

Effect of Assessment for Learning Strategy on Children's Learning Outcomes in Mathematics in Private-Owned ECCE Centers in Ilorin South Local Government Area, Kwara State

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Abstract

Research indicates that young children learn through play. Assessment for learning approach is aimed at improving the learning outcomes of children a non-intrusive way. The purpose of the study was to examine the effect of assessment for learning strategy on children's learning outcome in mathematics in private ECCE centers in Ilorin South local government of Kwara State. The design for the study was a non-randomized quasi-experimental design involving pre-test, post-test experimental control groups while the instrument for the study was a group assessment for learning module validated by two measurement experts. A pre-test and post-test control group design was implemented on the sampled from two schools. Children in the experimental groups were exposed to treatment using Group Assessment for Learning and Development approach for a period of 4 weeks; after which they were assessed. In order to test the hypotheses generated for the study; scores from both groups were analyzed using t-test and ANCOVA statistics. Children taught using assessment for learning strategy performed better than those taught using the traditional teaching strategy.

Key Words: Assessment for learning, Early Child Care Education, Formative assessment in mathematics

Introduction

Early Childhood Care and Education (ECCE) is an aspect of the Compulsory, Free Universal Basic Education in Nigeria which caters for children from ages zero to five (0 to 5). It is also referred to as the pre-school years. The ECCE in Nigeria is as old as formal education itself and is most managed by private individuals and agencies until the year 2004 when the Federal Government increased her level of commitment by integrating a one-year pre-primary education into the existing UBE Programme in public primary schools across the nation (UBE Act, 2004). Every public primary school is by the Act, expected to have the pre-primary/ECCE component of the Free Compulsory, Universal Basic Education, (FCUBE) which like the primary school component, should be non-fee paying and serviced free while the privately-owned centers are managed on a commercial, fee-paying basis. The fees charged usually depend on the quality of the teachers and facilities provided (UNESCO International Bureau of Education (IBE), 2006). As outlined by the National Policy on Education, children in ECCE in Nigeria are grouped into three levels. They are day care/crèche; meant for children between ages zero to two (0 to 2) years plus, kindergarten/pre-nursery/play group, meant for children between two to four (2 to 4) years and the nursery, a one-year education given to children between ages four to five (4 to 5) years plus, prior to their entry into primary school (FRN, 2013; NERDC 2007).

Core subjects taught in Nigeria right from childhood level of education include language, mathematics, science and social studies. Mathematics has specific application to different career options and this form the basis of making it a core subject at all levels of education. According to Dunphy, Dooley and Shiel (2014), mathematics is a human activity, a social phenomenon, part of human culture, historically evolved, and intelligible only in a social context. Mathematics is therefore viewed not only as useful and as a way of thinking, seeing and organizing the world, but also as aesthetic and worthy of pursuit in its own right (Zevenbergen, Dole, & Wright, 2004). Despite all efforts put in developing an acceptable general mathematics curriculum, right from ECCE level of learning, learner's performance in the subject appears to be declining over the years

(Akpan, Ojinnaka, & Ekanem, 2010; Adepoju & Oluchukwu, 2011; Sani, 2015). In a bid to alleviate this problem, a study by Adepoju and Oluchukwu (2011) revealed some factors responsible for this decline in performance some of which are poor school location, incessant changes in government policies, closure of schools as a result of teachers' strike action, high student-teacher ratio, lack of supervision, monitoring and evaluation machinery, lack of good textbooks, poor content and context of instruction, poor and non conducive environment among others. It is pertinent to consider getting it right at the foundational levels of children's development as all children are viewed as having the ability to solve mathematical problems, make sense of the world using mathematics, and communicate their mathematical thinking. Sani (2015) stressed that the importance of mathematics, therefore, not be overemphasized as effort has to be made to eradicate the learning difficulties of children in mathematics and hence improve on the basic mathematical skills acquired from their early years.

