

**EFFECTS OF KINESTHETIC LEARNING STRATEGY ON PUPIL'S
MOTIVATION AND ACHIEVEMENT IN NUMERACY IN NURSERY SCHOOLS IN
ABUJA, NIGERIA**

By

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Abstract

The study investigated the effects of Kinesthetic Learning Strategy (KLS) on Pupils' motivation in numeracy and achievement in primary schools in Abuja Municipal Area Council (AMAC) Abuja Federal Capital Territory (FCT), two research questions and two hypotheses guided the study. The quasi-experimental research design was used for the study. The population of the study consisted of nursery two (2) pupils of 2022/2023 academic session of AMAC numbering 6,498. The sample size for the study consisted of 133 (57 Males and 76 Females) drawn from six intact classes in the six area councils of the F.C.T. Simple random sampling was used to draw six intact classes from the six area councils in the F.C.T. Situation Motivation Scale (SMS) and Mathematics Achievement Test (MAT) were the instruments used for data collection. Cronbach Alpha formula was used to measure the internal consistency of (SMS), which yielded a reliability estimate of 0.71. Kuder-Richardson formula 20 (K-R 20) determined the reliability of (MAT), which yielded a reliability estimate of 0.75. Mean, standard deviations and Analysis of Covariance (ANCOVA) were used to analyze the pre-test and post-test data and the research questions and hypotheses raised for the study. The analysis revealed that the kinesthetic learning strategy increased pupils' motivation and enhanced their achievement in numeracy more than the conventional method in FCT nursery schools in Nigeria. The study recommends that kinesthetic learning strategies should be encouraged in schools especially in nursery schools to enhance their motivation and achievement in numeracy.

Keywords: Kinesthetic Learning Strategy, Motivation, Achievement, Numeracy and Nursery School

Introduction

The development of any nation of the world is reliant on the skills and capability of its human resources. The trend of skills, knowledge and technological development of any nation depends on its human resources who have a sound scientific and technical understanding of human problems and double its efforts towards the provision of solutions to human problems

scientifically. Education is a veritable tool for human capital development in all nations of the world vis-à-vis the supply of trained human resources for national development. It is an indispensable instrument that equips citizens with the necessary skills for problem-solving skills and capacity which hitherto will lead to personal and national development. (Ojonugwa 2022). Education at all levels entails problem-solving. At the nursery and primary levels pupil's activities after interaction and instructions are accompanied by activities that require problem-solving across all subject areas. Problem-solving is the application of previously acquired knowledge and skills to bring solutions to puzzles and problems in the learning field (Chukwuka, 2014). Problem-solving is part of man and as children grow up in the society they come across problems and challenges and thus requires skills and abilities that are needed to solve the problem. Education generally involves the provision of solutions to problems through human capital development in the instrumentality of training, teaching and learning. The actualization of the above requires nascent teaching methods that are interactive in its application in the classroom. One of its kind is kinesthetic learning strategy.

Kinesthetic learning strategy is a strategy that requires the manipulation of learning materials and hand-on-learning through doing and the use of organized materials in line with the instructional objectives to make learning more concrete for better understanding. Teachmint (2022) described Kinesthetic learning as a “learning style in which students learn things by carrying out physical activities instead of listening to lectures in the classroom” According to Houghton University (2022) “Kinesthetic learning style requires manipulation or touching of material to learn. “Kinesthetic-tactile techniques are used in combination with visual and/or auditory study techniques, producing multi-sensory learning”. It involves the full participation of the learner through physical interaction with learning materials with little guidance from the teacher.

