GPH INTERNATIONAL JOURNAL OF EDUCATIONAL RESEARCH
OPEN ACCESS
www.gphjournal.org

Original Research Paper | Vol. 04 Issue 06 June - 2021 | Manuscript ID: #0447

IMPACT OF COMPUTER SIMULATION INSTRUCTIONAL PACKAGE ON PHYSICAL EDUCATION PUPILS' MOTOR SKILLS DEVELOPMENT IN INDIVIDUALIZED LEARNING SETTINGS IN NIGER STATE, NIGERIA

HADIZA ASABE MOHAMMED PhD

Department of Physical and Health Education, College of Education, Minna, Niger State, Nigeria.

Corresponding author: *HADIZA ASABE MOHAMMED
Email: gwarbi@yahoo.com

ABSTRACT

The study examined the impact of a computer simulation instructional package on physical education pupils' motor skills development in an individualized learning setting in Niger State. The experimental research design was used and two research questions and two corresponding null hypotheses guided the study. Computer simulation instructional package and motor skills assessment and rating scale were used as research instruments. The instruments were subjected to experts' validation and reliability checks. Data collected were analyzed using Mean, Standard Deviation, and Analysis of Covariance (ANCOVA) in Statistical Package for Social Science (SPSS Version 20). Findings revealed that pupils' motor skills development when exposed to computer simulation instructional packages in individualized learning setting better than the demonstration method. Also, the motor skills of male pupils were better to enhance than that of their female counterparts. Based on the findings, it was recommended that teachers should adopt a computer simulation instructional package to replace the traditional means of teaching physical education.

KEYWORDS

Simulation instructional package, Physical education, gender, individualized learning

INTRODUCTION

Physical Education is a compulsory course taken at primary and secondary education of Nigeria education system. It is an educational process that integrates the development of physical, intellectual, social and spiritual dimensions of each student for a lifetime (NASPE, 2004). Physical Education and sports performance encourage learning of psychomotor skills in a play or movement exploration setting (Anderson, 2013). At both the primary and secondary schools, it is a phase of education that aims at imparting lifelong psychomotor skills through participation, which will lead to positive behaviour towards long term commitment for physical activities to build a healthy body (Wong, 2011). The Physical Education curriculum stresses three main domains of learning, which are cognitive, psychomotor and affective domains. The development of these domains requires proper practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution (Agyei & Voogt, 2012).

Research findings have shown that Physical Education is basically concerned with the arts and science of human movement as a discipline (Ojeme, 1990).The recent research findings have the framework of Physical Education to include, forms of movement; mechanical principles of movement; structure and functions of man in motion; movement and the person; methodological dimension of human movement as revealed by Akindutire (2005); MacDonald and Hay (2010). All these movements have their foundation in fundamental motor skills.

Motor skills are movement patterns that involve different parts of the body such as the legs, arms, trunk and head, and include such skills as running, hopping, catching, throwing, striking and balancing. They are the foundation movements necessary for children as a precursor to the more specialized, complex skills used in play, games, sports, dance, gymnastics, outdoor education and physical recreation activities. These skills are divided into two categories: locomotive skills, which involve moving the body from one point to another and manipulative skills, which involve moving objects with hands and feet (Dardens, 2013). It is essential for all children to learn motor skills so that they may be able to explore their environment and thus enhance their cognitive and social development. Behaviour in the motor domain has long adjudged as a significant indicator of unusual child development. It is known that under-development of such movement skills in children may lead to psychological and social problems in school (Mackenzie, 2009). Movement skills help children develop self-confidence and provide them with the opportunity to be physically fit and can participate in recreational activities and games. This physical fitness enhanced the performance of the heart, blood vessels, lungs and muscles to function at optimal efficiency. Thus, without developing such movement skills efficiently, the body is unable to experience the level of physical activity needed to maintain healthy hearts, lungs and muscles. This could mean more passive, less-fulfilling and less healthy lives (Salami, 2010).

Those skills that involve the projection and reception of the body are used during both work and leisure activities by most individuals. They are seen as universal in the motor pattern range. These skills include basic movements such as walking, running, hopping, twisting, throwing, catching and striking an object. Walking and running retain their importance in the achievement and continuation of physical fitness throughout life. Other skills, such as skipping, rolling and balancing also have a significant contribution during childhood and the development of such skills is emphasized during elementary school (Salami, 2010).

