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THE ROLE OF ACTIVE TEACHING PROGRAMMES IN ACADEMIC SKILLS ENHANCEMENT OF GRADE 2 LEARNERS IN THE STELLENBOSCH REGION

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ABSTRACT

The premise of this study focused on the holistic approach to the human body, mainly the connection between the brain and the body. Learners attend school as holistic beings and both the body and the brain require sufficient stimulation throughout the day. The primary purpose of the current study was to determine the effect of two intervention programmes presented over a period of 8 weeks: (1) an integrated academic skills and physical development programme; and (2) a moderately intensive physical activity programme, on Grade 2 learners' academic abilities, particularly with regard to literacy and numeracy skills. The Grade 2 learners (N=149) originated from two schools (School A [n=76]: boys=35, girls=41; School B [n=73]: boys=35, girls=38). Data was collected by means of a pre- and post-test. The measuring instruments used were the VASSI Mathematical Skills Test and the ESSI Reading and Spelling Test. The results indicated that both schools showed progress in literacy and numeracy, although it was not statistically significant ($p<0.05$). Based on the results obtained by the current study, general recommendations were made for the education practice. It is essential to recognise the importance of physical activity as it can have an effect on the holistic development of the child.

Key words: Holistic development; Physical activity; Physical Education; Life Orientation/Life Skills; Literacy and numeracy skills.

INTRODUCTION

There is currently an increasing and alarming realisation that many school going learners fall through the academic cracks. Archaic teaching methods, unqualified teachers, overcrowded classrooms, financial problems, lack of facilities, unwilling teachers and inadequate knowledge and skills about the curriculum are examples of factors that have a direct impact on South African schools (Van Deventer, 2009; Curry, 2011). According to Mji and Makgato (2006), the above-mentioned factors affect learners' academic performance directly, which has an impact on the child's future. Kokot (2006) believes that, although regular changes in both the education system and teaching methods are made, learning problems still occur among learners. According to Kokot (2010:7), 51% of all learners in South Africa (SA) experience moderate to severe problems in two or more academic areas.

Pica (2011) argues that academic skills are part of children's lives from an early age and the acquisition of motor skills is not always seen as important as academic skills. Fredericks *et al*. (2006) suggests that the impact of movement programmes on academic and cognitive skills are ignored by society on a regular basis. It seems as if society is under the impression that the body and mind function as separate entities and that the brain is equipped with more important functions than the body.

De Jager (2007) suggests that the body and brain are interconnected during the learning process. When something new is learned, the whole body comes into play. Every part of the body makes a unique contribution to the learning process. Unfortunately, the reality is that children are expected from an early age to take a static position behind the desk, focusing only on the blackboard during an academic lesson (Hannaford, 1995). According to De Jager (2008), it is ironic that all processes (including conception, development in the womb, the physical growth process, childbirth, breathing, reaching developmental milestones and the use of senses) are active processes. This suggests that children need time, space and opportunities for movement. It is also said that if children are not confident, from a young age, in the development of their motor skills, complications can occur in other areas such as the cognitive, emotional and social domains (Hendricks, 2004). It appears that society believes that the development of motor skills is a natural process that occurs as children grow older (Pica, 2011). However, research shows the contrary (De Jager, 2008). Although it is natural for children to constantly want to move, like run, jump, roll, swing and crawl, it is imperative that formal and structural movement experiences must be created during the school day.

Opportunities within school Physical Education (PE) have steadily declined since 1994 and a scarcity of movement experiences during the school day is evident (Trost & Van der Mars, 2010). In SA, PE followed the same route as in other countries, such as in the UK, Australia and the USA. Since 1994 it was officially no longer recognised as part of the South African school curriculum and currently only forms a focus area of the subject Life Orientation/Life Skills.

The primary purpose of the first democratic government in SA was to transform the education system. During apartheid, SA had more than 19 different education departments. It was divided by way of race, geography and ideology (DOE, 2001). This education system prepared children for different social, economic and political roles, as determined by the apartheid regime. According to Rooth (2005), the South African education system was established on highly authoritarian and strict Christian values. This led to an uneven distribution of resources, such as the pursuit of a content driven curriculum that was biased towards certain races, as well as separate education departments for each race group. Rooth (2005) believes that the quality of teaching and learning, as well as the lives of many South Africans, were negatively impacted. The education departments had to merge so that a new, post-apartheid and democratic national curriculum for all could be developed.

