterized by a lack of physical education programmes and suitably trained educators to implement such programmes. Neglect of gross motor development programmes increases sedentary habits, which in turn cause a decrease in motivation of learners and general scholastic underachievement among pupils at such schools. This malaise is compounded by an inherited burden of debilitating socio-economic factors in schools in such areas. The purpose of this research is to advise on economical and effective ways of relieving the effects of inherited poverty: to determine whether a gross motor development programme could stimulate and improve the lives of learners from a rural marginalized multi-grade primary school. Data emerging in this study revealed that through active participation in a well-researched and structured gross motor development programme, positive motivational and attitudinal changes could occur among learners.

The following section describes the general conclusions and recommendations that follow from the administration of the IMAD+ Test Battery scores from 2012 and 2013 in order to answer the research question: How does a gross motor development programme influence the lives of learners from a rural marginalized multi-grade primary school?

6.2 Emerging Insights

The following thoughts provide insight into the research questions posed in Chapter 1:

What are the physical changes in learners from the implementation of a GMD programme, and why?

It is imperative that motor development, physical education and physical activity be re-integrated into the daily lives of learners in rural marginalized environment in South Africa. Research indicated that sport is an important component of schools daily; increasing motivation and a sense of self-efficacy.

Lack of such opportunities and dismissal of structured physical education classes may do more harm than good to learners and learning. The IMAD+ programme, as implemented, indicates that effective development and enrolment of gross motor development programmes in a marginalized multi-grade environment may be managed by teachers who can be trained within the programme itself. A differentiated approach to education in multi-grade classes improves and enhances teaching in remote and rural areas. If educators are trained in arranging and organizing instructional resources, and facilitate learner learning, independence and interdependence by clear instructional strategies and routines based on learner needs, quality of instruction and learning can be appreciably enhanced in an affordable and effective way.

What are the motivational, attitudinal and self-esteem changes in learners from the implementation of a GMD programme, and why?

The gross motor skills development improvements that were discerned in the data exhibited numerous examples of improved physical skills, and an increase in self-esteem, positive attitudinal and motivational changes among learners. These results extend and affirm patterns and scientific findings in several studies that focus on the improvement of motor skills through physical activity and corresponding increases in self-esteem among young learners (Miyahara & Wafer, 2004:281-301; Joubert, 2011). Learners in multi-age classrooms demonstrate more positive attitudes toward school, greater leadership skills, self-esteem, increased sociability and fewer aggressive behaviours, compared to learners in traditional graded schools (McClelland & Kinsey, 2004), a trend that emerged in this study. This research project confirms that if physical activity experiences and environments were once again structured into the daily school environment of children and adolescents, individuals' feelings of self-efficacy regarding physical activity would increase. As shown in the data, such programmes increase the motivation and enhance positive attitudes among learners. In marginalized contexts that are subject to debilitating socio-economic circumstances, sustained programmes such as IMAD+ can produce positive outcomes both in the physical and scholastic motivational and attitudinal contexts.

6.2.1 Start early with Gross Motor Development Programmes

Gross motor development programmes need to be implemented together with early childhood development programmes. This joint implementation needs to focus on the pedagogy rather than the mere sense of implementation. Reviews of empirical research show that learners are eager to learn, and that learning occurs faster in the first five years of life than at any other time. Brain development is most rapid in the early years of life. Learners who receive assistance in their early years achieve better scholastically at school. The IMAD+ programme provided a structured framework within which these learners could evaluate their own gross motor developmental needs. This framework helped to develop positive attitudes and boost motivation.

In most programmes requiring such implementation, officials have become master checkers, handing out “checklists” instead of spending quality and extended time in the classrooms, or supporting the teacher to manage the large number of learners with barriers in their classes. The IMAD+ programme trained coordinators to implement various aspects at the three schools in the sample, and empowered these coordinators to engage positively with learners; with improved results. Such a framework added substantial and constructive value to the educational journey of the learners, in particular those in marginalized and deprived communities. Layzer asserts that ‘high quality early learning is like a ‘life jacket’ for low-income kids. They need the life-preserver; whereas middle and upper-income kids already know how to swim and are not dependent on this to get ahead” (2006:4).

6.2.2 Physical Education and Tertiary Training

There were no adequately trained Physical Education teachers at the sample schools at the time of the initial intervention of the programme. Gross motor development experts did not exist in the sample schools. This micro-scale scenario represents in miniature the chronic predicament in many South African schools. Where such expertise is most urgently needed, in rural marginalized multi-grade environments, it is most lacking. At such schools educational leaders themselves have poor content knowledge, pedagogical skills and management capacity (John, 2015:1). The injustice of this situation at multi-grade schools can, and should, be addressed in teacher training programmes at tertiary institutions and other in-service programmes.

But such curricular adjustments take time to feed through to schools and learners who, in the meantime, are being left behind, bereft of appropriate mental and physical stimulus.

6.2.3 Parent involvement

In the sample of schools in this study, parental involvement in children's work, both physical and academic, was initially minimal. This apathy relates to the parents' own lack of adequate academic opportunity under apartheid which is exacerbated by their need as unqualified labourers to submit to a migratory pattern of employment: following the need for harvesting or planting at large farms. Venter (2014) completed his research into parental involvement in learning at rural multi-grade schools in South Africa: a school, community and family partnership programme through the CMGE at some of the same sample schools used in this research. Insights garnered from his project were endorsed by the conclusions from this research project. Parental involvement in rural marginalized multi-grade schools in South Africa is poor. Such disconnects between parents and pupils have a deleterious effect at several pedagogical levels: psychologically, scholastically, socially and physically.

The context of multi-grade education in the sample schools reflects the reality of little or no parental involvement in South African multi-grade schools. South African rural marginalized multi-grade education is scarred by a selection of internal and external challenges that have a damaging effect on effective parental involvement. Research into comparable socio-economically deprived areas in developing countries such as India and Colombia has acknowledged parental involvement as one of the main aspects of successful interventions in projects such as the River Rishi Valley Project and Escuela Nueva multi-grade education models. To expand parental involvement, research undertaken in developing and developed countries focused on school, community and family partnership programmes.

Parents want the best possible opportunities for their children, and parents of rural marginalized multi-grade learners have proved in this research that they can have a positive motivational and attitudinal influence on the lives of their children. The home environment emerges as an integrating factor in learners' holistic development.

6.3 Recommendations

Derived from the data in the study, the following recommendations are proffered:

1. The effective execution of a structured gross motor development programme such as IMAD+ needs to be implemented provincially to determine the effects on student motivation and the ramifications of that effect upon scholastic achievement. To achieve that intervention nationally requires mechanisms for regular supervision, monitoring and support. Given budgetary restraints, and a lack of policy in this regard, it remains a daunting task to implement. One of the advantages of this model tested is the affordability of the project. A practical model may be that the Department of Education develops at least five prototype schools at which the programme is implemented as a longitudinal study to determine the effect of such a holistic programme.
2. The National Department of Education acknowledges that the curriculum as it stands does not suit or pedagogically benefit learners in a multi-grade classroom. Along with this acknowledgement, a commitment should be made to curriculum construction that includes pedagogies appropriate to the rural environment and predicaments of poverty inherited from an unjust, racially divisive system. Policy development in this regard is the first step.
3. To support the Western Cape Department of Sport and Recreation Mass Participation, Opportunity and Access, Development and Growth (MOD) programme, a survey needs to be conducted urgently to determine factors that contribute significantly to learner participation in a gross motor development programme.
4. Educators need to be empowered through annual teacher development programmes specifically designed for physical education. The aim of such programmes needs to be the holistic gross motor development of learners. These programmes should be compulsory for all teachers of Physical education.