In the Physical Education process, the development of fundamental motor skills as well as some specialized motor skills must begin in the earlier years of primary school (Miletic & Kostic, 2010). During these years, pupils are physically and intellectually capable of benefiting from the instruction in Physical Education and are highly motivated and enthusiastic about learning fundamental motor skills. Mastering of these skills by children is necessary if the optimum development of higher-level skills is to take place. Children who do not master these skills are less able to and often less willing to persist with learning more complex motor skills, and will avoid activities which expose them to failure. Ultimately, such children often reject participation in physical activities as part of their lifestyle. Failure naturally leads to lack of interest and rejection.

Instructional media such as computer simulation can reduce the opinion that Physical Education is a difficult field of study as the pupils can learn independently and repeatedly in an interactive environment and in a meaningful way (Lunsdaina, 2009). According to Strangman and Hall (2003), computer simulation is a computer-generated version of real-world objects or processes. It can take different forms, ranging from computer renderings of 2-dimensional geometric shapes to 3-dimensional multimedia environment in real time. This means simulation is a computer program that allow learner to interact with a computer representation of real-life experience. Educators associate computer simulations with science fiction, high-tech industries, and computer games; only few mainly associate these technologies with education. They are also used in applied fields such as aviation and medical imaging. According to Strangman, Hall and Meyer (2011) these technologies have begun to edge their way into the classroom. However, only few studies on the efficiency of virtual reality software in Physical Education were made with conflicting results / findings. Most of the presently used software for Physical Education were developed based on general learning theory and did not consider psychomotor skills' learning theories (Goktas, 2011).

Computer Simulation Instructional Package might have the potential to offer an exciting and challenging environment in teaching fundamental motor skills in Physical Education when used in individualized learning setting (Hall & Leigh, 2013). The use of such in individualized learning settings could have positive impact on pupils' motor skills development as against when being taught by teachers in an abstract way. Hence, the need for this study.

Statement of the Research Problem

The method of instruction of Physical Education in schools has changed from the traditional method which is not yielding positive result on the attainment of its goals in Nigerian. The common method of teaching Physical Education is still regimental/command type, especially in learning skill courses. This method contradicts the provisions in the National Policy of Education. There searcher traced the problem of decline in Physical Education participation and interest towards the subject to be the method of instruction employed by teachers, which has contributed to low motor skills development in pupils and decline in interest towards the subject at all levels of education in Nigeria. With this problem in the school system, most teachers resort to the teaching of Physical Education concepts through demonstration method with or without the appropriate instructional materials. This situation in the school system has made the teaching and learning of Physical Education boring, uninteresting and even meaningless to most pupils. These in turn brought about the decline in interest and development of basic motor skills that is acquired at the early stage of child development.

Therefore, as a step towards addressing these problems a more interactive strategy that will actively involve the pupils in the Physical Education activities becomes imperative. Consequently, the researcher sought to examine the impact of Computer Simulation Instructional Package on development of Physical Education pupils' motor skills when used in individualized learning settings in and interest towards Physical Education in Niger state, Nigeria.

Purpose of the Study

The study aimed at examining the impact of Computer Simulation Instructional Package on development of Physical Education pupils' motor skills when used in individualized learning settings in and interest towards Physical Education in Niger state, Nigeria. Specifically, the study was guided by two research questions and two corresponding null hypotheses.

Research Questions

The following research questions were answered in the study:

1. Is there any difference in the motor skills development of pupils taught Physical Education using Computer Simulation Instructional Package in individualized learning setting and those taught using demonstration method?
2. Is there any difference in the motor skills development of male and female pupils taught Physical Education using Computer Simulation Instructional Package (TCSIP) in individualized learning setting?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 alpha level:

HO_1: There is no significant difference in the motor skills development of pupils taught Physical Education using Computer Simulation Instructional Package in individualized learning setting and that taught using demonstration method.

HO_2: There is no significant difference in the motor skills development of male and female pupils taught Physical Education using Computer Simulation Instructional Package in individualized learning setting.

Methodology

The study adopted a pretest and post test experimental group design. The variables of the work are computer simulation instructional package and demonstration method (independent variables), motor skills development (dependent variable), and gender (moderating variable).The research design layout is shown below:

Table 1: Research Design Layout

Groups	Pretest Score	Treatment	Posttest Score
Experiment Group	O_1	X_1	O_2
Control Group	O_1	X_0	O_2

Where:

O_1, represents the pretest in individualized setting and demonstration method

O_2, represents the posttest in individualized setting and demonstration method

X_1represents he treatment for the individualized learning setting

X_0 represents the treatment using demonstration method

The population of the study comprised of the 585,737 primary school pupils (357, 827male and227, 910 female), in3, 016 primary schools from Niger South, Niger East and Niger North of Niger State, Nigeria. The target population in these schools was primary five (5) pupils. A total of ten primary schools were purposively selected from the three senatorial zones A, B, and C, for the study.