The first major curriculum statement of the new democratic SA was the Lifelong Learning through a National Curriculum Framework document published in 1996 (DOE, 2001:4). It emphasised the importance of change in education and training in SA, the normalisation and transformation of teaching and learning, and the need for outcomes-based education (OBE).

In 1998, the first OBE curriculum, namely Curriculum 2005, was implemented in schools. The principles of Curriculum 2005 focused on the new South African constitution, which was based on human rights, equality, inclusiveness and social and environmental justice (Rooth, 2005). This curriculum defined specific outcomes and standards in specific learning areas. Although impracticalities have occurred within Curriculum 2005, it formed the basis on which the curriculum could be reviewed (Rooth, 2005). Curriculum 2005 was reviewed in 2000 after which it was renamed the National Curriculum Statement (NCS), which is an outcome-based, integrated knowledge system that focuses on a learner-centred methodology (Van Deventer, 2009).

According to Van Deventer (2009) transformation in the South African education system introduced not only Curriculum 2005 and OBE, but also a new learning area, namely Life Orientation. Life Orientation is one of eight subjects in the NCS. The scope of Life Orientation is aimed to develop learners on a personal, psychological, cognitive, physical, moral, spiritual, cultural and socio-economic level and for them to reach their full potential in a new democratic SA (DOE, 2003). Motor skills development and movement activities that are offered during Life Orientation, seek to form the foundation of sport skills and all learners are encouraged to take part in learner-centred, inclusive and integrated movement programmes. It encourages healthy living practices and mutual respect for other individuals (DOE, 2011). Life Orientation, therefore, attempts to assist teachers to develop and teach learners in a holistic, balanced and integrated way (Hendricks, 2004).

According to Hendricks (2004), holistic education focuses on the experience of intellectual, emotional, social, physical, creative and spiritual teaching. It is important that children not only participate in learning experiences inside and outside of the classroom, but also communicate with each other on a physical level so that positive interaction takes place between them. The problem is that the physical (movement) component of Life Orientation is not being taught in most public schools in SA (Pienaar, 2009; Van Deventer, 2009).

This phenomenon makes it difficult for learners, parents and teachers to believe that exercise is beneficial and that movement might have a positive effect on the body and the brain (Summerford, 2001). Coe *et al*. (2006) states that one of the many reasons for the absence of PE can be attributed to teachers and parents that believe participation in physical activity might interfere with learners' academic success. The Department of Education may also reason that funds spent on physical activities can be better utilised in other academic environments. According to Hendricks (2004), PE contributes to the functioning of most of the body's systems, including the skeletal, nervous and muscular systems. It also contributes to children's cognitive, motor and emotional development. Despite the benefits associated with participation in physical activities, children are far less active than in the past (Aldahesh, 2012). Except for reasons already mentioned in the literature, the blame can be placed on aspects such as electronic and/or social media, the high crime rate in SA (making it too dangerous for children to play outside unsupervised), and the absence of structured movement experiences in schools (Krog, 2010). Golden *et al*. (2006) believes that the school environment is the ideal place to provide opportunities to promote physically active lifestyles among children because they spend a large amount of time during the day at school.

In SA, this study can make an important contribution to similar research that has already been conducted in the area of the relationship between movement programmes and learning abilities. PE is not considered with the required seriousness it deserves and children are deprived of the holistic benefits it poses. The present study aims to establish whether a relationship exists or not between participation in structured physical activities and cognitive functioning (specifically literacy and numeracy).

PROBLEM STATEMENT

The main problem was to determine whether two intervention programmes: (1) an integrated academic skill and physical development programme; and (2) a moderately intensive physical activity programme), had an impact on Grade 2 learners' academic abilities, especially in terms of literacy and numeracy skills.