5. For optimal gross motor development to take place, the key to an effective physical education programme ought to be that these programmes are not designed to be sport specific, but rather focus on motor foundations presented in this research.
6. The IMAD+ programme empowered non-qualified coordinators who presented the programme to learners at each of the sample schools. Research showed that non-qualified physical education coordinators who are efficiently trained and supported could significantly increase gross motor scores, improve attitudes and enhance motivation of learners in rural marginalized multi-grade schools. The contribution that this intervention has on the learner, school, community and coordinator can and should be duplicated with all urgency at all rural marginalized schools throughout South Africa.
7. The simple design and layout of the IMAD+ programme and wheelie bin enable the user to be fully functional and ready to present a lesson in less than 5 minutes. Equipment can be used on all surfaces and no officially designated field or sports facility is needed to present the lessons. These factors render the IMAD+ programme affordable and easy to use.

6.4 Suggestions for future research

1. Future research could specifically examine the status and operation of feeding schemes' nutritional supplementation plan regarding growth of learners and the influence that correct dietary habits have upon on physical education trends, particularly in marginalized multi-grade environments. Further research needs to be undertaken into the effective general contribution that the state-feeding scheme has on children from a rural marginalized multi-grade environment.
2. Further research needs to be undertaken into factors within the school environment that influence holistic development with respect to learner numeracy and literacy. There are many motivational and attitudinal factors that contribute to the holistic development of learners: useful research could take place into how such motivational and attitudinal factors contribute to numeracy and literacy proficiency.

3. Further research needs to be launched into FAS and means of assisting learners afflicted by this social disease: research needs to examine the consequent isolation and neglect of FAS learners within marginalized multi-grade environments. A particular aspect for further research is implementation of gross motor programmes in marginalized multi-grade environments in determining how such a programme could assist learners with physical and neural deficits related to FAS. Schooling tends to be a negative experience for children with FAS, who are too readily dismissed as over-active, distractible “flighty”, have poor fine motor coordination, attention deficit and poor short-term memory. With or without low IQ, such victims of socially-determined situations of destitution deserve and require educational assistance. Teachers often experience them as uncooperative, difficult to manage and disruptive in class. Because of their small stature they are easy targets for bullying by schoolmates. These indicators open the field for further vital research.
4. The need for a national learner gross motor skills proficiency database is imperative to understand the specific gross motor needs of all learners in South African schools. Contributions to track the gross motor progression of learners could add to numerous related fields and further research significantly. This proficiency database could form part of an information and reference base for all physical education research in South Africa.

6.5 Conclusion

6.5.1 General Conclusions

1. Gross motor skills may be influenced by the structured nature of the activities to which they are exposed.
2. Lack of opportunities, dismissal of structured physical education classes, closing of multi-grade schools, may do more harm than good in regard to victims of historical racial segregation in rural areas of the country. Changes through active participation in a structured gross motor development programme could bring immediate relief to several dire

situations at schools, bringing hope and advancement to learners, teachers and parents alike.

3. Motivational and positive attitudinal changes may be enhanced by involvement and active participation in a structured gross motor development programme.
4. Effective development and enrolment of gross motor development programmes in a marginalized multi-grade environment can be implemented and managed by non-trained physical education teachers.

6.5.2 Final Conclusion

Findings suggest that a fundamental role does exist for gross motor skills development in physical education classes. Data suggest that learners who actively participated in the IMAD+ programme expressed better attitudes and motivation towards themselves, their peers, teachers, their schoolwork and physical movement. Such a programme ought to be considered a vital component in the holistic education of South Africa's children, especially those left to suffer in deprived socio-economic conditions not of their own making.

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Appendix A: Research Authorisation



Directorate: Research

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REFERENCE: 20130605-12253

ENQUIRIES: Dr A T Wyngaard

Mr George Joubert
1 Black Prince Street
Wellington
7655

Dear Mr George Joubert

RESEARCH PROPOSAL: THE INFLUENCE OF A GROSS MOTOR DEVELOPMENT PROGRAMME ON THE LIVES OF RURAL MARGINALISED MULTI GRADE PRIMARY SCHOOL LEARNERS

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and students are under no obligation to assist you in your investigation.
2. Principals, educators, students and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **1 March 2012 till 2 September 2013**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

**The Director: Research Services
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000**

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard

Directorate: Research

DATE: 06 June 2012

Appendix B: Waiver and Indemnity



WAIVER AND INDEMNITY- Participation in Project 4 – IMAD+ Gross Motor Development Programme

I, the undersigned, hereby waive any claim of whatsoever nature, including any claim for consequential loss, damage, injury, disablement, or death, which but for this waiver I may have against the Cape Peninsula University of Technology (CPUT); and I hereby indemnify and hold the CPUT harmless against any claims that may be instituted against it for any loss or damage to any property of any nature, owned by whomsoever, as may from time to time be on any premises, any injury, disablement or death caused to anyone whomsoever, whether it is occasioned by an act, omission or negligence (gross or otherwise) of any employee or office holder of the CPUT or anyone else for whose action the CPUT can be held liable in terms of the law.

Dated at Wellington/Hopefield/Grabouw on this day of2012.

STUDENT NAME:

SIGNATURE:

GUARDIAN:

SIGNATURE:

ID NUMBER:

AS WITNESS:

1.

2.

Appendix C: Evaluation Score Sheets

(Boys aged 10-15, Girls aged 10-15)

EVALUERINGTELKAART				EVALUATION SCORE SHEET							
Seuns 10 jaar Male 10 years	Naam/Name			Datum/Date			Gr.	Skool/School			
Toets/Test				1	2	Algemene kommentaar/ General comments:					
Persentasie/Percentage											
Massa/Mass											
Lengte/Height											
Beamte/Official											
Standaard Standard	Persentiel Percentile	Kenop-treke Chin ups	Horis ontale sprong Horis ontal jump	27.5 m	800m	Op-stote Push ups	Ma ag-krul-le Abd o-min al curls	Vertikal e sprong Vertical jump	Hand-muur gooi Hand-wall-toss	Tou-sprong Rope skipping	Moto-riese vaar-dig-heid Motor skill
Uitstekend	100	11	210	4.2	2:45	46	66	36	31	138	10
	95	9	193	4.3	2:57	36	57	33	26	90	
Excellent	90	8	184	4.4	3:10	35	51	32	23	81	9
	85		179	4.5	3:20	32	46	31	21	75	
Baie Goed Very Good	80	5	173	4.6	3:24	30	45	30	20	69	8
	75		168	4.7	3:30	29	43	28	19	64	
Goed Good	70	4	164	4.8	3:34	27	41	25	18	60	7
	65		160	4.9	3:40	25	40	26	17	57	
Redelik goed Reasonably good	60	2	158		3:45	24	39	25	16	55	6
	55		155		3:50	22	38	25	15	52	
Gemiddeld Average	50	1	151	5.0	3:55	21	37		14	50	5
	45		149	5.1	4:02	20	35	24	12	47	
Onder gemiddeld Below average	40	1	146		4:10	19	33		11	44	4
	35		144	5.2	4:20	17	30	23	10	41	
Swak Weak	30	0	140	5.3	4:26	16	28	21	9	36	3
	25		136	5.4	4:35	14	25	20	8	31	
Baie swak Very weak	20	0	131	5.5	5:00	12	24		7	29	2
	15		124	5.6	5:30	10	21	19	5	25	1

