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## Managing the Productivity of Hyperactive Children through Movement Education in Schools

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By

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### Abstract

*This is a study in which simulated games and sports were used as academic behaviour management of children with Attention deficit hyperactivity disorder(ADHD). With a quasi-experimental design, a laboratory experiment was done with 10 (5 control group members, 5 experimental group members) Junior Secondary School (Basic 7) students randomly selected by balloting from 150 hyperactive students diagnosed with the characteristics of excitability, poor concentration and impulsivity. The experimental group was treated with Dot-to-Dot game (for eye-hand-coordination), spelling Relay game (for logical reasoning) balloon volley ball (for physical and mental fitness) for 13 weeks. The two groups were pre-tested, taught by their teachers and post- tested in the same mathematical concepts. The hypothesis tested was there is no significant difference between the control and experimental groups in their performances in the post-test using t-statistic. A significant difference was found between the two and it was recommended that teachers should adapt simulated games and sports in teaching for enhanced productivity.*

Ufot [1979] stated that at each stage of a child's education, he deliberately works towards an examination and his environment forcibly lends weight to this approach to education. Thus the hyperactive child who does not find diversified curricular approaches to his/her learning finds it difficult to internalize concepts due to his short attention span for any task. This may make him drop out of school as he progresses from the junior to the higher level in his educational pursuit. It therefore becomes pertinent for other learning management measures to be adopted in the teaching/learning process of hyperactive children to facilitate high concentration, purposeful learning and increased assimilation of concepts.

Though from extant literature ( e.g Reeves & Schweitzer's, 2004 use of Ritalin or Adderall as medication for hyperactive children, Chronis et al, 2004 behaviour management and a combination of medication and behaviour management of hyperactive children ), various methods have been used in managing the learning behaviours of hyperactive children, not much has been done in the use of movement education (cognitive and physical exercises, perceptual – motor training with dotted shapes) to stimulate the cognitive functioning and long attention span of hyperactive children in Nigeria. Citing Frost [1986], Salami [2004] stated that movement in physical education is a carefully planned sequence of learning experiences designed to fulfill the growth, development and behaviour needs of each individual. Salami further emphasized that, movements can be regarded as sequential learning experiences when there is a properly planned curriculum and guidance to school children. Thus any activity that is being used to sensitise the interest of children with short attention span has to be structured to have much effect. The problems in sustaining attention were found by Tsal, Shalev., and Mevorach (2005) as the most common type of attention problem in children with Attention deficit hyperactivity disorder (ADHD). Though Rebollo and Montiel (2006) found that exercise increases the levels of two neurotransmitters, dopamine and norepinephrine that improve concentration, not much exercises have been adapted in a classroom management of Attention deficit hyperactive children.

However, there are several investigations into ways of reducing the level of inattentiveness in children with Attention deficit hyperactivity disorder through practical learning. For instance Schwartz and Budd (1983) found that when students with dyscalculia (inability to understand and calculate mathematical concepts) have only written mathematical problems to solve, the concepts remain vague but when functional applications are used (e.g involving money or time), they can connect the concepts to their practical applications and demonstrate greater understanding. In support of this, Gallico and Lewis (1992) stated that teaching may focus on the use of money in fast food restaurants (e.g making change), grocery shopping (e.g comparing prices per unit or weight), and banking (e.g balancing a cheque book, calculating interest), cooking (e.g measurement), and transportation (e.g reading, keeping to schedules). Though such functional methods of learning have been found to have remarkable effects on the level of understanding of some mathematical concepts, exercises would have a long-term effect on remediating handicapping behavioural tendencies of inattentiveness, impulsivity, and learning difficulty that are characteristics of children with Attention deficit hyperactively disorder.

Extant literature have shown exercises to be highly effective in the cognitive management of exceptional children.

Oyundoyin and Adepoju's [2007] study of the effect of the following physical exercises, running on the spot, throwing and catching a ball, walking and running, hop, step and jump, and ring the skittle, on 10 mentally retarded students from the child clinic, Department of Special Education, University of Ibadan, Nigeria for a period of four weeks showed that physical exercises have significant effects on the body coordination vis-à-vis balancing, eye-hand coordination, zig zag movement, of mentally retarded students. However, Salami (2003) observed that the disabled children find it most difficult to take part in sporting activities because they are ashamed of their handicap or afraid of being injured. This might be a challenge to any teacher who tries to engage such students in physical exercises but with modern technology, disability can no longer be a hindrance to physical exercises. This can further be enhanced by making use of some simulated games with small groups of students under the supervision of the teacher.