The sub-problems of the research were:

- to determine whether there was a significant difference between the participant's literacy and numeracy results before and after the intervention programmes;
- to determine whether there was a significant difference between the results and outcomes of both intervention programmes and whether the results and outcomes of the intervention programmes can be compared in terms of academic skills; and
- to determine whether boys' and girls' academic skills were influenced differently by the intervention programmes.

METHODOLOGY

Ethical issues

Ethical approval was obtained from the Ethics Committee of Stellenbosch University (No. HS703/2011), and permission to perform the study in the schools was obtained from the Western Cape Education Department (WCED). The principals of the schools were approached by means of a formal letter explaining the aim and protocol of the study and requesting permission to perform the study during school hours. Consent forms had to be completed and signed by the Grade 2 learners' parents. Information regarding the procedures of the study was explained in the consent form. If the learners' parents agreed, the learners also had to sign an assent form agreeing to participate in the study.

Participants

The study took place at two primary schools (School A= Quintile 5; School B= Quintile 2) in the Stellenbosch area. The participants in the study were Grade 2 Afrikaans-speaking learners.

Only 6 Grade 2 classes (N=149) were made available for the purpose of this study. Because of the rules that the schools set, it was not possible to randomly select the sample, therefore, a convenient sample was used. The participants from School A (n=76) consisted of 35 boys and 41 girls, while there were 35 boys and 38 girls from School B (n=73) (Table 1). The average age of the participants in School A and School B was 7.33 years and 7.47 years respectively.

***TABLE 1*: PARTICIPANTS**

Variable	School A	Variable	School B	Total
Boys	35	Boys	35	70
Girls	41	Girls	38	79
Total	76	Total	73	149
Mean age (yrs)	7.33	Mean age (yrs)	7.47	

Two Grade 2 groups, one from each school, served as the experimental groups (n=97) and took part in the intervention programmes. One group from each school served as the control group (n=52) who did not participate in the intervention programmes and went about their school day as usual. The experimental and control groups were randomly assigned.

Measuring instruments

Numeracy and literacy

Standardised tests were used to measure the literacy and numeracy skills of Grade 2 learners. The standardised tests used during the pre- and post-test were the VASSI Mathematical Skills Test and the ESSI Reading and Spelling Tests.

The VASSI Mathematical Skills Test is a South African assessment tool that was originally designed for diagnostic purposes (Vassiliou, 2004). The test is standardised for English-, Afrikaans- and Sotho-speaking learners in the Foundation Phase (Grades 1-3), and in the Intermediate Phase (Grades 4-6). The test determines whether a learner experiences math problems and if so, in which particular area the problem occurs. It also determines whether learners meet the expectations of the curriculum and indicates which cognitive processes require stimulation (Vassiliou, 2004). The specific cognitive processes refer to receiving, interpreting, organising, implementing, memory and problem-solving skills that apply during mathematical tasks. The VASSI Mathematical Skills Test can identify and address these problems. Assessment can be conducted in groups or individually. Specific items were removed from the test that could be harmful to cultural groups, making it a reliable and valid measurement tool (VGM, 2004).

The ESSI Reading and Spelling Skills Test is a South African assessment tool that can be applied diagnostically. English- and Afrikaans-speaking Grade 1-7 learners can participate in this test. The rationale of the tests is based on the belief that reading and writing skills not only have an impact on learners' achievement levels in language subjects, but also affects other academic subjects. Therefore, the assumption can be made that learners with spelling and/or reading problems will also experience other learning problems. Thus, it would affect their overall school performance adversely (Esterhuyse, 1997).

Intervention programmes

The current study focused on an integrated academic skill and physical development programme and a moderately intense physical activity programme to find a possible relationship between academic skills and participation in physical activities for Grade 2 learners. Both programmes were implemented over a period of 8 weeks consisting of 3 days a

week, 30 minutes per day.

The *integrated* academic skills and perceptual-motor development programme was presented outside the classroom. The two experimental groups in both schools participated in this programme. The programme focused on sensory- and perceptual-motor skills that form the basis of cognition and intellect, which is of vital importance for academic progress (Kranowitz & Newman, 2010). During this programme the learners participated in a series of integrated activities. The activities were designed to stimulate the following sensory and perceptual-motor skills: balance; bilateral coordination; body awareness; directionality; laterality; midline crossing; and spatial orientation.