The kinesthetic learning strategy encompasses the participation of hands and all other human parts. It involves motion and emotion created to be remembered through “movement, coordination, rhythm, emotional response and physical comfort prominently in this learning style”. It has been revealed that pupils “tend to like touching people, stand close together and a lot of moves “as pupils “learn by doing, pointing/writing while reading, and responding physically”. Kinesthetic learning strategy requires pupils' full participation in the learning processes as the strategy requires pupils to be touching and assessing objects through the learning process and sometimes pupils are required to take home if they have worked on the home. Alyssa (2017) posited that kinesthetic learning is a teaching strategy that engages pupils in guided manipulations of learning objects and other learning materials in a process referred to as “learning by doing”. To the author, pupils who are involved in learning through the manipulation of learning materials and fully participate in learning activities are said to be kinesthetic learners. Kinesthetic learners will participate in learning when they are fully involved and learn effectively when they are using their hands and bodies in the teaching-learning processes. Their attention will be focused right on the learning activities as the learning style involve them by doing. Conversely, if they are expected to sit very still and pay attention and listen, success will not follow. The more they have to sit still, the less they can focus and learn. However, for learning to be effective in kinesthetic learning strategy, the pupils may need to be motivated.

Motivation is the act of activating human reactions and actions towards goal-oriented events, things and activities and will eventually to the actualization of the set goals and objectives. According to Hamid and Muhammed (2012) “motivation is “Powering people to achieve high levels of performance and overcoming barriers to change”. Motivation is the activation of interest and drives for achievement. Motivation is the arousal of will and interest

and its sustenance and guidance for increased intensity of this interest and will for the high achievement of a stated goal. The authors further noted that “motivation is a very important factor which determines how successful we are at what we do as it serves a driving force that gives us the will to accomplish the task and eventually succeed in reaching an ultimate goal”. The idea of motivation is the force that originates an action and sustains and increases the intensity of the action until the set goals are fully achieved.

Motivation can be described as inward arousal in the form of drives, force and strong desires that instigate an individual to begin an action, sustain that action and increases the intensity of that until the pre-stated goals are fully achieved for self and societal satisfaction. According to Motevalli, Perveen, and Michael. (2020) “Motivation is a psychological term where it stems from the desire of wanting something and give fuel as a drive to continue pursuing the desire”. Rapiudin (2019) asserted that “the reason to do something is often derived from motivation itself” Brown, (2021) has it that motivation “refers to an internal process that activates, guides, and maintains individuals’ behaviour over time. It is not enough to instigate an action; the motivating force must be available to sustain the action and must also be available to intensify the desire when challenged with obstacles until the pre-stated goals are fully achieved. Many factors can enhance motivation according to Reamen (2016), the author opined that “motivation does not just occur in a vacuum, much of our motivation act is fueled by emotional states, interest, exploration, play and learning” She further demonstrated that, desire to work and learn, interest in the subject matter, general desire to achieve, environment, facilities, patience and persistence” are some of the factors that motivation that may eventually lead to goal achievement.

Achievement can be described as the attainment of a pre-conceived goal after a comprehensive process and activities outlined to lead to the achievement of the goal. Suvarna and Bhata (2015) described the academic achievement as the “outcome/performance of education, it indicates the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments”. Academic achievement requires the use of educational instruments to measure it. Some factors influence academic achievement, examples of some of the factors according to Bhatia are “general intelligence, achievement motivation, recognition, interest, attitude, aptitude, Personality and so on. Thus, pupil’s orientation, actions and performance towards academic achievement depends on various factors”. Atchia and Chinapah (2019) have the following as some of the factors affecting academic achievement in school: socio-economic factors, school leadership, student factors and teacher. in addition to the factors mentioned by Atchia and Chinapah, the strategy used in teaching all subjects by teachers under teacher’s factors may also affect the achievement of pupils in a particular subject, especially in mathematics and numeracy.

Statement of the Problem

The use of conventional teaching methods by teachers create a situation where pupils are not exposed to learning materials but result to the description of learning materials may not make learning effective in the nursery section. This style of teaching work against concrete learning. A situation where pupils will be made the memory is learning contents, alphabet, numbers, words and other learning contents making learning to be like a drama among children certain. The above is more with the public schools. The above descriptions are some of the features of the conventional method of teaching. The above scenario is contrary to the 21st-century teaching strategies with interactive qualities and designs that make learning concrete and practical in the nursery school system. Some examples of these 21st-century teaching strategies are differentiated instruction, collaborative learning, cooperative learning, flipped

classroom, kinesthetic learning strategy and others. The above opposite scenario calls for this study to ascertain the effectiveness of one of the 21st-century teaching strategies, the kinesthetic teaching strategy as against the conventional teaching method to determine its effectiveness.