EVALUERINGTELKAART						EVALUATION SCORE SHEET					
Dogters 11 jaar Female 11 years			Naam/Name			Datum/Date		Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:					
Persentasie/Percentage											
Massa/Mass											
Lengte/Height											
Beamte/Official											
Standaard Standard	Persentiel Percentile	Kenop-treкке Chin ups	Horisontale sprong Horisontal jump	27.5 m	800m	Opstote Push ups	Magkrulle Abdominal curls	Vertikale sprong Vertical jump	Handmuur gooi Handwall-toss	Tou-spring Rope skipping	Motoriese vaardigheid Motor skill
Uitstekend	100	4	180	4.5	2:35	39	44	35	34	134	10
Excellent	95		175	4.6	2:45	34	39	31	29	129	
Baie Goed Very Good	90	3	170	4.8	3:01	32	37	29	26	123	9
Baie Goed Very Good	85		165	4.9	3:10	29	35	28	24	117	
Baie Goed Very Good	80	2	160	5.0	3:16	26	33	27	23	111	8
Goed	75		156		3:21	24	31		22	105	
Goed	70	1	151	5.1	3:25	22	29	25	21	99	7
Redelik goed	65		149	5.2	3:28	19	27		20	93	
Redelik goed	60	0	147	5.3	3:32	17	25	24	19	87	6
Gemiddeld	55		144		3:37	15	23	23	18	81	
Gemiddeld	50	0	142	5.5	3:41	14	21		17	75	5
Gemiddeld	45		140	5.6	3:45	13	19		16	69	
Onder gemiddeld	40	0	139	5.7	3:50	12	18	22	15	61	4
Onder gemiddeld	35		136	5.8	3:52	11	17		14	59	
Swak	30	0	133		4:10	10	16	21	13	55	3
Swak	25		130	5.9	4:14	9	15		12	51	
Baie swak	20	0	127		4:25	8	14	20	10	47	2
Baie swak	15		124	6.0	4:43	7	13	17	9	43	1

EVALUERINGTELKAART						EVALUATION SCORE SHEET						
Seuns 11 jaar Male 11 years			Naam/Name			Datum/Date			Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard Standard	Persentiel Percentile	Kenop-treкке Chin ups	Horisontale sprong Horisontal jump	27.5 m	800 m	Opstote Push ups	Maagkrulle Abdominal curls	Vertikale sprong Vertical jump	Handmuur gooi Handwall-toss	Tou-spring Rope skipping	Motoriese vaardigheid Motor skill	
Uitstekend	100	11	213	3.9	2:35	49	69	35	34	149	10	
Excellent	95	9	196	4.1	2:45	40	58	31	29	106		
	90	8	185	4.3	3:01	36	53	29	26	100	9	
Baie Goed	85	6	181	4.4	3:10	33	49	28	24	91		
Very Good	80	5	179	4.5	3:16	31	47	27	23	86	8	
Goed	75		175		3:21	30	46		22	81		
Good	70	4	173	4.6	3:25	28	45	25	21	78	7	
Redelik goed	65		170	4.7	3:28	26	44		20	75		
Reasonably good	60	3	169		3:32	25	43	24	19	71	6	
Gemiddeld	55		166	4.8	3:37	23	40	23	18	68		
	50	2	163		3:41	22	39		17	63	5	
Average	45		160	4.9	3:45	21	37		16	60		
Onder gemiddeld	40	1	157		3:50	19	35	22	15	57	4	
Below average	35		155	5.0	3:52	18	34		14	52		
Swak	30	0	151	5.1	4:10	17	32	21	13	47	3	
Weak	25		149	5.2	4:14	15	28		12	42		
Baie swak	20	0	145	5.3	4:25	13	26	20	10	39	2	
Very weak	15		140	5.4	4:43	11	23	17	9	35	1	

EVALUERINGTELKAART						EVALUATION SCORE SHEET						
Dogters 12 jaar			Naam/Name			Datum/Date			Gr.		Skool/School	
Dogters 12 years												
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard	Persentiel	Kenop-treke	Horisontale sprong	27.5 m	800m	Opstote	Maagkrulle	Vertikale sprong	Handmuur gooi	Tou-sprong	Motoriese vaardigheid	
Standard	Per-centile	Chin ups	Horisontal jump			Push ups	Abdominal curls	Vertical jump	Hand-wall-toss	Rope skipping	Motor skill	
Uitstekend	100	3	190	4.4	2:45	40	45	36	36	136	10	
	95		185	4.5	3:01	35	40	32	31	130		
Excellent	90	2	180	4.7	3:10	33	38	29	28	124	9	
	85		175	4.8	3:16	30	36	28	27	118		
Baie Goed	80	1	170	5.0	3:21	27	34	27	25	112	8	
	75		167	5.1	3:25	25	32	26	24	106		
Goed	70	0	165	5.2	3:28	23	30	25	23	100	7	
	65		163	5.3	3:32	21	28		22	94		
Redelik goed	60	0	160	5.4	3:37	19	26	24	21	88	6	
	55		157	5.5	3:41	17	24	23	20	82		
Gemiddeld	50	0	155	5.6	3:45	16	22		19	76	5	
	45		153	5.7	3:58	15	20		18	70		
Onder gemiddeld	40	0	150	5.8	4:00	14	19	22	17	64	4	
	35		147	5.9	4:10	13	18		16	60		
Swak	30	0	145	6.0	4:14	12	17	21	15	56	3	
	25		143	6.1	4:25	11	16	20	14	52		
Baie swak	20	0	140	6.2	4:43	10	15	19	13	48	2	
	15		137	6.3	4:50	9	14	15	11	44	1	
Very weak												

EVALUERINGTELKAART						EVALUATION SCORE SHEET						
Seuns 12 jaar Male 12 years			Naam/Name			Datum/Date			Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard Standard	Persentiel Percentile	Kenop- trekke Chin ups	Horis- ontale sprong Horis- ontal jump	27. 5 m	800 m	Op- sto- te Pus- h ups	Ma- ag- krul- le Abd- o- min- al curls	Vertikal e sprong Vertical jump	Hand- muur gooi Hand- wall- toss	Tou- spring Rope skip- ping	Moto- riese vaar- dig- heid Motor skill	
Uitstekend	100	12	231	3.7	2:30	51	71	40	36	159	10	
	95	10	214	3.9	2:44	40	61	36	31	130		
Excellent	90	8	209	4.0	3:00	37	57	33	28	116	9	
	85	7	200	4.1	3:09	34	52	30	27	107		
Baie Goed Very Good	80	6	194	4.2	3:15	32	49	29	25	102	8	
	75		188	4.3	3:20	30	48		24	96		
Goed Good	70	5	185	4.4	3:24	29	47	26	23	89	7	
	65		182	4.5	3:27	27	46		22	84		
Redelik goed Reasonably good	60	4	180	4.6	3:30	25	45	25	21	80	6	
	55		178	4.7	3:35	24	43	24	20	76		
Gemiddeld Average	50	3	175	4.8	3:40	22	41	23	19	71	5	
	45		171	5.0	3:42	21	39		18	68		
Onder gemiddeld Below average	40	2	169	5.2	3:48	20	38	22	17	62	4	
	35		164	5.3	3:50	19	36		16	57		
Swak Weak	30	1	160	5.4	4:08	17	34	21	15	52	3	
	25		157	5.5	4:14	15	31		14	48		
Baie swak Very weak	20	0	152		4:25	14	28	20	13	44	2	
	15		148	5.6	4:35	12	25	17	11	40	1	