The *intensive* physical activity programme was presented outside of classroom where the two experimental groups in both schools participated in moderate to strenuous activities which included the following activities: appropriate warm-up activities; stretching exercises; strength and resistance exercises; aerobic/cardiovascular activities; and appropriate cooling down activities. The outcomes of this programme focused specifically on the possible positive correlation between academic performance and moderate to intense physical activity.

The experimental and control groups both completed the standardised literacy (ESSI Reading and Spelling Test) and numeracy (VASSI Mathematical Skills Test) tests 1 week before and 1 week after the intervention programmes were implemented. The pre-test was conducted in the first week of the study (week 1). The experimental groups of both schools were involved in the intervention programmes, where they participated in either the 1) integrated academic skill and perceptual-motor development programme or the 2) moderately intensive physical activity program (weeks 2 to 9). On completion of the intervention programmes, both the experimental and control groups completed the post-test (week 10). A research assistant helped the researcher to conduct the pre-test of the Grade 2 learners. The test instructions were given verbally and the answers were completed in the test booklet supplied by the researcher. The researcher conducted the post-test individually, with the aid of some of the teachers from both schools.

Research design

In this study a quasi-experimental design was used. The study took place in schools that were conveniently selected due to financial constraints. Quantitative data were used and the data was converted into numerical form for statistical analyses.

Statistical analysis

The statistical analysis was performed by the Centre for Statistical Consultation at Stellenbosch University. Before and after measurements between the different treatment groups were compared using a mixed model, repeated observations and analysis of variance. This type of analysis was chosen as before and after measurements (repeated measurements), which was performed on the same children. Descriptive results are reported through averages and standard deviations. The level of significance chosen was 5% ($p<0.05$).

RESULTS AND DISCUSSION

Before the study commenced, it became clear that the participants of the respective schools' differed in literacy and numeracy abilities, as well as in their participation in physical activities. The statistical analysis indicated that the schools as independent variables played a role in the effect of the intervention, namely the third-order interaction. This interaction is indicative of the school's role in the effect of the intervention. The results were statistically insignificant and, therefore, the tendencies or possibilities (second-order interaction) were considered.

***TABLE 2*: ACADEMIC SKILLS: P-VALUE AND PERCENTAGE IMPROVEMENT (Pre- vs. post-tests within a school)**

Variable	Pre (n)	Post (n)	Experimental variable	Pre-Test M±SD	Post-Test M±SD	**p-Value	Improvement
School A (n=76)							
Vassi Math	25	25	*Integrated Pr.*	47.5±23.1	52.9±29.8	0.65	11%
	26	26	*Intensive Pr.*	62.9±27.9	66.6±27.0		6%
	25	25	*Control group*	47.5±29.4	57.6±26.0		21%
Essi Spelling	25	24	*Integrated Pr.*	63.7±58.2	87.5±50.1	0.33	37%
	26	26	*Intensive Pr.*	88.4±58.6	116.3±57.7		32%
	25	25	*Control group*	99.5±62.5	121.0±51.1		21%
Essi Reading	24	25	*Integrated Pr.*	121.3±34.9	159.5±43.5	0.83	31%
	25	26	*Intensive Pr.*	100.0±62.0	130.6±59.1		31%
	24	20	*Control group*	125.5±51.6	175.6±19.4		40%
School B (n=73)							
Vassi Math	23	23	*Integrated Pr.*	10.6±13.5	22.8±23.0	0.40	78%
	23	22	*Intensive Pr.*	16.0±16.5	30.7±26.2		92%
	27	23	*Control group*	9.4±11.2	16.7±13.4		115%
Essi Spelling	22	22	*Integrated Pr.*	49.2±29.0	61.4±27.7	0.009*	25%
	23	23	*Intensive Pr.*	17.9±15.3	41.2±24.5		130%
	26	27	*Control group*	35.8±26.7	42.7±28.1		19%
Essi Reading	23	23	*Integrated Pr.*	90.5±76.7	104.2±67.9	0.10	13%
	22	23	*Intensive Pr.*	59.6±67.9	76.6±67.0		30%
	26	26	*Control group*	43.2±60.0	47.3±57.9		0%