The effects of games in enhancing the academic performances of disabled children cannot be overemphasized. For instance, a quasi-experimental study by Adelokun, Ogunyemi and Akinyode [2007] of 20 randomly selected JS 2 visually impaired students of the Kwara School for the handicapped, Ilorin, Nigeria, using a Chemistry Achievement test [CAT] and a self-designed treatment game based on the periodic table, elements, symbols [first twenty elements], and balancing of equations prepared with Braille paper having spur wheel, gum and labeled with slate and stylus, showed that game has positive influence on the academic performance of visually impaired. Hyperactive children have been diagnosed to present the following characteristics ADHD with predominantly inattention; ADHD with predominantly hyperactivity/impulsivity; ADHD with both inattention and hyperactivity/impulsivity (Santrock, 2008). Besides Klein & Rapin (1990) stated that ADHD children often have coexisting learning disabilities that are accentuated by hyperactivity and decreased attention span.

From Akinyode's (2007) finding, physical activity and games could be simulated in the classroom to manage students with Attention deficit hyperactivity disorder so as to broaden their learning horizon and intellectuality. Thus, this study focuses on the use of games and adapted physical activity (spelling relay, balloon volley ball, dot-to-dot diagrammatic tracing and interpretation) in managing the intellectual ability of children with Attention deficit hyperactive disorder methods.

## **Methods**

**Population:-** The population comprises 150 hyperactive students in Junior Basic 7 Education [Junior Secondary School 1] in Lagos state, Nigeria who were diagnosed using a Behaviour Observation Scale (BOS) and a check-list drawn from Conner's Rating Scale and American Psychiatric Association Diagnostic Criteria.

**Sample and Sampling Techniques:-** The study was a laboratory study in which 10 students were randomly selected by balloting amongst the Junior Secondary School 1 students diagnosed to have Attention deficit hyperactivity disorder. The choice of “Yes” was a criterion for selection of the sample made of a control group with 5 students and an experimental group with 5 students

**Design:** - This was a quasi-experimental design with control and experimental groups.

**Instrumentation:** - The instrument used to diagnose children with Attention deficit hyperactivity disorder was a Behaviour Observation Scale [BOS] and a Check-list drawn from Connors Rating Scale and American Psychiatric Association Diagnostic Criteria. The instrument has a test-retest reliability of 0.75 and concurrent validity on a pilot study of 50 students (25 each) of 0.65 using Pearson Product Moment Correlation Coefficient. It was face-validated by contemporary researchers in line with the original contents of the adapted rating scale and diagnostic criteria.

The instruments used to treat the experimental group were Dot-to-Dot learning Game, Balloon Volley Ball and Spelling Relay Games which are described in the Appendix. The treatment was to enhance their attention span and level of understanding of Mathematical Concepts.

**Procedure:** - The investigated hypothesis was there is no significant difference between the hyperactive students exposed to movement education and those not exposed to such activities in their academic performances. Both the control and Experimental groups were taught Mathematics by their regular class teacher for a period of 13 weeks, to ensure a uniform knowledge acquisition at the start of the experiment. Before the treatment of the experimental group, a pretest was administered on both groups in some Mathematical Concepts [addition, LCM, expansion, Co-ordination, Multiplication, Subtraction, Ratio, and algebraic Operations].

The experimental group was treated with Dot-to-Dot learning game [to enhance perceptual – Motor – Co-ordination], Spelling Relay game [for mental alertness and logical reasoning] and balloon volley ball [for physical and mental fitness] for a period of 13 weeks. The control group had no treatment. The whole sample was taught mathematics using the class curriculum for 13 week. At the end of the 13 week teaching, a post test was administered on both groups with questions from conversion to fraction, Ratio, LCM and algebraic expressions with bracket removal in Mathematics.

**Method of Data Analyses** -The data were analysed using percentages mean, standard deviation and t-statistic.

It was found that the prevalent hyperactive characteristics in a descending order in the control group are excitability [80mins], poor concentration [45mins], and difficulty in learning [45mins], impulsivity [20mins] and mood changes [20mins]. The prevalent hyperactive characteristics in a descending order in the experimental group are excitability [65mins], poor concentration [40mins], difficulty in learning [45mins], impulsivity [25mins] and mood changes [25mins] using the Behaviour Observation Scale. [cf appendix for characteristics of hyperactivity sub-types]. The check-list was used to determine the level of involvement in hyperactive behavioural tendencies by the sampled students which are as indicated in table 1.