Objectives of the Study

The following objectives were formulated and guided this study;

1. To find out the differences in the value of numeracy mean motivation scores of pupils exposed to the kinesthetic learning strategy and those exposed numeracy using the conventional method.
2. To find out the differences in the value of numeracy mean achievement scores of pupils exposed to the kinesthetic learning strategy and those exposed to the “conventional method.

Research Questions

1. What is the difference in the value of numeracy mean motivation scores of pupils exposed to the kinesthetic learning strategy and those exposed to the “conventional method?
2. What is the difference in the value of numeracy mean achievement scores of pupils exposed to the kinesthetic learning strategy and those exposed to the conventional method?

Research Hypotheses

1. Kinesthetic learning strategy has no significant effect on pupils’ motivation in numeracy as measured by their mean score on SMS.
2. Kinesthetic learning strategy has no significant effect on pupils’ achievement in numeracy measured by their mean score on MAT.

Methodology

The study adopted a quasi-experimental research design to determine the effect of kinesthetic learning strategy (KLS) on the motivation and achievement of nursery school pupils in numeracy. Quasi experimental research design is that design that has features of experimental research but cannot be fully referred to as experimental research design. Quasi experimental research design includes the manipulation of participants in the experimental group without similar intervention for the control group (Chiang, 2015).

Two learning strategies were used for the study, the kinesthetic learning strategy and the conventional method for nursery schools. Numeracy contents used for the study were drawn from the nursery school numeracy curriculum as provided by the FCT Universal Basic Education Board. The conventional method has identical learning objectives, contents and evaluation modes. The major difference with the learning procedure is that the kinesthetic learning strategy required the manipulation of learning materials in small group activity-based teaching, while the conventional method used manual packages identical to that of the “, kinesthetic learning strategy” for the same class. ‘Kinesthetic learning strategy’ was used for the treatment group while the ‘conventional method’ was the method put to use for the control group.

Before the study, subjects in both groups were pre-tested with the draft of the Situation Motivation Scale (SMS) and Numeracy Achievement Test (NAT). After the pre-test, the designed packages for which is the teaching of Numeracy began with teachers working strictly with the available instructional packages developed during the training session. The experiment was built into the normal school calendar in line with the school time table which lasted for four (4) weeks. The end of the experiment cleared the ground for post-test administration of the Situation Motivation Scale (SMS) and Numeracy Achievement Test (NAT) on the subjects in the experimental and control groups. Items in the post-test package were reshuffled after the pre-test otherwise, the content remained the same. Data collected from both the pre-test and post-test of the experimental and control groups were separated and analysed through the instrumentality of ‘mean and standard deviation’ for research questions and ‘analysis of Covariance’ (ANCOVA) at an alpha level of 0.05 level of significance.

Results

Research Question One: What is the difference in the value of numeracy mean motivation scores of pupils exposed to the kinesthetic learning strategy and those exposed to the conventional method?

Table 1

Pretest and posttest mean motivation numeracy scores of nursery school pupils taught using Kinesthetic Learning Strategy (KLS) and those taught with the Convectional Method.