*p<0.05 **= Second-order interaction

According to the second-order interaction, the result of School A (VASSI Mathematical Skills Test: p=0.65; ESSI Spelling Test: p=0.33; ESSI Reading test: p=0.83), and School B (VASSI Mathematical Skills Test: p=0.40, ESSI Spelling Test: p=0.009; ESSI Reading Test: p=0.10), was also statistically insignificant (p<0.05) (Table 2). The inference that can be made was that the improvements for both schools were the same. Based on the non-significant third- and second-order interactions, it was, therefore, possible to determine the

effect of the intervention (if any) without distinguishing between the two schools.

***TABLE 3*: VASSI MATH: MEANS AND STANDARD DEVIATIONS FOR PRE- AND POST-TESTS FOR EXPERIMENTAL AND CONTROL GROUPS**

	Control group		**Exp. Gr. 1 Integrated program**		**Exp. Gr. 2 Intensive program**		****p-Value**
School A & B	Pre-test (n=50) M±SD	Post-test (n=47) M±SD	Pre-test (n=47) M±SD	Post-test (n=47) M±SD	Pre-test (n=49) M±SD	Post-test (n=48) M±SD	
VASSI Math	28.3±29.0	38.0±29.6	33.0±24.6	42.9±28.7	38.4±35.0	46.5±34.2	0.33
% Improve-ment	34%		30%		21%		

*p<0.05; **= Second-order interaction M= Mean; SD= Standard Deviation

Table 3 shows that an improvement occurred from the pre- to the post-test in all 3 groups (the control- and the 2 experimental groups). It is evident in Table 3 that no statistically significant differences (p<0.05) between School A and B's interaction p-value (p=0.33), from the pre-to post-test, occurred. The latter improvements do not refer to the impact of the intervention programmes, but to the improvement of the participants' normal scholastic development (in mathematical and literacy abilities) from the pre-to post-test.

***TABLE 4*: ESSI SPELLING: MEANS AND STANDARD DEVIATIONS FOR PRE- AND POST-TESTS FOR EXPERIMENTAL AND CONTROL GROUPS**

	Control group		**Exp. Gr. 1 Integrated program**		**Exp. Gr. 2 Intensive program**		****p-Value**
School A & B	Pre-test (n=50) M±SD	Post-test (n=50) M±SD	Pre-test (n=47) M±SD	Post-test (n=46) M±SD	Pre-test (n=49) M±SD	Post-test (n=49) M±SD	
ESSI Spelling	67.9±57.4	80.8±57.6	56.9±47.0	75.0±42.6	55.3±56.2	81.1±58.7	0.007*
% Improve-ment	19%		32%		47%		

*p<0.05; **= Second-order interaction M= Mean; SD= Standard Deviation

Based on the second-order interaction, Table 4 shows that for both schools together the p-value (p=0.007) with regard to spelling was significant. This means that there was a tendency that the intervention programmes had a statistical significant (p<0.05) effect on spelling. The moderately intensive physical activity programme indicated the best improvement (in percentage), between the control- and experimental groups. There is a strong possibility that this programme had a significant effect on the spelling skills of the experimental groups. It would, therefore, be worthy to conduct further research.

***TABLE 5*: ESSI READING: MEANS AND STANDARD DEVIATIONS FOR PRE- AND POST-TEST FOR EXPERIMENTAL AND CONTROL GROUPS**

School A & B	**Control group**		**Experimental Gr: Integrated program**		**Experimental Gr.: Intensive program**		****p-Value**
	Pre-test (n=50) M±SD	Post-test (n=45) M±SD	Pre-test (n=46) M±SD	Post-test (n=47) M±SD	Pre-test (n=47) M±SD	Post-test (n=49) M±SD	
ESSI Reading	82.7±69.2	100.9±77.9	104.7±60.3	132.0±62.8	80.8±67.4	105.3±67.8	0.15
% Improve-ment	22%		26%		30%		

*p<0.01; **= Second-order interaction M= Mean; SD= Standard Deviation

According to the second-order interaction p-value (p=0.15) (Table 5), it is clear that no statistically significant difference (p<0.05) with regards to reading occurred between the schools from the pre- to the post-test. From the latter, the conclusion can be made that the control- and experimental groups demonstrated an improvement from the pre- to post-test, regardless of the intervention. Therefore, improvement could be attributed to the participants' normal scholastic development (reading ability).