The sample of the study was made up of 160 pupils (80 males and 80 females) selected from 12 primary schools out of the 3,016 primary schools in three senatorial zones of Niger State. Four schools were drawn from each zone. The twelve (12) primary schools comprised of primary five (5) pupils from 2014/2015 session.

Based on the nature of this research, a two-stage sampling technique was adopted. First, a purposive sampling technique was adopted to obtain twelve (12) primary schools out of the 3,016fromNiger South, Niger East and Niger North of Niger State, Nigeria. These schools were purposively sampled based on equivalence (facilities and manpower), school type (public schools), gender composition (mixed schools). Secondly, the selected twelve (12) primary schools were purposively assigned to Experimental Group and control based on their zones. Experimental group was assigned to Individualized learning setting while Control Group was assigned to the Demonstration method. These schools were believed to have common environmental conditions such as manpower and gender composition.

The following three research instruments were developed and used by the researcher to gather data for the study. They are: Computer Simulation Instructional Package

Motor Skills Assessment and Rating Scale. The Computer Simulation Instructional Package (CSIP) for primary school Physical Education pupils was usable at individualized learning setting. It was developed by the researcher with the support of a computer programmer. The CSIP was structured to teach four (4) concepts under eight (8) lessons. The concepts of motor skills were adopted from primary five physical education curriculum. The four motor skills selected for the study from the curriculum were sub –divided into individualized activities-Vertical jump, Ball throw, Ball bounce and Trunk exercise.

The Motor Skills Assessment and Rating Scale were made of four (4) motor skills activities considering the pupils capabilities. The items were divided into two (2) categories ranging on individualized motor skills activities for accurate motor skills development by the pupils. The pupils were required to perform each of the motor skills correctly by being able to at least perform a particular skill five times correctly following the stated guiding procedures for each of the skills. The pupils were expected to respond to the instrument in two sections: Section A was designed to elicit information on the pupil's bio- data, class, school, age, and gender.

Section B was designed to elicit information from the pupils on the various motor skill activities. The instrument was administered to the experimental and control groups as posttest after two (2) weeks of pretest during the main experiment.

The Computer Simulation Instructional Package (CSIP) of Motor Skill activities was validated by two Educational Technology experts and two Physical Education experts. After scrutiny by experts some items were modified while some were dropped, before the instrument was considered valid. The Motor Skills Assessment and Rating Scale were validated two Physical and Health Education experts. Fifteen (15) motor skills were submitted for validation and eight (8) of the skills were certified to have content validity.

To test the reliability of the instruments, pilot test was conducted within the targeted population but outside the school sampled for the study. The result obtained from pilot test conducted was used for reliability test of the instruments. The test was administered on 30 primary five (5) pupils, (15 male, 15 female) randomly selected using test re-test method. Pearson Product Moment Correlation formula (PPMC) was used to determine the reliability coefficient of Motor Skills Assessment and Rating Scale (MSAARS) which yielded 0.83.

The data collected was analyzed by using inferential and descriptive statistics. T-Mean and Standard Deviation were used to answer the research questions while Analysis of Covariance was used to test the hypotheses. Statistical package for Social Science (SPSS Version 2o was used for the analysis and alpha level of 0.05 was used to reject or accept the hypotheses.

Results

Table 2: Mean and Standard Deviation of Scores of Experimental Group and the Control Group Pretest

Group	N	$\bar{X}$	SD
Individualized	80	47.24	11.66
Demonstration	80	37.96	9.32

Table 2 reveals the mean and standard deviation of scores of pupils taught Physical Education in Experimental Group (individualized) and those taught using demonstration method in the Control Group pretest. The Table shoes that the mean scores of the three groups were different while Experimental Group I had mean scores of 47.24 with standard deviation of 11.66 while the Control Group had mean scores of 37.96with standard deviation of 9.32.

Research Question One: Is there any difference in the motor skills development of pupils taught Physical Education using Computer Simulation Instructional Package in individualized learning setting and those taught using demonstration method (control group).