**Table 1: - The Level of Involvement in Hyperactive Tendencies By the Sample Students From the Check-List [Cf Appendix For The Characteristics].**

<b>Subject</b>	<b>Control Group Percentage involvement %</b>	<b>Experimental Group Percentage involvement %</b>
1.	53.33	20.00
2.	73.33	46.67
3.	60.00	53.33
4.	53.33	80.00
5.	53.33	46.67

Data in table 1 indicate that based on the level of involvement in hyperactive characteristics, the students used for the study are essentially hyperactive and need to be managed behaviourally for better productivity. Their degrees of hyperactivity are further highlighted in the bar charts in fig.1.

**FIG. 1: Bar Chart Showing the Levels of Hyperactivity of the Sample Students**

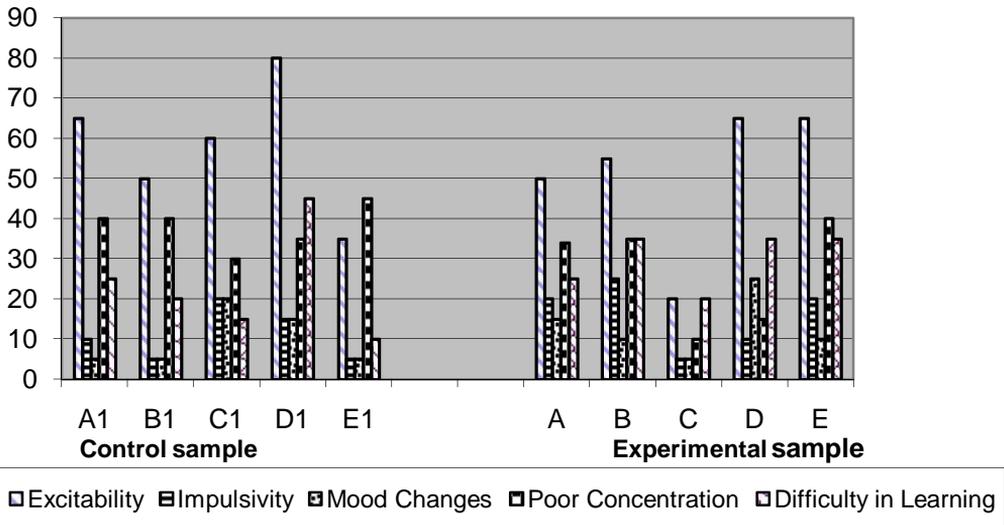


Fig 1 shows that observable characteristics exhibited by the sampled students. The students seemed to be highly excited, and with poor concentration at any form of task. All of them had difficulty in learning. Though they seemed to exhibit some measure of impulsivity and mood changes such behavioural tendencies were not to the levels of excitability, poor concentration and difficulty in learning whose management were the major focus of this study.

Table 2 shows the pre- and post-tests score of the subjects in the control and experimental groups.

**Table 2: Pre- and Post-test Results of the Control and Experimental Groups in Mathematical Exercises**

GROUP	Pre-Test	Total Mark = 20		Post-Test	Total Mark = 20	
	Control Group	Control Group	Experimental Group	Control Group	Control Group	Experimental Group
SUBJECT 1	4	4	5	7	7	14
SUBJECT 2	6	6	3	9	9	15
SUBJECT 3	5	5	6	6	6	13
SUBJECT 4	3	3	7	8	8	14
SUBJECT 5	4	4	9	5	5	9

MEAN	4.40	6.00	7.00	13.00
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The data in table 2 show that both the control and experimental groups are relatively below average in their academic performances. Though the scores in the post-test show some remarkable improvement, the control group members scored relatively too low.

A performance bar chart drawn from the data in table 2 as indicated in fig. 2 shows the experimental group to have a superior performance over the control group in the post-test of some mathematical concepts. Though the control group members improved in their post-test performances, the experimental group improved more. It seems the treatment they had, is responsible for their significantly improved performances in the post-test.