The statistical analyses further aimed to determine whether gender - as an independent variable - had an effect on the measurements during the period in which the intervention took place. The third-order interaction is an indication of the possible effect of the intervention on gender. According to the third-order interaction (VASSI Mathematical Skills Test: p=0.08; ESSI Spelling Skills Test: p=0.09; ESSI Reading Skills Test: p=0.32), the results were not statistically significant (p<0.01). Although the interaction p-values were not significant with regards to gender, it is clear that improvements occurred, but the improvements could be attributed to the participants' normal scholastic development.

From the averages and percentage improvements, the following tendencies among the boys and girls were derived:

- The boys that participated in the integrated and intensive intervention programmes showed better progress than the girls during the VASSI Mathematical Skill Test, specifically those who took part in the integrated programme.
- The girls that participated in the intensive intervention programme showed better progress than the boys in the ESSI Spelling Skills Test. The boys that participated in the integrated programme showed better progress in the ESSI Spelling Skills Test than the girls.

***TABLE 6*: GENDER: IMPROVEMENT, MEANS AND STANDARD DEVIATIONS FOR ACADEMIC SKILLS TESTS**

			VASSI Mathematical Skills Test		
Variables	Pre (n)	Post (n)	Pre-Test M±SD	Post-Test M±SD	Improve-ment
Boys					
Integrated programme	24	24	35.8±24.3	52.2±26.4	45%
Intensive programme	24	24	32.1±35.5	42.9±35.6	34%
Control group	21	21	29.4±31.5	34.7±33.1	18%
Girls					
Integrated programme	23	23	30.2±25.2	33.3±28.3	10%
Intensive programme	25	24	44.3±35.5	50.1±35.6	13%
Control group	29	26	27.5±28.2	40.6±26.7	48%
Third-order p-value				0.08	
			ESSI Spelling Test		
Variables	Pre (n)	Post (n)	Pre-Test M±SD	Post-Test M±SD	Improve-ment
Boys					
Integrated programme	24	24	52.2±40.7	73.6±35.3	41%
Intensive programme	24	24	45.0±49.6	67.2±55.8	22%
Control group	21	21	74.8±60.3	84.2±59.4	13%
Girls					
Integrated programme	23	22	61.7±53.3	76.5±50.2	24%
Intensive programme	25	25	65.1±61.2	94.4±59.5	45%
Control group	29	29	62.8±55.6	78.3±57.1	24%
Third-order p-value				0.09	
				ESSI Reading Test	
Variables	Pre (n)	Post (n)	Pre-Test M±SD	Post-Test M±SD	Improve-ment
Boys					
Integrated programme	23	24	113.5±53.6	144.5±54.7	27%
Intensive programme	23	24	66.9±64.9	89.0±69.0	33%
Control group	21	20	86.0±74.2	108.8±74.5	27%
Girls					
Integrated programme	23	23	96.0±66.3	119.0±69.0	24%
Intensive programme	24	25	94.1±68.3	120.9±64.0	28%
Control group	29	25	80.3±66.6	96.0±81.6	20%
Third-order p-value				0.32	

*p<0.01; M= Mean; SD= Standard Deviation

Therefore, it seems that the boys showed better progress in mathematical skills and that both the boys' and girls' spelling improved.

LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

Certain restrictions occurred during the execution of the intervention, which played a role in the outcome of the current study's results. In the discussion that follows, the general limitations of the study will be highlighted. General recommendations for further research in this field will follow.