EVALUERINGSKART						EVALUATION SCORE SHEET						
Dogters 13 jaar Female 13 years			Naam/Name			Datum/Date			Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard Standard	Persentiel Percentile	Kenop-treke Chin ups	Horisontale sprong Horisontal jump	27.5 m	800 m	Opstote Push ups	Maagkrulle Abdominal curls	Vertikale sprong Vertical jump	Handmuur gooi Handwall-toss	Tou-sprong Rope skipping	Motoriese vaardigheid Motor skill	
Uitstekend	100	3	200	4.3	3:00	41	46	38	37	138	10	
	95		195	4.5	3:10	36	41	35	32	132		
Excellent	90	2	190	4.6	3:16	34	39	32	30	126	9	
	85		185	4.8	3:21	30	37	30	28	120		
Baie Goed Very Good	80	1	180	4.9	3:25	28	35	28	27	114	8	
	75		170	5.0	3:28	26	33	27	26	108		
Goed Good	70	0	165	5.1	3:32	24	31	26	25	102	7	
	65		163	5.2	3:37	22	29	25	24	96		
Redelik goed Reasonably good	60	0	160	5.3	3:41	20	27	24	23	90	6	
	55		157	5.4	3:45	18	25	23		84		
Gemiddeld Average	50	0	155	5.5	3:58	17	23	22	22	78	5	
	45		153	5.6	4:00	16	21	21	21	72		
Onder gemiddeld Below average	40	0	150	5.7	4:10	15	20	20	20	66	4	
	35		147	5.8	4:14	14	19	19	19	62		
Swak Weak	30	0	145	5.9	4:25	13	18	18	18	58	3	
	25		143	6.0	4:43	12	17	17	17	54		
Baie swak Very weak	20	0	140	6.1	4:50	11	16	16	16	50	2	
	15		137	6.2	5:00	10	15	15	14	46	1	

EVALUERINGSKART						EVALUATION SCORE SHEET						
Seuns 13 jaar Male 13 years			Naam/Name			Datum/Date			Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard Standard	Persentiel Percentile	Kenop-treke Chin ups	Horisontale sprong Horizontal jump	27.5 m	800 m	Opstote Push ups	Maagkrulle Abdominal curls	Vertikale sprong Vertical jump	Handmuur gooi Handwalltoss	Tou-sprong Rope skipping	Motoriese vaardigheid Motor skill	
Uitstekend Excellent	100	13	238	3.6	2:26	52	73	40	37	164	10	
	95	11	221	3.9	2:40	43	63	36	32	134		
Baie Goed Very Good	85	8	209	4.1	3:05	35	54	30	28	120		
	80	7	204	4.2	3:12	33	51	29	27	112	8	
Goed Good	75	6	200		3:15	31	49		26	105		
	70	5	196	4.3	3:24	30	48	26	25	100	7	
Redelik goed Reasonably good	65		192	4.4	3:27	28	47		24	98		
	60	4	189	4.5	3:30	26	46	25	23	94	6	
Gemiddeld Average	55		186	4.6	3:35	25	44	24		89		
	50	3	183	4.7	3:40	23	42	23	22	85	5	
Onder gemiddeld Below average	45		180	4.8	3:42	22	40		21	82		
	40	2	178	5.0	3:48	20	39	22	20	77	4	
Swak Weak	35		175	5.1	3:50	19	37		19	71		
	30	1	171	5.2	4:08	18	35	21	18	66	3	
Baie swak Very weak	25		167	5.3	4:14	16	32		17	60		
	20	0	162	5.4	4:25	15	30	20	16	55	2	
	15		158	5.6	4:35	13	29	17	14	49	1	

EVALUERINGTELKAART						EVALUATION SCORE SHEET						
Dogters 14 jaar			Naam/Name			Datum/Date			St./Std		Skool/School	
Dogters 14 years												
Toets/Test				1		2		Algemene kommentaar/ General comments:				
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard	Persentiel	Kenop-treke	Horisontale sprong	27.5 m	800 m	Opstote	Maagkrulle	Vertikale jump	Handmuur gooi	Tou-spring	Motoriese vaardigheid	
Standard	Per-centile	Chin ups	Horisontal jump			Push ups	Abdominal curls	Vertical jump	Hand-wall-toss	Rope skipping	Motor skill	
Uitstekend	100	4	210	4.2	3:10	42	47	38	39	140	10	
	95		201	4.3	3:16	37	42	35	34	134		
Excellent	90	3	195	4.6	3:21	35	40	32	31	128	9	
	85		189	4.7	3:25	31	38	30	30	122		
Baie Goed	80	2	184	4.8	3:28	29	36	28	28	116	8	
	75		179	4.9	3:32	27	34	27	*	109		
Goed	70	1	171	5.0	3:37	25	32	26	27	105	7	
	65		166	5.1	3:41	23	30	25	26	98		
Redelik goed	60	0	163	5.2	3:45	21	28	24	25	92	6	
	55		160	5.4	3:58	19	26	23	24	86		
Gemiddeld	50	0	157	5.5	4:00	18	24	22	23	80	5	
	45		155	5.6	4:10	17	22	21	22	74		
Onder gemiddeld	40	0	152	5.7	4:14	16	21	20	21	68	4	
	35		149	5.8	4:25	15	20	19	20	64		
Swak	30	0	147	5.9	4:43	14	19	18	19	60	3	
	25		145	6.0	4:50	13	18	17	18	56		
Weak	20	0	142	6.1	5:00	12	17	16	17	52	2	
	15		139	6.2	5:15	11	16	15	15	48	1	
Baie swak												
Very weak												

EVALUERINGTELKAART						EVALUATION SCORE SHEET						
Seuns 14 jaar Male 14 years			Naam/Name			Datum/Date			Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard Standard	Persentiel Percentile	Kenop-treke Chin ups	Horisontale sprong Horizontal jump	27.5 m	800 m	Opstote Push ups	Maagkrulle Abdominal curls	Vertikale sprong Vertical jump	Handmuur gooi Handwalltoss	Tou-sprong Rope skipping	Motoriese vaardigheid Motor skill	
Uitstekend	100	15	252	3.5	2:26	54	75	47	39	169	10	
	95	13	235	3.8	2:40	44	65	43	34	139		
Excellent	90	11	220	3.9	2:58	40	60	40	31	130	9	
	85	10	215	4.0	3:05	37	56	38	30	122		
Baie Goed Very Good	80	9	210	4.1	3:12	34	54	34	28	117	8	
	75	8	207	4.2	3:15	32	52	33		109		
Goed Good	70	7	204	4.3	3:24	30	50	32	27	105	7	
	65		200	4.4	3:27	29	49	30	26	102		
Redelik goed Reasonably good	60	6	199	4.5	3:30	27	48	27	25	99	6	
	55		196	4.6	3:35	26	46	26	24	95		
Gemiddeld Average	50	5	193	4.7	3:40	24	45	25	23	90	5	
	45		190	4.8	3:42	23	44	23	22	86		
Onder gemiddeld Below average	40	4	187	5.0	3:48	21	42	22	21	82	4	
	35		184	5.1	3:50	20	40		20	78		
Swak Weak	30	3	180	5.2	4:08	19	39	21	19	73	3	
	25	2	178	5.3	4:14	18	37		18	69		
Baie swak Very weak	20	1	173	5.4	4:25	16	35	20	17	62	2	
	15		167	5.6	4:35	14	33	17	15	56	1	