Table 3: Mean and Standard Deviation of Pretest and Posttest Scores of Experimental Group and the Control Group

Group	N	Pretest		Posttest		Mean Difference
		$\bar{X}$	SD	$\bar{X}$	SD	
Individualized	80	47.24	11.66	71.06	10.29	23.82
Demonstration	80	37.96	9.32	40.58	9.46	2.62

Table 3 reveals the mean and standard deviation of pretest and posttest scores of pupils taught Physical Education through CSIP in Experimental Group (individualized) and those taught using demonstration method in the Control Group at pretest and posttest. From the Table, it was observed that the mean scores of the three groups at posttest differ with the Experimental Group having the highest mean scores of 71.06 with standard deviation of 10.29, unlike the Control Group which had mean scores of 40.58 with standard deviation of 9.46. To determine whether the difference in the mean scores of the three groups at posttest was significant, Analysis of Covariance (ANCOVA) was used to test hypothesis one as presented in Table 4

Hypothesis One (HO_1): There is no significant difference in the motor skills development of pupils taught Physical Education using Computer Simulation Instructional Package (CSIP) in individualized learning setting and those taught using demonstration method.

Table 4: Summary of Analysis of Covariance (ANCOVA) of Posttest Scores of Experimental and the Control Group

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	62941.023	2	20980.341	415.768	.000
Intercept	9227.388	1	9227.388	182.859	.000
Covariate (Pretest)	14519.165	1	14519.165	287.726	.000
Main Effect (Treatment)	22459.428	1	11229.714	222.539*	.000
Error	11908.960	176	50.462		
Total	957914.000	180			
Corrected Total	74849.983	179			

**: Significant at 0.05 levels*

Table 4 shows the ANCOVA result of the comparison of posttest scores of pupils in Experimental Group and the Control Group. An examination of the Table shows ($F(1, 176) = 222.539$, $p < 0.05$). On the basis of this, hypothesis one was rejected. Therefore, there was significant difference in the motor skills development of pupils taught Physical Education using Computer Simulation Instructional Package (TCSIP) in individualized learning setting and those taught using demonstration method.

Research Question Two

Is there any difference in the motor skills development of male and female pupils taught Physical Education using Two-Mode Computer Simulation Instructional Package (TCSIP) in individualized learning setting?

Table 5: Mean and Standard Deviation of Scores of Male and Female Pupils taught Physical Education through CSIP in Individualized Learning Setting at Pretest and Posttest

Group	N	Pretest		Posttest		Mean Difference
		$\bar{X}$	SD	$\bar{X}$	SD	
Male	40	56.08	8.43	78.02	7.64	14.98
Female	40	38.40	6.65	64.10	7.55	25.70

Table 5 reveals the mean and standard deviation of scores of male and female pupils taught Physical Education through TCSIP in individualized learning setting at pretest and posttest. Table 4.3(a) revealed that male pupils had higher mean scores of 78.02 with standard deviation of 7.64 while their female counterparts had mean scores of 64.10 with standard deviation of 7.55. To determine whether the differences between the groups were significant, analysis of covariance was carried out as in Table 6.

Hypothesis Two (HO_2): There is no significant difference in the motor skills development of male and female pupils taught Physical Education using Computer Simulation Instructional Package (CSIP) in individualized learning setting.

Table 6: Summary of Analysis of Covariance (ANCOVA) of Posttest Scores of Male and Female Pupils taught Physical Education through TCSIP in Individualized Learning Setting

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	5027.484	2	2513.742	57.758	0.00
Intercept	4375.168	1	4375.168	100.527	0.00
Covariate (Pretest)	1149.372	1	1149.372	26.409	0.00
Main Effect (Gender)	208.295	1	208.295	4.786*	0.03
Error	3351.203	77	43.522		
Total	412369.000	80			
Corrected Total	8378.687	79			

**: Significant at 0.05 level*

Table 6 shows the ANCOVA result of the comparison of posttest scores of male and female pupils taught Physical Education using TCSIP in individualized learning setting. An examination of the table shows a significant main effect between the mean scores of the two groups ($F(1, 79) = 4.786$, $p < 0.05$). On the basis of this, hypothesis two was rejected. Therefore, the result revealed that there was significant difference in the motor skills development of male and female pupils taught Physical Education using Computer Simulation Instructional Package (TCSIP) in individualized learning setting.