Limitations

- The first limitation refers to the sample of the study. The sample does not represent the total population of Grade 2 learners in SA, but only learners in the Stellenbosch area. That is, the results obtained are not necessarily applicable for the rest of SAs Grade 2 learners. Therefore, generalisations regarding all Grade 2 learners could not be made.
- The participants' reading skills were a further limitation. Some of the Grade 2 learners' reading skills in both schools were limited. Therefore, the researcher and research assistant had to help the learners with the reading of the instructions for the questionnaires and tests (VASSI Mathematical Skills Test). Some learners could not work at their own pace because they had to wait until the questions were read. Other learners worked slowly and did not keep up with the questions being read. This was very time-consuming. The subjects completed the tests in a longer period than planned.
- The lack of space for the presentation of the intervention programmes also limited the study. Permission was obtained at both schools prior to the study and provision was made for the study, but space was still problematic. This led to the intervention programmes at School B mostly being presented in the parking area of the school.
- During the intervention a heat wave hit Stellenbosch, and which made the presentation of the intervention difficult. Some day's learners could not participate for the whole 30 minutes because of the warm weather conditions.
- The duration of the intervention could also have been limiting. The study was conducted over a period of 10 weeks. The first week was for the completion of the pre-tests. The next eight weeks (three sessions per week) were spent on the intervention programmes and the last week was set out for the completion of the post-tests. Only one term was spent on the intervention. The study of Wells (2012) confirms the effect of these limitations on the results of an intervention. According to Wells (2012) the timeline for a study can cause the intervention programmes to not make a significant statistical difference in scholastic abilities.

During the intervention the current study was too time-restricted for certain activities (or the number of repetitions) to be repeated. The children had only one chance to master some of the physical activities. According to Cheatum and Hammond (2000), new skills should be repeated regularly. This rehearsal of skills form connections between neurons and ensure definite neurological pathways. The neurological pathways are responsible for learning. A previous study supports these findings and also found that the period of an intervention programme may have an effect on the results of the study (Lubbe, 2010). In the present study

it was possible that the short duration of the intervention programmes might have had an effect on the outcome of the results and not specifically the skills of the intervention programmes. The latter is a possibility; however, both factors mentioned might have played a role in the results.

Recommendations

- A larger sample: There has already been referred to the fact that the results only apply to the sample that participated in this study. It is recommended that future studies use larger and more diverse samples. Subjects form different environments and cultures in SA can be used to form a larger, more diverse and representative sample. The findings of this study may be used as a starting point for further research.
- The period in which the study should take place: It might be beneficial for similar future studies to rather perform the research later in the year. For example, the study should rather take place in the third term than the first term of a new school year, especially with regards to the transition from Grade 1 to Grade 2. This would enable the subjects to already have the necessary reading skills they need to complete the pre- and post-test. It might also be beneficial to engage teachers in the reading of the questionnaires and measurement instruments to save time (Lubbe, 2010).
- Space to present the intervention programmes: It is suggested that future researchers should draft a schedule with the school before the commencement of the study. This schedule should indicate the available space and time for the intervention. It must be clarified with the teachers in advance.
- The duration of intervention: The proposal is that for future research the intervention programme (specifically the physical activity programmes), should be presented over a longer period. The assumption is that when the intervention takes place over a longer period, the effect of physical activities on several cognitive, emotional, social and physical domains may be observed. Engelbrecht and Green (2007) believe that the development of children is an integrated process, that is, all domains are interdependent. Elliot and Sanders (2002) supports this view and also believes that movement forms an integral part of children's development mechanisms.

CONCLUSION AND RECOMMENDATION

Despite the limitations of the current study, the information obtained is still useful in terms of the contribution of intervention programmes on the different developmental domains (physical, social, emotional and cognitive). The effect of movement on these domains creates an overall picture of the importance of physical activity programmes for young, developing children. The current study also highlights the need for physical activity programmes (Physical Education) in South African schools. It emphasizes the important role that physical activity programmes can play in the school environment. It also supports a holistic approach to teaching that leads to an optimal learning environment. With all the information available, it is strongly recommended that the role of Physical Education in schools is reconsidered.

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