EVALUERINGTELKAART						EVALUATION SCORE SHEET						
Dogters 15 jaar Female 15 years			Naam/Name			Datum/Date			Gr.	Skool/School		
Toets/Test				1	2	Algemene kommentaar/ General comments:						
Persentasie/Percentage												
Massa/Mass												
Lengte/Height												
Beamte/Official												
Standaard Standard	Persentiel Percentile	Kenop- trekke Chin ups	Horis- ontale sprong Horis- ontal jump	27. 5 m	800 m	Op- sto- te Pus h ups	Ma- ag- krul- le Abd- o- min- al curls	Vertikal e sprong Vertical jump	Hand- muur gooi Hand- wall- toss	Tou- spring Rope skip- ping	Moto- riese vaar- dig- heid Motor skill	
Uitstekend	100	3	215	4.0	2:59	43	48	38	40	142	10	
	95		210	4.2	3:05	38	43	35	34	136		
Excellent	90	2	200	4.4	3:10	36	41	32	32	130	9	
	85		195	4.6	3:16	32	39	30	31	124		
Baie Goed Very Good	80	1	187	4.7	3:21	30	37	28	30	118	8	
	75		182	4.8	3:25	28	35	27	29	112		
Goed Good	70	0	177	4.9	3:28	26	33	26	28	106	7	
	65		172	5.0	3:32	24	31	25	27	100		
Redelik goed Reasonably good	60	0	169	5.1	3:37	22	29	24	26	94	6	
	55		167	5.2	3:41	20	27	23	25	88		
Gemiddeld Average	50	0	165	5.3	3:45	19	25	22	24	82	5	
	45		160	5.4	3:58	18	22	21	23	76		
	40	0	157	5.5	4:00	17	21	20	22	70	4	
Onder gemiddeld Below average	35		154	5.6	4:10	16	20	19	21	66		
	30	0	152	5.7	4:14	15	19	18	20	62	3	
Swak Weak	25		149	5.8	4:25	14	18	17	19	58		
	20	0	144	6.1	4:43	13	17	16	18	54	2	
Baie swak Very weak	15		140	6.2	4:50	12	16	15	16	50	1	

EVALUERINGTELKAART						EVALUATION SCORE SHEET					
Seuns 15 jaar		Naam/Name			Datum/Date		Gr.	Skool/School			
Seuns 15 years											
Toets/Test				1	2	Algemene kommentaar/ General comments:					
Persentasie/Percentage											
Massa/Mass											
Lengte/Height											
Beamte/Official											
Standaard	Persentiel	Kenop-treke	Horisontale sprong	27.5 m	800 m	Opstote	Maagkrulle	Vertikale sprong	Handmuur gooi	Tou-spring	Motoriese vaardigheid
Standard	Per-centile	Chin ups	Horisontal jump			Push ups	Abdominal curls	Vertical jump	Hand-wall-toss	Rope skipping	Motor skill
Uitstekend	100	16	261	3.4	2:19	56	77	51	40	176	10
	95	14	244	3.7	2:28	45	67	45	34	142	
Excellent	90	12	235	3.8	2:45	41	64	42	32	131	9
	85	11	229	3.9	3:00	38	62	40	31	125	
Baie Goed	80	10	225	4.0	3:10	35	60	38	30	120	8
	75		220	4.1	3:12	33	57	35	29	116	
Goed	70	9	217	4.2	3:20	31	55	32	28	109	7
	65	8	214	4.3	3:27	30	53	31	27	107	
Redelik goed	60	7	210	4.4	3:30	29	51	29	26	102	6
	55		207	4.5	3:35	27	50	28	25	99	
Gemiddeld	50	6	204	4.6	3:40	26	49	27	24	93	5
	45		201	4.7	3:42	25	46	26	23	89	
Onder gemiddeld	40	5	199	4.8	3:40	23	45	25	22	84	4
	35		197	4.9	3:45	22	43	24	21	80	
Swak	30	4	193	5.0	4:08	20	41	23	20	75	3
	25		189	5.1	4:14	19	39	22	19	71	
Baie swak	20	2	184	5.2	4:25	18	38	20	18	65	2
	15	1	180	5.4	4:35	16	35	17	16	59	1
Very weak											

Appendix D

IMAD+ Gross Motor Development Programme

(211 pages – Appendix G – Attached CD)

Appendix E: Annual National Assessment Interpretation

Annual National Assessment Interpretation 2013

ANA results from three sample schools for 2013 with reference to home language and maths for Grade 5 and Grade 6 learners participated in the IMAD+ Gross Motor Development programme. The research acknowledges that foetal alcohol syndrome did exist in the sample of each of the three schools. This Annual National Assessment interpretation is only an indicator to where these schools find themselves with regards to home language and maths in comparison to the Western Cape and rest of South Africa.

Annual National Assessment achievement scores in the three models schools for 2013.

SCHOOLS	Numbers of learners in sample	ANA		Grade Percentage	Total Percentage
		ANA 1 Home Language	ANA 2 Mathematics		
SCHOOL ONE	n - 12	36.25%	19.45%		
	Grade 5 n - 6	41.50%	18.60%	30.05%	27.85 %
	Grade 6 n - 6	31%	20.30%	25.65%	
SCHOOL TWO	n - 22	36,10%	8,21%		
	Grade 5 n - 12	40.80%	37.36%	39.08%	32.15 %
	Grade 6 n - 10	31.40%	19.06%	25.23%	
SCHOOL THREE	n - 16	34.85%	28.61%		
	Grade 5 n - 10	37.50%	34.07%	35.78%	31.73%
	Grade 6 n - 6	32.20%	23.15%	27.67%	

As the above table illustrates, School 1 (n=12) have a significant lower total percentage score (27.85%) on the ANA scores in comparison with School 2 (n= 22) at (32.15%) and School 3 (n=16) at (31.73%). The above table further illustrates that School 1 have a significant lower percentage score for Mathematics (19.45%) compared to School 2 at (28.21%) and School 3 at (28.61%) but have quite similar Home Language percentage scores at (36.24%) compared to School 2 at (36.10%) and School 3 at (34.85%).

School 1 - Analysis for Grade 5 learners - ANA scores for 2013.

The analysis further reveals that School 1 have a significant lower total percentage score for Grade 5 learners at (30.05%) compared to School 2 at (39.08%) and School 3 at (35.78%). The Grade 5 sample for School 1 where smaller at (n=6) compared to School 2 at (n=12) and School 3 (n=10). School 1 had a considerable lower percentage score for the Mathematics at (18.60%) compared to School 2 at (37.36%) and School 3 at (34.07%). School 1 had the highest percentage score for Home Language at (41.50%) compared to (40.80%) at School 2 and (37.50%) at School 3.

School 1 - Analysis for Grade 6 learners - ANA scores for 2013.

The Grade 6 sample for School 1 where smaller at (n=6) compared to School 2 at (n= 10) and similar to School 3 (n=6). School 1 (25.65%) had a slightly higher total percentage score for Grade 6 learners than School 2 at (25.23%) but lower percentage score than School 3 at (27.67%). School 1 had a considerable lower percentage score for the Mathematics at (20.30%) compared to School 3 at (23.15%) but higher percentage score than School 2 at (19.06%). School 1 had the lowest percentage score for Home Language at (31%) compared to (31.40%) at School 2 and (32.40%) at School 3.

School 2 - Analysis for Grade 5 learners - ANA scores for 2013.

The analysis shows that School 2 have a significant higher total percentage score for Grade 5 learners at (39.08%) compared to School 1 at (30.05%) and School 3 at (35.78%). The Grade 5 sample for School 2 where larger at (n=12) compared to School 1 at (n=6) and similar to School 3 (n=10). School 2 had a considerable higher percentage score for the Mathematics at (37.36%) compared to School 1 at (18.60%) and also a higher percentage score of (34.07%) compared to School 3. School 2 had a higher percentage score for Home Language at (40.80%) compared to (37.50) at School 3 but a lower percentage score than School 1 at (41.50%).

School 2 - Analysis for Grade 6 learners - ANA scores for 2013.

The Grade 6 sample for School 2 where larger at (n=10) compared to School 1 at (n= 6) and School 3 (n=6). School 2 had the lowest total percentage score for Grade 6 learners at (25.23%) compared to School 1 at (25.65%) and School 3 at (27.67%).

School 2 had the lowest percentage score for the Mathematics at (19.06%) compared to School 3 at (23.15%) and School 1 at (20.30%). School 2 had a lower percentage score for Home Language at (31.40%) compared to (32.40%) at School 3 and (32.40%) but a higher percentage score of (31%) at School 3.

School 3 - Analysis for Grade 5 learners - ANA scores for 2013.