The policy document on Early Childhood Care and Development Standards for Nigeria prescribe that the developmental domains that must be covered by the ECCE centers for a holistic development include social, emotional, physical and intellectual components. Whatever children, therefore, learn within this age range is basic to their educational success throughout life. Research shows that fundamental cognitive, physical, emotional, and social skills develop very quickly during a child's first five years (Illinois State Board of Education: Early Childhood Education, 2012). As such, getting it right at the developmental stage of a child in mathematics instruction holds the promise of a lasting solution to failure recorded in students' academic performance in mathematics.

Throughout schooling, assessments are used to make decisions about tracking, promotion or retention, placement and certification. Assessment in early childhood education evidence as a process of gathering evidence about children, their development and personal learning styles (Barnes, 2012). Assessment at the ECCE level of education should not follow the standardized testing or student assessment model that may be

appropriate for higher grade levels as children who are one to five years of age are developing rapidly, at individual paces, and with different interests (Illinois State Board of Education, 2012). Center for Educational Research and Innovation (CERI) (2008) stressed that formative assessment is a move away from models that suggest that all children should receive better-enabled inputs; rather, teachers should adjust methods to recognize individual differences between children. As such, adopting the formative assessment techniques at this level of education is therefore much appropriate; this being a reason why the use of formative assessment as an instrument for evaluating children's learning outcomes on the rise.

Formative assessment is used to describe the ways in which, in the everyday practice, children learn while being observed and effort is geared toward understanding it, which is in turn; channeled to ensure achieving set learning objectives and outcomes. In other words, assessment in early childhood education is not about removing children from situations or implementing testing regimes. Rather, it is a process of observation, interpretation and analyzing a child's progress embedded in the everyday interaction with learners (Barnes, 2012). Each day, early childhood educators make decisions about what to teach, modify lesson plans, and build on children's strengths and respond to their needs as they arise in the classroom. Formative assessment provides important information on which to base decisions and assist with planning instruction for individuals and groups, and preparation of a stimulating and learning environment. It also supports practical growth for individual children, communication with parents, and identification of children who may need special services (State of Connecticut State Board of Education, 2007).

Formative assessment refers to frequent, interactive assessments of learner's progress and understanding to identify learning needs which in turn helps to adjust teaching appropriately. Bearing in mind that children learn at different paces, teachers using formative assessment approaches and techniques are better prepared to meet diverse learners' needs through differentiation and adaptation of teaching in a bid to

raise levels of children's achievement and to achieve a greater equity of student outcomes (Center for Educational Research and Innovation, (CERI), 2008). Formative assessment strategy adopts the assessment for learning mode which occurs throughout the learning process. It is a strategy designed to make each student understands visible so that teachers can decide what they can do to help students progress. Learners make progress on educational outcomes in individual and idiosyncratic ways and there are predictable patterns of connections and preconceptions that some learners may experience as they move along the continuum from emergent to proficient. Therefore, in assessment for learning, teachers use assessment as an investigative tool to find out as much as they can about what their students know and can do, and what confusions, preconceptions, or gaps they might have (Western and Northern Canadian Protocol for Collaboration in Education (WNCPCPE), 2006).

It also describes an ongoing process of gathering and analyzing information about children's learning with the goal of achieving set behavioral objectives as well as enhancing their learning outcomes (Barnes, 2012). For instance, an educator working with a baby who is just beginning to reach for objects may observe that when an object is not in the baby's line of sight, she/he does not reach for it. Having assessed the situation, the educator moves the object into the baby's line of sight and the baby is able to see and reach for the object. Once the baby is reaching for the object, the educator might place the object slightly further away to encourage the baby to roll towards the object. However, if the educator observes that this frustrates the baby, she will move the object closer to the baby. As such, learning occurs in children while they are playing or participating in interactive activities on a regular basis (Illinois State Board of Education, 2012).