Variable Teaching Strategies	N	Pre-test		Post-test		Mean gain
		\bar{x}	SD	\bar{x}	SD	
Kinesthetic Learning Strategy	55	2.32	0.24	3.53	0.39	1.21
Conventional Method	78	2.26	0.23	2.89	0.24	0.63

The result presented in Table 1 shows the pretest and posttest numeracy motivation mean scores of pupils in nursery school taught using the ‘kinesthetic learning strategy’ (KLS) and those taught with the ‘conventional method’ (control group). The result indicates that the pretest numeracy motivation mean scores of pupils taught using ‘kinesthetic learning strategy’ (KLS) (experimental group) was 2.32 with a standard deviation of 0.24 and posttest numeracy mean motivation score of 3.53 with a standard deviation of 0.39. The mean gain between the pretest and posttest numeracy motivation mean scores taught using the ‘kinesthetic learning strategy’ (KLS) (experimental group) was 1.21. The results also shows that the control group had a pretest numeracy motivation mean of 2.26 with a standard deviation of 0.23 and a posttest mean of 2.89 with a standard deviation of 0.24. The mean gain between the pretest and posttest numeracy motivation mean scores in the control group was 0.63. For both experimental and control groups, the posttest numeracy motivation mean scores obtained were greater than the pretest mean motivation scores, with pupils, taught using the ‘kinesthetic learning strategy’ (KLS) (experimental group) having a higher mean gain. This implies that the ‘kinesthetic learning strategy’ (KLS) increased nursery school pupils' motivation in numeracy more than the ‘conventional method’.

Hypothesis One: Kinesthetic Learning Strategy has no significant effect on motivation in numeracy as measured by their mean score on SMS.

Table 2

Analysis of Covariance (ANCOVA) of the difference in the numeracy motivation of nursery school exposed to the Kinesthetic Learning Strategy (experimental group) and those exposed to the conventional method (control group).

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13.773 ^a	4	3.443	47.388	.000
Intercept	20.620	1	20.620	283.792	.000
Print	1.147	1	1.147	15.788	.000
Strategies	13.044	1	13.044	15.544	.000
Error	10.245	111	0.073		
Total	1566.467	133			
Corrected Total	24.017	133			

The result in Table 2 indicated that an F-ratio of 15.788 with an associated probability value of 0.000 was obtained concerning the difference in the motivation of numeracy in nursery school exposed to “kinesthetic learning strategy” (KLS) (experimental group) and those exposed to “conventional method” (control group). Since the associated probability (0.000) below 0.05 was set as a criterion for taking a decision, the null hypothesis one (H_{01}) was hence rejected. Therefore, the conclusion drawn was that the difference in the motivation of pupils in numeracy in nursery school exposed to “kinesthetic learning strategy” (KLS) is significant compared to those exposed to the “conventional method”. The above statement portrayed that the “kinesthetic learning strategy” (KLS) is effective in teaching numeracy in nursery school and increased the pupil’s motivation in numeracy better than the “conventional method”.

Research Question Two: What is the difference in the value of numeracy mean achievement scores of pupils exposed to the kinesthetic learning strategy and those exposed to the conventional method?

Table 3

Pretest and posttest mean achievement scores of numeracy achievement of nursery school taught using kinesthetic learning strategy (KLS) and those taught using the conventional method.

Variable	N	Pre-test		Post-test		Mean gain
		\bar{x}	SD	\bar{x}	SD	
Kinesthetic Learning Strategy	55	2.32	0.23	3.63	0.25	1.31
Conventional Method	78	2.24	0.24	2.63	0.24	0.39

The presentation of results in Table 3 revealed the mean achievement scores (pretest and posttest) of numeracy in nursery school taught using “kinesthetic learning strategy” (KLS) and those in the control group. The result revealed that the mean achievement score (pretest)

of pupils in numeracy taught using “kinesthetic learning strategy” (KLS) was 2.32 with a standard deviation of 0.23 and a posttest mean achievement score of 3.63 with a standard deviation of 0.25. The difference between the mean achievement scores (pretest and posttest) of pupils in numeracy taught using kinesthetic learning strategy (KLS) was 1.31. Table 3 also showed that the control group had a pretest mean achievement score of 2.24 with a standard deviation of 0.24 and a posttest mean of 2.63 with a standard deviation of 0.24. The difference between the mean achievement scores (pretest and posttest) of pupils in numeracy in the control group was 0.39. The indication is that the two groups; experimental and control posttest mean numeracy achievement scores obtained were greater than the pretest mean achievement scores, with pupils, taught using kinesthetic learning strategy (KLS) (experimental group) having a higher mean gain. This revealed that the kinesthetic learning strategy (KLS) improved the achievement of pupils in numeracy more than the conventional method.