The analysis reveals that School 3 have a significant lower total percentage score for Grade 5 learners at (35.78) compared to School 2 at (39.08%) but a significant higher total percentage score than School 1 at (30.05%). The Grade 5 sample for School 3 where larger at (n=10) compared to School 1 at (n=6) and similar to School 2 (n=12). School 3 had a considerable higher percentage score for the Mathematics at (34.07%) compared to School 1 at (18.60%) but a lower percentage score than School 3 at (37.36%). School 3 had the lowest percentage score for Home Language at (37.50%) compared to (40.80%) at School 2 and (41.50%) at School 1.

School 3 - Analysis for Grade 6 learners - ANA scores for 2013.

The Grade 6 sample for School 3 where smaller at (n=6) compared to School 2 at (n= 10) and similar to School 1 (n=6). School 3 had the highest total percentage score for Grade 6 learners at (27.67%) compared to School 1 at (25.65%) and School 2 at (25.23%). School 3 had the highest percentage score for the Mathematics at (23.15%) compared to School 2 at (19.06%) and School 1 at (20.30%). School 3 had the highest percentage score for Home Language at (32.40%) compared to (31.40%) at School 2 and (31%) at School 3.

Annual National Assessment achievement in Grade 5 Mathematics by province in 2013.

The national percentage total score for Grade 5 Mathematics for 2013 stands at (33.4%) that is lower than the (39.7%) percentage score of the Western Cape Province where the sample was taken. In comparison School 1 scored a considerable lower average score of (18.60%) to the provincial average score of (39.7%) and further the national average score of (33.4%). The Western Cape Province had the second highest average percentage score for grade 5 Mathematics; only Gauteng Province had a higher percentage mark of (40.8%).

School 2 scored a higher average score of (37.36%) to the national average score of (33.4%) but a lower average score compared to the provincial average of (39.7%). School 3 scored a higher average score of (34.07%) to the national average score of (33.4%) but a lower average score compared to the provincial average of (39.7%).

Annual National Assessment achievement in Grade 5 Mathematics by province in 2013.

SOUTH AFRICAN PROVINCE	Eastern Cape	Free State	Gauteng	Kwazulu Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape	National percentage Total (%)
AVERAGE	29,1	32,5	40,8	35,0	26,1	29,1	28,8	28,2	39,7	33,4

Annual National Assessment achievement in Grade 5 Home Language by province in 2013

In the table above the national percentage total score for Grade 5 Home Language for 2013 reflects at (45.6%) that is lower than the (55.8%) percentage score of the Western Cape Province where the sample was taken. In comparison School 1 scored a considerable lower average score of (41.50%) to the provincial average score of (55.8%) and further the national average score of (45.6%). The Western Cape Province had the second highest average percentage score for grade 5 Home Language, only Free State Province had a higher percentage mark of (57.5%). School 2 scored a lower average percentage score of (40.8%) to the national average score of (45.6%) and a considerable lower average score compared to the provincial average of (55.8%). School 3 scored a lower average percentage score of (37.50%) to the national average score of (45.6%) and a considerable lower average score compared to the provincial average of (55.8%).

Annual National Assessment achievement in Grade 5 Home Language by province in 2013.

SOUTH AFRICAN PROVINCE	Eastern Cape	Free State	Gauteng	Kwazulu Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape	National percentage Total (%)
AVERAGE	36,3	57,5	51,6	43,7	32,6	52,2	42,7	39,6	55,8	45,6

Annual National Assessment achievement in Grade 6 Mathematics by province in 2013.

In the table above, the national percentage total score for Grade 6 Mathematics for 2013 stands at (39%) that is lower than the (44.9%) percentage score of the Western Cape Province where the sample was taken. In comparison School 1 scored a considerable lower average score of (20.30%) to the provincial average score of (44.9%) and further the national average score of (39%).

The Western Cape Province had the highest average percentage score for grade 6 Mathematics nationally. School 2 scored a significant lower average score of (19.06%) compared to the national average score of (39%) and an even lower average score compared to the provincial average of (44.9%). School 3 scored a considerable lower average score of (23.15%) to the provincial average score of (44.9%) and further the national average score of (39%).

Annual National Assessment achievement in Grade 6 Mathematics by province in 2013.

SOUTH AFRICAN PROVINCE	Eastern Cape	Free State	Gauteng	Kwazulu Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape	National percentage Total (%)
AVERAGE	33,0	40,0	44,7	41,2	32,9	33,6	35,6	36,5	44,9	39,0

Annual National Assessment achievement in Grade 6 Home Language by province in 2013.

In the table above, the national percentage total score for Grade 6 Mathematics for 2013 stands at (58.8%) that is lower than the (63%) percentage score of the Western Cape Province where the sample was taken. In comparison School 1 scored a significant lower average score of (31%) to the provincial average score of (63%) and further the national average score of (58.8%). The Western Cape Province had the second highest average percentage score for grade 6 Mathematics; only Free State Province had a higher percentage mark of (64.8%). School 2 scored a significant lower average score of (31.40%) to the provincial average score of (63%) and further the national average score of (58.8%). In contrast School 3 scored a significant lower average score of (32.20%) to the provincial average score of (63%) and further the national average score of (58.8%).

Annual National Assessment achievement in Grade 6 Home Language by province in 2013.

SOUTH AFRICAN PROVINCE	Eastern Cape	Free State	Gauteng	Kwazulu Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape	National percentage Total (%)
AVERAGE	44,8	64,6	61,3	57,4	51,6	57,5	52,8	58,3	63	58,8

School 1 improvement (Year 1 – 2012 vs. Year 2 – 2013)

School 1 improvement (Year 1 – 2012 vs. Year 2 – 2013)

School 1 improvement (Year 1 - 2012 vs. Year 2 - 2013)

School 1(n=12)	Length	Weight	Reach	Pull ups	Standing long jump	27,5m sprint	800m	Push ups	Abdominal curls	Vertical jump	Hand wall toss	Rope skipping	Throw test	Vertical jump
Year 1 (Mean) 2012	1.379	32.083	1.779	1.500	134.333	5.117	4.053	13.583	23.833	21.958	7.417	60.750	6.375	1.999
Year 2 (Mean) 2013	1.475	39.957	1.886	4.043	159.565	4.564	3.430	24.826	32.130	30.391	18.957	87.783	7.609	2.190
Difference	0.096	7.873	0.106	2.543	25.232	-0.552	-0.623	11.243	8.297	8.433	11.540	27.033	1.234	0.191
Sig (95%)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F ratio	15.610	8.899	9.238	6.344	14.808	17.169	6.546	17.473	11.867	15.503	46.524	5.920	8.117	18.975
p-value	.000	.005	.004	.015	.000	.000	.014	.000	.001	.000	.000	.019	.007	.000

The above table reveals the Gross motor development improvement of School 1, for the sample of (n=12) that have been analysed in this research. The mean score Length improved from (M-1.379 in Year-1 to M-1.475 (measurement in centimetres) in Year-2) with a Difference of (0.096) with a “Yes” Sig (95%) and a (statistical significant p-value of .000). Weight improved from (M-32.083 in Year-1 to M-39.957 (measurement in kilograms) in Year-2) with a Difference of (7.873) with a “Yes” Sig (95%) and a statistical significant p-value of (.005). Reach improved from (M-1.779 in Year-1 to M-1.886 in Year-2) with a Difference of (0.106) with a “Yes” Sig (95%) and a statistical significant p-value of (.004). Pull-ups improved from (M-1.500 in Year-1 to M-4.043 in Year-2) with a Difference of (2.543) with a “Yes” Sig (95%) and a (p-value of .015).