Educators assess for learning in order to enhance children's learning outcomes rather than make comparative judgments. This mode of assessment is ongoing, frequent and usually in context. This implies that it is not necessary to remove the child from the situation in order to assess that child's learning and development; rather its goal is to support learning in such a way that the person who conducts the assessment is the one who acts upon what has been learnt from the assessment. In addition, assessment for

learning is viewed as the process of identifying the details of children's knowledge, skills and understanding in order to build a detailed picture of the child's development and subsequent learning needs (Page, Nutbrown & Clare, 2013; Nutbrown, 2011). Furthermore, assessment for learning is a powerful way of raising pupils' learning outcomes; being based on the principle that pupils will improve most if they understand the aim of their learning, where they are in relation to this aim and how they can achieve the aim (or close the gap in their knowledge). As such, is not an add-on or a project but central to effective teaching and learning (Department for Children, Schools and Families (DCSF), National Strategies and Quality and Curriculum Authority (QCA) & Chartered Institute of Educational Assessors, 2008). Assessment for learning makes for accurate, fair, reliable, useful and focused formative assessment. Assessment for learning is therefore a reliable form of formative assessment as it extends children's learning as well as enhances teaching.

Assessment of learning and assessment as learning help to determine whether or not learning has occurred. Assessment for learning doubles as a means-in-itself to facilitate learning and to bring about improvement in learning. When educators assess for learning, they are mindful that children develop at different rates and in different ways and they should have a voice in the assessment process. According to Department of Children, Schools and Families (DCSF) (2008), narrative approaches to assessment are also required if the aim is to capture evidence of deep learning and collaborative interpretations, which allow input from children, educators and family members. CERI (2008) stresses that there are quantitative and qualitative evidences that teaching which incorporates assessment for learning; a formative assessment strategy has helped to raise levels of learner's achievement, and has better enabled teachers to meet the needs of closing gaps in equity of student outcomes. As such, the use of assessment for learning strategy should be encouraged among ECCE instructors.

Instructional steps in implementing assessing for learning strategy of learning in children have been presented by various researchers. Some of which are reflecting about

their knowledge and their achievements, assessing their study process and progress as well as necessary remediation steps and identifying children's strengths and weaknesses in order to supply or reinforce them (Santos, 2013); Focus on Learning by clearly stating the learning objectives as well as what to pay most attention to in their activity in order to achieve the stated learning objectives, effective questioning which demands for extended participation of children in whole class and how questioning strategies that aid pupils' learning are developed, formative feedback where attention is focused on steps that will lead to achieving stated instructional objectives, and scaffolding reflection which is about building in time for pupils to recognize what and how they are learning and to make changes as they go along (Council for the Curriculum, Examination and Assessment, 2009) and observing and documenting children's learning, understanding children's learning and putting gained understanding to enhancing their learning (Barnes, 2012).

Various studies on Early Childcare Education have been centered on the curriculum implementation (Connecticut State Board of Education, 2007); the level of ECCE implementation (Oluwafemi, Nma, Osita, and Olugbenga, 2014); challenges its implementation (Adewole, 2016); policies, implementation and achievement of the educational goals in ECCE (Salami, 2016); among others. Aside a study by Illinois State Board Of Education (2012) on an update and review of resources need for Authentic Assessment and Early Childhood Education for K-12 Assessment; no study known to the researcher has been fully centered on effective assessment practices for enhancing children's learning outcomes and this is a gap this study is set to fill. Assessment for learning aims at documenting a child's development and progress in a way that is non-intrusive and captures how a child uses his or her skills while engaging with materials, teachers, parents, and peers (Illinois State Board of Education: Early Childhood Education, 2012). It becomes pertinent to see if taking these slow and reflective steps will result in assessment strategy that captures the complexity, richness, and diversity of children's learning. The aim study, therefore, is to examine the effect of assessment for learning strategy on children's learning outcome in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State; while providing answers to the

following research questions:

Research Questions

1. What is the general learning outcome on the pre-test assessment of children between ages three and five in Mathematics enrolled in private-owned ECCE centers in Ilorin South local government of Kwara State?
2. What is the effect of assessment for learning strategy on children's learning outcome in Mathematics enrolled in private-owned ECCE centers in Ilorin South local government of Kwara State?

Hypotheses

H₀₁: There is no significant difference in the learning outcomes of children in Mathematics in the control group compared to those in the experimental group in private ECCE centers in Ilorin South local government of Kwara State.