Hypothesis two: Kinesthetic learning strategy has no significant effect on pupils’ achievement in numeracy measured by their mean score on MAT.

Table 4

Analysis of Covariance (ANCOVA) of the difference in the value of the numeracy achievement scores of nursery school pupils exposed to the Kinesthetic learning strategy (experimental group) and those exposed to the conventional method (control group).

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13.773 ^a	4	3.443	47.388	.000
Intercept	20.620	1	20.620	283.792	.000
Print	1.147	1	1.147	15.788	.000
Strategies	13.044	1	13.044	15.544	.000
Error	10.245	111	0.073		
Total	1566.467	133			
Corrected Total	24.017	133			

The result in Table 4 shows that an F-ratio of 15.544 with an associated probability value of 0.000 was obtained with regards to the difference in the numeracy achievement of pupils in nursery school exposed to “kinesthetic learning strategy” (KLS) (experimental group) and those exposed to “conventional method” (control group). Since the associated probability (0.000) was less than 0.05 set as a criterion for taking a decision, the null hypothesis two (H_{02}) was therefore rejected. Hence, the inference drawn was that the difference in the achievement of pupils in numeracy exposed to the “kinesthetic learning strategy” (KLS) is significant to those exposed to the “conventional method”. The conclusion here based on the above statement revealed that the kinesthetic learning strategy (KLS) is effective in teaching numeracy in nursery school and improved achievement in numeracy more than the conventional method.

Discussion

The inference drawn based on the results from this study indicated that pupils exposed to kinesthetic learning strategy (KLS) indicated higher motivation in mathematics and achievement compared to those exposed to the (teachers-centered) conventional method. This assertion is in agreement with the study carried out by Lap and Nguyen, (2021), which reported

that “kinesthetic strategy enhanced the interest of students and improved mathematics achievement by encouraging teachers to improve motivational conditions in mathematics classes in Vietnam”. The results obtained from this study are also in line with Brima, Abubakarr and Sheik-MAS (2015) who investigate the impact of motivation on pupils’ academic achievement and learning outcomes in mathematics among secondary school pupils in Njala and Taiama kori chiefdoms Moyamba district. The authors revealed that motivating pupils using textbooks, teaching strategies and other factors enhanced their achievement in mathematics. The result of this study is in line with the submission of Gonzales (2014) which reported that kinesthetic learning strategies provided changes in student engagement in mathematics. Pupils taught using kinesthetic learning strategy did better on the post-test academic achievement about kinesthetic learning strategy than those taught using the conventional method. The study concluded, “That kinesthetic learning strategy of instruction was better than conventional teaching method”. The position of this study also agrees with the research work of Alyssa (2017) on the impact of Kinesthetic Learning on Student Knowledge Retention in mathematics which reported changes in attitude and achievement as a result of the kinesthetic learning strategy.

Conclusion

With the results obtained, the conclusions are as follows that: Kinesthetic Learning Strategy (KLS) enhanced numeracy motivation among nursery school pupils more than the conventional method and Kinesthetic Learning Strategy (KLS) improved numeracy achievement among nursery school pupils more than the conventional method.

Recommendations

In line with the results obtained from the study, the researchers in the agreement have the following recommendations:

1. That instructional strategies that have interactive features like kinesthetic learning strategy (KLS) should be encouraged in schools especially in primary school to enhance their motivation and achievement in mathematics.
2. That proprietors of private schools and the government should adopt interactive teaching methods, organize seminars for stakeholders and ensure that all schools embrace kinesthetic learning strategy (KLS) in Nigeria.
3. Teachers should be encouraged to adapt kinesthetic learning strategy in teaching nursery schools numeracy and other subjects and governments should take up the task of promoting kinesthetic learning strategy (KLS) to enhance pupils' attitude and achievement in numeracy in Nigerian nursery schools.

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