Standing Long Jump improved from (M-134.333 in Year-1 to M-159.565 (measurement in centimetres) in Year-2) with a Difference of (25.232) with a “Yes” Sig (95%) and a statistical significant p-value of (.000). The 27.5 m Sprint improved from (M-5.117 in Year-1 to M-4.564 (measurement in seconds) in Year-2) with a Difference of (-0.552) with a “Yes” Sig (95%) and a statistical significant p-value of (.000). The 800 m improved from (M-4.053 in Year-1 to M-3.430 (measurement in minutes/seconds in Year-2) with a Difference of (-0.623) with a “Yes” Sig (95%) and a (p-value of .014). Push-ups improved from (M-13.583 in Year-1 to M-24.826 in Year-2) with a Difference of (11.243) with a “Yes” Sig (95%) and a statistical significant p-value of .000). Abdominal curls improved from (M-23.883 in Year-1 to M-32.130 in Year-2) with a Difference of (8.297) with a “Yes” Sig (95%) and a statistical significant p-value of (.001).

Vertical Jump improved from (M-21.958 in Year-1 to M-30.391 (measurement in centimetres) in Year-2) with a Difference of (8.433) with a “Yes” Sig (95%) and a (statistical significant p-value of (.000). Hand Wall Toss improved from (M-7.417 in Year-1 to M-18.957 in Year-2) with a Difference of (11.540) with a “Yes” Sig (95%) and a statistical significant p-value of (.000). Rope Skipping improved from (M-60.750 in Year-1 to M-87.783 in Year-2) with a Difference of (27.033) with a “Yes” Sig (95%) and a (p-value of .019). Throw test improved from (M-6.375 in Year-1 to M-7.609 in Year-2) with a Difference of (1.234) with a “Yes” Sig (95%) and a (p-value of .007).

Vertical Height 2 – Actual Height jumped improved from (M-1.999 in Year-1 to M-2.190 in Year-2) with a Difference of (0.191) with a “Yes” Sig (95%) and a statistical significant (p-value of .000).

School 2 improvement (Year 1 – 2012 vs. Year 2 – 2013)

School 2 improvement (Year 1 – 2012 vs. Year 2 – 2013)

School 2 improvement (Year 1 - 2012 vs. Year 2 - 2013)

School 2 (n=22)	Length	Weight	Reach	Pull ups	Standing long jump	27.5m sprint	800m	Push ups	Abdominal curls	Vertical jump	Hand wall toss	Rope skipping	Throw test	Vertical Jump
Year 1 (Mean) 2012	1.359	32.068	1.620	1.818	126.273	4.860	3.659	11.864	20.136	20.227	7.818	49.182	6.091	1.822
Year 2 (Mean) 2013	1.456	40.318	1.814	3.636	151.136	4.435	3.318	23.227	30.955	28.227	20.909	78.045	7.136	2.095
Difference	0.097	8.250	0.194	1.818	24.864	0.424	0.341	11.364	10.818	8.000	13.091	28.864	1.045	0.273
Sig (95%)	Yes	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	No
F ratio	6.166	8.981	1.798	1.503	5.334	1.028	.780	17.462	13.980	10.398	98.098	6.422	3.702	2.783
p-value	.017	.005	.187	.227	.026	.316	.382	.000	.001	.002	.000	.015	.061	.103

The above table reveals the Gross motor development improvement of School 2, for the sample of (n=22) that have been analysed in this research. The mean score Length improved from (M-1.359 in Year-1 to M-1.456 (measurement in centimetres) in Year-2) with a Difference of (0.097) with a “Yes” Sig (95%) and a (p-value of .000). Weight improved from (M-32.068 in Year-1 to M-40.318 (measurement in kilograms) in Year-2) with a Difference of (8.250) with a “Yes” Sig (95%) and a statistical significant (p-value of .005). Reach improved from (M-1.620 in Year-1 to M-1.814 in Year-2) with a Difference of (0.194) with a “No” Sig (95%) and a (p-value of .187). Pull-ups improved from (M-1.81 in Year-1 to M-3.636 in Year-2) with a Difference of (1.818) with a “No” Sig (95%) and a (p-value of .227). Standing Long Jump improved from (M-126.273 in Year-1 to M-151.136 (measurement in centimetres) in Year-2) with a Difference of (24.864) with a “Yes” Sig (95%) and a (p-value of .026). The 27.5 m Sprint improved from (M-4.860 in Year-1 to M-4.435 (measurement in seconds) in Year-2) with a Difference of (-0.424) with a “No” Sig (95%) and a (p-value of .316).

The 800 m improved from (M-3.659 in Year-1 to M-3.318 (measurement in minutes/seconds in Year-2) with a Difference of (-0.341) with a “No” Sig (95%) and a (p-value of .382).

The observation showed that the coordinator at school 2 implemented an extra cross-country training programme before school for the sample at school 2. This action contributed to the enormous improvement of the 27,5m and 800m test results at school 2. Push-ups improved from (M-13.583 in Year-1 to M-24.826 in Year-2) with a Difference of (11.243) with a “Yes” Sig (95%) and a statistical significant p-value of .000). Abdominal curls improved from (M-20.136 in Year-1 to M-30.955 in Year-2) with a Difference of (10.818) with a “Yes” Sig (95%) and a statistical significant p-value of (.001). Vertical Jump improved from (M-20.227 in Year-1 to M-28.227 (measurement in centimetres) in Year-2) with a Difference of (8.000) with a “Yes” Sig (95%) and a (statistical significant p-value of .002). Hand Wall Toss improved from (M-7.818 in Year-1 to M-20.909 in Year-2) with a Difference of (13.091) with a “Yes” Sig (95%) and a statistical significant p-value of (.000). Rope Skipping improved from (M-49.182 in Year-1 to M-78.045 in Year-2) with a Difference of (28.864) with a “Yes” Sig (95%) and a (p-value of .015). Throw test improved from (M-6.091 in Year-1 to M-7.136 in Year-2) with a Difference of (1.045) with a “Yes” Sig (95%) and a (p-value of .061). Vertical Height 2 – Actual Height jumped improved from (M-1.822 in Year-1 to M-2.095 in Year-2) with a Difference of (0.273) with a “Yes” Sig (95%) and a (p-value of .103).

School 3 improvement (Year 1 – 2012 vs. Year 2 – 2013)

School 3 improvement (Year 1 – 2012 vs. Year 2 – 2013)

School 3 improvement (Year 1 - 2012 vs. Year 2 - 2013)

School 3 (n=16)	Length	Weight	Reach	Pull ups	Standing long jump	27,5m sprint	800m	Push ups	Abdominal curls	Vertical Jump	Hand wall toss	Rope skipping	Throw test	Vertical Jump
Year 1 (Mean) 2012	1.368	27.500	1.721	0.250	128.063	5.110	3.753	13.875	23.313	23.750	4.000	59.813	5.188	1.959
Year 2 (Mean) 2013	1.448	34.813	1.837	1.688	157.813	4.573	3.375	20.375	32.250	29.813	15.688	93.063	7.063	2.135
Difference	0.079	7.313	0.116	1.438	29.750	0.537	0.378	6.500	8.938	6.063	11.688	33.250	1.875	0.176
Sig (95%)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F ratio	11.565	20.486	13.705	9.458	18.437	12.147	7.555	8.611	18.533	13.376	67.257	5.028	11.499	17.445
p-value	.002	.000	.001	.004	.000	.002	.010	.006	.000	.001	.000	.032	.002	.000

The above table reveals the Gross motor development improvement of School 3, for the sample of (n=16) that have been analysed in this research. The mean score Length improved from (M-1.368 in Year-1 to M-1.448 (measurement in centimetres)

in Year-2) with a Difference of (0.079) with a “Yes” Sig (95%) and a statistical significant (p-value of .002). Weight improved from (M-27.500 in Year-1 to M-34.813 (measurement in kilograms) in Year-2) with a Difference of (7.313) with a “Yes” Sig (95%) and a statistical significant (p-value of .000).