H₀₂: There is no significant effect of Assessment for Learning Strategy on children's learning outcome in Mathematics in private ECCE centers in Ilorin South local government of Kwara State.

Methodology

Design: The pretest, posttest quasi-experimental control group design was adopted for this study. A quasi-experimental design does not provide for full control of extraneous variables, primarily because of the lack of random assignment of subjects to groups (Ali, 2006; Harris, 2006). This design is considered appropriate for the study because intact classes were used to avoid disruption of normal lessons in the schools. The pretest was used to partial out initial differences in the two groups and to control selection bias, which is a threat to internal validity in this type of design.

Sampling: The population for this study consisted of ages three to five pupils in all private ECCE centers in Ilorin-South LGA of Kwara State. Two centers were purposively sampled due to their equivalence in terms of teacher qualification, curriculum implementation standards, learning environment and children's age.

Instruments: The instrument designed for this study was the Group Assessment for Learning Module (GALM) which covered two units of instruction (identification of shapes and arranging shapes in twos) in Mathematics. The instrument was designed and validated by two measurement experts who both agreed that the contents represent the objectives being measured.

Treatment: Children in both the experimental and control groups were pretested after which they were exposed to the two units of instruction (identification of shapes and arranging shapes in twos) in Mathematics. While children in the control group were taught using the traditional method of teaching, children in the experimental group were taught using Group Assessment for Learning strategy. This was implemented by going through the module designed for the study (GALM). The two groups were then posttested on the two units covered after four weeks of instruction.

Data Analysis: Their results were analyzed with the use of Analysis of Covariance at 0.05 level of significance.

Results

This section presents answers to each of the research questions and results of the tests of the hypothesis generated for the study.

Research Question 1: *What is the general learning outcome on the pre-test assessment of children between ages 3 and five in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State?*

To answer this research question, the mean and standard deviation performance for children in both the experimental and control groups was used in order to compare the performances of the two groups as shown in table 4.

Table 1: Learning Outcome of Children in Mathematics

Group Academic Performance	Minimum	Maximum	Mean	Std. Deviation
Control	8.00	20.00	13.56	3.40
Experimental	8.00	20.00	12.89	3.94

Data in table 4 shows that the mean learning outcome of children in mathematics in the control group was 13.56 while the mean learning outcome for children in the

experimental group was 12.89. It could be deduced that general learning outcome on the pre-test assessment of children between ages 3 and five in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State is below average since mean score of 13.56 and 12.89 were respectively obtained by participants in control and experimental group. With higher mean of 13.56 obtained by the control group, there is need for test of significant difference.

Hypotheses

Two hypotheses were generated for the study. Hypothesis one was tested using t-test statistics while hypothesis two was tested using Analysis of Covariance statistics.

H₀₁: There is no significant difference in the learning outcomes of children in the control group compared to those in the experimental group in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State.

To determine if there were significant differences in the children’s learning outcome in the control group compared to those in the experimental group, a t-test statistics was computed as shown in table 2.

Table 2: Independent t-test on significance difference in the children’s learning outcome in Mathematics

Group	N	Mean	Std Deviation	df	Cal. t	Sig-value	Decision
Control	18	13.56	3.40	43	.56	.59	Accept H ₀₁
Experimental	27	12.89	3.94				

As shown in table 5, the t-test calculated value is 0.587. The decision is to accept hypothesis one as Sig-value: 0.587 is greater than 0.05. This means that there is no significant difference in children’s learning outcome in Mathematics. Difference in the groups (Control and Experimental) means (13.56 and 12.89) is not statistically significant. It implies that participants in control and experimental groups were on the same pedestal before treatment (Assessment for Learning) was administered

H₀₂: There is no significant effect of Assessment for Learning Strategy on children's learning outcome in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State.

The children in the experimental group were exposed to treatment (Assessment for Learning Strategy of teaching) while children in the control group were taught going by the traditional method after which both groups were tested and graded. The scores obtained formed the basis for testing hypothesis two. The hypothesis was tested with the analysis of covariance using the pretest scores obtained by children in the test administered as the covariate. Results are as shown in table 3.