Discussions

The result on the effects of Computer Simulation Instructional Package (TCSIP) in individualized learning setting and demonstration method on motor skill development of pupils exposed to Physical Education showed that experimental group pupils taught with CSIP in individualized setting with mean score of (71.06) scores higher than the demonstration group with mean score of (40.58). This implies that there were differences in the mean score of pupils taught using CSIP in individualized learning setting and those taught with demonstration method. The outcome of testing the corresponding hypothesis one further revealed that the differences between the mean scores of experimental group and control group were statistically significant.

The results agreed with the findings of Hassan (2005) that indicated that there was a significant difference between the performance scores of Physical Education pupils taught with computer assisted instruction (CAI) strategy and those taught without the conventional method. (iii) There was no significant difference between the mean performance scores of male and female Physical

Education pupils taught with computer assisted instruction. This shows that the CAI could stimulate male and female pupils. Lockyer et al. (2010) agreed that computer simulation instruction can be used for maximum achievement in the teaching learning process, such as simple level of instruction drills and practice simulation. This is supported by Monzani et al (2000) who observe that application of virtual simulation technology in teaching motor skills can create a new training environment, with interaction between the real and virtual environments.

CONCLUSIONS AND RECOMMENDATIONS

It can therefore be concluded based on the findings of the study that the instructional strategies that teachers employ in teaching Physical Education have significant effects on pupils' performance. Through the use of Computer Simulation Instructional Package in individualized learning setting, their motor skills developed were enhanced.

Physical educators, coaches and students/athletes should take advantage of the already available and accessible multimedia courseware and teaching materials to improve their performance. Physical educator, coaches and ICT personnel should collaborate to develop software modules for motor skill teaching in order to encourage speedy and correct learning of skills, reduce error and promote scientific innovations. This will go a long way to lay good foundation for the children, who are future athletes and create job opportunity in this new area of innovations and technology in physical education and sports coaching in Nigeria.

References

Agyei, D. D.,& Voogt, J. (2012). Developing technological pedagogical content knowledge in pre-service mathematics teachers through collaborative design. *Australasian Journal of Educational Technology*, 28(4), 547-564. http://www.ascilite.org.au/ajet/ajet28/agyei.html. Retrieved on August 18, 2014.

Akindutire, I. O. (2005). Repositioning Physical Education and Sports Programmes for the Development of man 13th Inaugural Lecture (Thursday 12th May), University of Ado-Ekiti.

Anderson, D. (2013). *The discipline and the profession.* Foundations of Canadian Physical Education, Recreation, and Sports Studies. Dubuque, IA: Wm. C. Brown Publishers.

Dardens, G. F. (2013). Demonstrating motor skill-Rethinking that expert demonstration Though effective demonstrations must involve highly skilled performers showing the ideal technique and outcome. Evidence suggests that demonstrations by experts may not always provide the best learning conditions and/ or athletes. This calls for the use of CAI. *Journal of Physical Education Recreation and Dance*, 68(1), 34-39.

Goktas, Z. (2011). The self-confidence levels of Physical Education and sport students towards information and communication technologies (ICT). *Nigde University Journal of Physical Education and Sport Sciences,* 5(1), 50-57. [in Turkish] http://dergi.nigde.edu.tr/index.php/besyodergi/article/view/247/165.

Hall, A.,& Leigh, J. (2013). ICT in Physical Education. Pearson Publishing Chesterton Mill. Cambridge, UK.

Lunsdaina, J. (2009). *A Short History of Educational Ideas and Societal Problems.* New York: John Wiley and Sons.

MacDonald, D.,& Hay, P. (2010). Health &Physical Education as/and technology: An Australian perspective. Presented at Global Forum for Physical Education Pedagogy 2010, Iowa, USA. [PowerPoint, 2.9 MB] http://www.globalpeforumgc.org/sites/default/files/presentations/Macdonald-Hay.pdf

Ojeme, E. O. (2009). *Notes on methods and materials of teaching Physical Education.* Benin-City: Aji-rhomes Business Press.

Salami, I. A. (2010). Contribution of Physical Education to school Sports development. *Paper presented in 1st ICHPER in African regional conference*, Lagos University of Lagos conference centre, 44-46.

Strangman, N.,& T. Hall.(2003). Virtual Reality/Simulations.Wakefield, MA.: National Center on Accessing the General Curriculum.

Wang, L. M. D.,& Yanes, M. (2010). Creating student-centred learning experience through the assistance of high-end technology in Physical Education. *Journal of Instructional Psychology*, 37(4), 352-356.