Reach improved from (M-1.721 in Year-1 to M-1.837 in Year-2) with a Difference of (0.116) with a “Yes” Sig (95%) and a statistical significant (p-value of .001). Pull-ups improved from (M-0.250 in Year-1 to M-1.688 in Year-2) with a Difference of (1.438) with a “Yes” Sig (95%) and a statistical significant (p-value of .004). Standing Long Jump improved from (M-128.063 in Year-1 to M-157.813 (measurement in centimetres) in Year-2) with a Difference of (29.750) with a “Yes” Sig (95%) and a statistical significant (p-value of .000). The 27.5 m Sprint improved from (M-5.110 in Year-1 to M-4.573 (measurement in seconds) in Year-2) with a Difference of (-0.537) with a “Yes” Sig (95%) and a statistical significant (p-value of .002). The 800 m improved from (M-3.753 in Year-1 to M-3.375 (measurement in minutes/seconds in Year-2) with a Difference of (-0.378) with a “Yes” Sig (95%) and a (p-value of .010).

Push-ups improved from (M-13.875 in Year-1 to M-20.375 in Year-2) with a Difference of (6.500) with a “Yes” Sig (95%) and a (p-value of .006). Abdominal curls improved from (M-23.313 in Year-1 to M-32.250 in Year-2) with a Difference of (8.938) with a “Yes” Sig (95%) and a statistical significant p-value of (.000). Vertical Jump improved from (M-23.750 in Year-1 to M-29.813 (measurement in centimetres) in Year-2) with a Difference of (6.063) with a “Yes” Sig (95%) and a statistical significant (p-value of .001). Hand Wall Toss improved from (M-4.000 in Year-1 to M-15.688 in Year-2) with a Difference of (11.688) with a “Yes” Sig (95%) and a statistical significant p-value of (.000).

Rope Skipping improved from (M-59.813 in Year-1 to M-93.063 in Year-2) with a Difference of (33.250) with a “Yes” Sig (95%) and a (p-value of .032). Throw test improved from (M-5.188 in Year-1 to M-7.063 in Year-2) with a Difference of (1.875) with a “Yes” Sig (95%) and a statistical significant (p-value of .002). Vertical Height 2 – Actual Height jumped improved from (M-1.959 in Year-1 to M-2.135 in Year-2) with a Difference of (0.176) with a “Yes” Sig (95%) and a statistical significant (p-value of .000).

Percentage change in IMAD+ test battery scores 2012 – 2013

Percentage change in IMAD+ test battery scores 2012 - 2013

Total (n=50)	Length	Weight	Reach	Pull ups	Standing long jump	27,5m sprint	800m	Push ups	Abdominal curls	Vertical jump	Hand wall toss	Rope skipping	Throw test	Vertical jump
Year 1 (Mean) 2012	1.367	30.690	1.692	1.240	129.680	4.987	3.831	13.020	22.100	21.620	6.200	59.060	5.740	1.908
Year 2 (Mean) 2013	1.459	38.280	1.837	3.180	156.640	4.494	3.392	23.400	31.740	29.540	18.160	88.420	7.240	2.132
Difference	0.091	7.590	0.145	1.940	26.960	0.493	0.438	10.380	9.640	7.920	11.960	29.360	1.500	0.224
% Change	6.7%	24.7%	8.6%	156.5%	20.8%	9.9%	11.4%	79.7%	43.6%	36.6%	192.2%	49.7%	26.1%	11.8%

The data revealed in above table indicates that an overall percentage improvement from pre-test - 2012 to post-test - 2013 testing mean scores were recorded for all tested fields. The researcher arranged the data in Table 8.9 according to the percentage change from the largest to the smallest.

- Hand wall toss, pre-test - 2012 (M-6.200) to post-test - 2013 (M-18.160). Total percentage score improvement of 192.2%.
- Pull Ups, pre-test - 2012 (M-1.240) to post-test - 2013 (M-3.180). Total percentage score improvement of 156.5%.
- Push Ups, pre-test - 2012 (M-13.020) to post-test - 2013 (M-23.400). Total percentage score improvement of 79.7%.
- Rope Skipping, pre-test - 2012 (M-59.060) to post-test - 2013 (M-88.420). Total percentage score improvement of 49.7%.
- Abdominal Curls, pre-test - 2012 (M-22.100) to post-test - 2013 (M-31.740). Total percentage score improvement of 43.6%.
- Vertical Jump, pre-test - 2012 (M-21.620) to post-test - 2013 (M-29.540). Total percentage score improvement of 36.6%.
- Throw Test, pre-test - 2012 (M-5.740) to post-test - 2013 (M-7.240). Total percentage score improvement of 26.1%.
- Standing Long Jump, pre-test - 2012 (M-129.680) to post-test - 2013 (M-156.640). Total percentage score improvement of 20.8%.

- Vertical Height 2 – Actual Height jumped, pre-test - 2012 (M-1.908) to post-test - 2013 (M-2.132). Total percentage score improvement of 11.8%.
- 800m, pre-test - 2012 (M-3.831) to post-test - 2013 (M-3.392). Total percentage score improvement of 11.4%.
- 27.5m Sprint, pre-test - 2012 (M-4.987) to post-test - 2013 (M-4.494). Total percentage score improvement of 9.9%.

The following test were only used as a measurement in the IMAD+ test battery, the percentage change are as follow:

- Weight, pre-test - 2012 (M-30.690) to post-test - 2013 (M-38.280). Total percentage score improvement of 24.7%.
- Reach, pre-test - 2012 (M-1.692) to post-test - 2013 (M-1.837). Total percentage score improvement of 8.6%.
- Length/Height, pre-test - 2012 (M-1.367) to post-test - 2013 (M-1.459). Total percentage score improvement of 6.7%.

Appendix F

IMAD+ Seminar Invitation



Innovative
motor ability &
development

Verwysing
Reference : Seminar
Navrae
Enquiries : Cyril Lawless / Sors Joubert
Telefoon
Telephone : 021 873 7486 / 021 873 7843
www.imadplus.co.za

Dear Name

The IMAD + seminar on structured physical activity and motor development is an important forum for the dissemination of information that will contribute towards the evolution of theory into practice. Additionally, the seminar serves to promote cooperation between individuals involved in research and those who are responsible for the implementation of programs associated with engagement in physical activity. The key aim of the seminar is to gather experts from the above mentioned areas to present their perspectives so as to assist in the continuing development of research into the teaching and learning of motor skills. Delegates attending the seminar will have the opportunities to liaise with each other to both acquire new ideas and share current information in regards to future studies and improved practices in the area of motor skill development.

IMAD + are auspicious to have invited some of the most renowned experts in sport development, sport science and social upliftment all under one roof and we would value your attendance.

The following guest speakers will attend the seminar;

Gert Oosthuizen, Deputy Minister of Sport
Prof. Tim Noakes, Sport Science Institute Cape Town
Nadi Albino, Unicef South Africa – Chief of Education
Anneke van der Niet, Groningen University, The Netherlands
Sors Joubert, IMAD+
Jurie Joubert, Centre for Multi Grade Education – Wellington
Ashwin Willemse, Ex Springbok Rugby player/TV Presenter

IMAD+ is hosting its 1st seminar on the 18 September 2012. You are invited to a discussion on structured physical activity and motor development in primary rural schools at Lemoenkloof, Guesthouse, Paarl at 9:30 am.

Please R.S.V.P before 31 August 2012

Best Regards
IMAD +

innovative motor ability and development



Video material of the seminar in **Appendix G**

Appendix G (Appendix CD)

IMAD+ Programme

Photos

Supersport – Broadcast material – Let's Play

IMAD+ Promotional video.

Video material from IMAD+ seminar.