Table 3: Analysis of Covariance Summary table for Children's learning Outcomes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	168.354 ^a	2	84.177	11.850	.000
Intercept	331.039	1	331.039	46.603	.000
PRETEST	20.125	1	20.125	2.833	.101
GROUP	132.064	1	132.064	18.592	.000
Error	248.620	35	7.103		
Total	11433.000	38			
Corrected Total	416.974	37			

With the F ratio of 18.592 and a p-value of 0.000 for group, the stated hypothesis that there is no significant effect of Assessment for Learning Strategy on children's learning outcome in private-owned ECCE centers in Ilorin South Local Government Area of Kwara State is rejected because the p-value is less than 0.05 alpha level ($0.000 < 0.05$). To ascertain where the significant difference lies, mean performance for each of the groups is as shown in table 4.

Table 4: Posttest Mean performance of each group

GROUP	N	Mean	Std. Deviation
Control	18	14.94	3.37
Experimental	20	18.90	1.20

Table 3 shows that children in the experimental group had a mean of 18.90 while those in the control group had a mean of 14.94. This shows that the mean of the experimental group is higher than that of the control group. It is therefore concluded that the significant effect is accounted for by the experimental group. Thus, Assessment for Learning Strategy has significant effect on children's learning outcome in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State. The pretest mean of experimental group on Tale 1 was 12.89 but after the treatment, improvement was recorded by the group. 18.90 posttest mean recorded by the group was the evidence of the recorded improvement.

Discussion

Findings of this study revealed that general learning outcome on the pre-test assessment of children between ages three and five in Mathematics in private-owned ECCE centers in Ilorin South local government of Kwara State is below average. This finding could be foundational to the general decline of learner's performance in the subject over the years (Akpan, Ojinnaka, & Ekanem, 2010; Adepoju & Oluchukwu, 2011; Sani, 2015). Schoenfeld and Stipek (2011) indicated that early mathematical proficiency is associated with later proficiency in mathematics. They further stressed that children who begin school with poor math skills typically do not catch up and as such children who have low math scores at the ECCE level continue to lag behind their better prepared peers. Therefore, getting it right from the foundation remains a plausible solution to the general decline of learner's performance in the mathematics over the years. Findings also, revealed that Assessment for Learning Strategy has significant effect on children's learning outcome in Mathematics in private-owned ECCE centers in Ilorin South local government Area of Kwara State. This outcome could be anticipated as children tend to learn effectively while in play; more so that assessment for learning is an instructional strategy that lay more emphasis on teaching for mastery rather than for assessment. As such, though assessment is indeed part of the learning process while implementing the assessment for learning strategy; however, it is carried out in a subtle manner that removes the treats assessment naturally posed to learners. It also gives the children a

feeling of being in charge of their learning and as such, the teacher is seen more as a partner towards achieving the set instructional objectives rather than an instructor. The outcome of this study is similar to the reports by Illinois State Board Of Education (2012) which revealed that Authentic assessment, an assessment for learning strategy has proved to be useful for guiding a child to develop to his or her potential and also as a tool for developing lesson plans that will help children individually progress toward meeting learning outcomes. Further to this, assessment for learning strategy is also seen as an effective practice which allows early childhood professionals to develop a critical understanding of their own practice, and continually develop the necessary skills, knowledge and approaches to achieve the best outcomes for children. This is regarded as a key feature of high-quality early childhood education and care settings (Marbina, Church & Tayler, 2010).

Conclusion

It is concluded that there is a significant effect of Assessment for Learning Strategy on children's learning outcome in private-owned ECCE centers in mathematics in Ilorin South local government of Kwara State. Implementing this strategy for teaching children mathematics will as well go a long way in giving children a solid background in the subject and resultantly; have an impact on eradicating poor performance in mathematics in later years.

Recommendations

It is therefore recommended that Assessment for Learning Strategy should be introduced for the teaching children enrolled in ECCE centers in Mathematics in Ilorin South Local Government Area of Kwara State.

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