**FIG. 2: Performance Bar Chart of the Control and Experimental Groups at the Pre and Post - Tests of the Sampled Students**

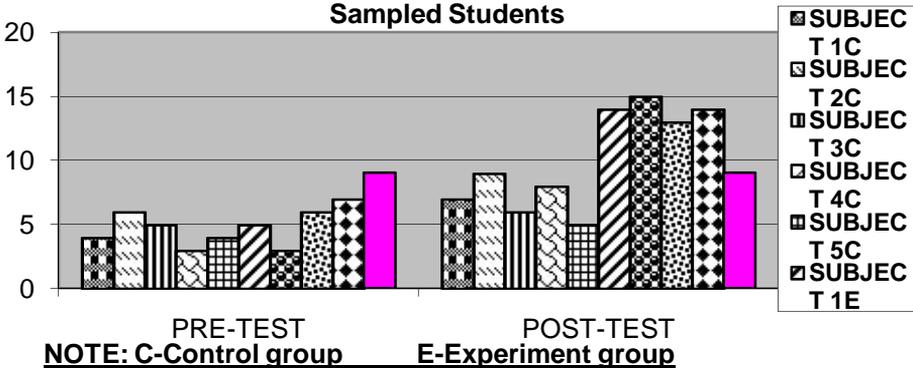


Table 3 shows the mean, standard deviation and t-test results for the pre-test and post-tests of the control group and the experimental group.

**Table 3: Mean, Standard Deviation and T-Test Results for the Pre-Test and Post-Tests of the Control Group and the Experimental Group.**

Group	N	Pre-test	Post-test	S.D	t – test
		Mean	Mean		
Control	5	4.40	7.00	7.12	1.12
Experimental	5	6.00	13.00	10.33	2.90*

**Note:**

**P < 0.05**

\* significant

**SD = Standard deviation**

**N = Total number**

**t<sub>9.05</sub> = 1.83**

### *The Intuition*

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A t- test analysis of the data in table 3 shows the calculated t 1.12 to be lower than the critical t 1.83 at 9 degrees of freedom and 0.05 level of significance in the control group and the calculated t 2.90 is higher than the critical t 1.83 at 9 degrees of freedom and 0.05 level of significance in the experimental group. Therefore, the null-hypothesis which states that there is no significant difference between the control and the experimental groups in their performances in the mathematical concepts at the post test was rejected and the alternative hypothesis which states that there is a significant difference between the control and the experimental groups in their performances in the mathematical concepts was accepted .

**Discussion** The subjects in this study showed the following hyperactive characteristics in a descending order, excitability, poor concentration, difficulty in learning, impulsivity and mood changes. There was a significant difference between the control group and the experimental group in the post-test of some mathematical concepts. There was an improved trend in the academic performance of the control group. However the experimental group performed significantly better than the control group in the investigated mathematical concepts. This may be due to their treatment with spelling relay game [for cognitive enlargement], dot-to-dot game [for perceptual-motor- co-ordination and enhancement of good concentration span] and balloon volley ball sport [for physical and mental fitness as well as social competence].

The treatment could have reduced some of the hyperactive tendencies thereby, enhancing better study skills and productivity. This finding of the effect of differentiated instruction is supported by the Council of Ontario Directors of Education (CODE) May, 2005 project reported by Dr. Rosemary Tannock, a researcher in Adaptive Technology, of the University of Toronto, Canada in her Research Monograph No.3. The Council of Ontario Directors of Education [CODE] project involved 75 supervisory officers, 21,000 school board employees and almost two million students. Evidence- based strategies such as differentiated instruction, assistive technology, and professional learning communities were introduced and monitored for their impact on student achievement. Overall, evaluations showed that the outcomes have been positive. Corroborating this, Ravis, Reches and Hecht's [1994] study of an intervention in Israel involving 92 preschool and 266 first grade children with experimental manipulation using school-based movement education programme showed that the experimental group had greater reading skills and arithmetic scores than control group.

However, Melnick, Sabo, and Vanfossen [1992] detected no relationship between academic achievement and sports participation in 3,686 African – American and Hispanic students from the “High-School and Beyond study”. Sports participation was however associated with a lower drop-out rate. The researchers then suggested

that if sports participation contributes to academic achievement, it may do so indirectly, by encouraging retention in school.

### **Conclusion**

The improved performance of the experimental group could be due to the treatment experienced by the group. Demonstration of words used in mathematical problems, using soccer terms, volley ball, relay terms, tracing and exposure to body movement could facilitate the proper understanding and assimilation of mathematical concepts or other educational concepts.

### **Recommendations**

Based on the findings in this study, it is therefore recommended that:

- (i) Teachers should embrace dot-to-dot game, spelling relay game, balloon volley ball game in their teaching methods to reduce poor concentration and poor activity amongst students.
- (ii) School administrators should set up Counseling Clinics and provide budgetary allocation for the clinics that could be used by counselors to equip the clinics with special developmental games and sporting outfits that can be adapted to the cognitive and behavioral management of hyperactive and other disabled children.
- (iii) Workshops, Seminars and Conferences should be organized regularly for parents and the significant others on techniques of managing hyperactivity using physical activity through parental collaboration for better productivity.
- (iv) Teachers should be patient with the hyperactive children during any teaching / learning process and encourage them by adopting diversified curricular approaches that involve conceptual illustration by physical activities.
- (v) Mental health of the hyperactive children can be enhanced by structured programmes of physical activities like the use of volley balls, rebounder or trampoline etc which are not too energy sapping and monotonous.
- (vi) teachers should be made to know through workshops, seminars and conferences that there is enough global scientific evidence confirming the existence and the detrimental impact of Attention deficit hyperactivity disorder [A.D.H.D.] on individuals [children and adults alike]. They should therefore be re-orientated towards such classroom practices, particularly the adaptive physical activities that can enhance their intellectual development.
- (vii) The curricula of all teacher-preparation programs should be made to embrace latest advances in educational intervention of Attention deficit hyperactivity disorder.

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**Appendix**

**Behaviour Observation Scale.**

**Tick as applicable. State age of pupil =**  
Behaviour

**class =**  
Measurement Observation

Time

		5	10	15	20	25	30	30	35	40min
1.	Calls across class to other children *									
2.	Will not start work when requested to do so. * * * * *									
3.	Snatches things from other children *									
4.	Chews pencil or biro cover * * * *									
5.	Forgets some writing materials at home * * * *									
6.	Performs poorly in relation to other pupils in class * * * * *									
7.	Stares out of window during lesson * * * *									
8.	Distracting other pupils in class by hitting them. *									
9.	Fighting in the playground * * *									
10.	Too noisy in class * *									

**Note:** Characteristics of sub-types of Hyperactivity

\* Excitability      \*\*\* Mood changes      \*\*\*\* Poor Concentration      \*\*\*\*\* Difficulty in learning

Asterck indicates characteristics of sub-types.

**Throw the Balloon Volley Ball:** Inflated balloons are used instead of conventional balls for this game and this can be done either sitting or standing. The net was made lower than the convectional height because of the use of balloon.

### **Spelling Relay**

Divide the group into two teams.

Line them up in file fashion; one behind the other. About 20ft in front of each team put a chair on which a complete set of alphabet letters is placed. The leader announces the number of letters in the word to be spelt in each team. If the word has 5 letters, the first five players in the line get ready. At the signal to go, they run to the cards, pick out the necessary letters and line up in the proper order holding the cards and facing the team. The first group to spell the word correctly wins a point for the team. This group then retires to the end of the line and the next players get ready. The leader attempts to use words that have each letter used only once. The teams are warned that if a word calls for the same letter in two places the player holding that letter must wave it back and forth from one position to the other to show its proper place in the word. Since only 5 students were in each team of two, each student was allowed to do the spelling in the team.

### **Check - list drawn from Connors Rating Scale and American Psychiatric Association Diagnostic Criteria for Attention Deficit hyperactivity Disorder.**

Tick as appropriate

Makes inappropriate noises / does not make inappropriate noises

Makes demands that must be met immediately / does not make demands that must be met immediately.

Easily distracted student / not easily distracted student.

Disturbs other students / does not disturb other students.

Daydreams at inappropriate time / does not daydream at inappropriate time.

Student's mood changes quickly and drastically / student's mood does not change quickly and drastically.

Student is restless and always "up and on the go" / student is not restless and always "up and on the go".

Excitable and impulsive / not excitable and not impulsive.

Makes excessive demands for teachers' attention / does not make excessive demands for teachers' attention.

Fails to finish things that he or she starts / Finishes things that he or she starts.

Exhibits childish immature behaviour / does not exhibit childish immature behaviour.

Easily frustrated in efforts / not easily frustrated in efforts.

Uncooperative with teacher / Cooperative with teachers.

Have difficulty in learning / does not have difficulty in learning.

### *The Intuition*

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Engages in physically dangerous activities without thinking of consequences / does not engage in physically dangerous activities.

Talks excessively / does not talk excessively.

Shifts from uncompleted activity to another / does not shift from one uncompleted activity to another.

Fidgets with hands or feet in seat / does not fidget with hands or feet in seat.

### **Dot-to-Dot Game**

This involves line drawing of dots presented to represent a shape.

The diagram is to be named and labeled by the respondent. In this study, shapes of mathematical concepts as well as concepts in the respondent home environment were utilized.