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IMPACT OF FORMATIVE EVALUATION ON PSYCHOLOGICAL READINESS AND ACHIEVEMENT IN MATHEMATICS AMONG ADOLESCENTS IN IKORODU LOCAL GOVERNMENT AREA OF LAGOS STATE

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Abstract
The study examined the impact of formative evaluation on psychological readiness and achievement in mathematics among adolescents in Ikorodu Local Government Area of Lagos State, Nigeria. Three research questions and three null hypotheses were formulated to guide the study. The study adopted a quasi-experimental design. The population for the study consists of all the 11, 211 public senior secondary school class two (SS II) students in in Ikorodu Local Government Area of Lagos State. The stratified sampling technique was used to select 200 respondents (SS2 students) consisting of 100 subjects for experimental group and 100 subjects for control group in the study. The instrument for data collection was structured questionnaire developed by the researcher titled: Psychological Readiness Questionnaire (PRQ), Mathematics Achievement Test (MAT) and Mathematics Formative Evaluation Test (MFET). The instrument was faced validated by three experts from the Department of Educational Foundations, Faculty of Education, University of Lagos, Akoka, Nigeria. The instruments have high stability co-efficient of 0.82, 0.75 and 0.79 when tested during the pilot study at 0.05 level of significance. The findings of the study revealed that there is a significant impact of formative evaluation on students' academic achievement in Mathematics, as well as in psychological readiness amongst secondary school students. Based on the findings, it was recommended amongst others that the school administrators should emphasize to their teachers on regular basis that the teaching of Mathematic in secondary school should be carried out by using regular formative evaluation, adequate feedback and remediation for students to improve their academic achievement.

Keywords: Adolescents, Formative evaluation, Psychological readiness, Achievement in mathematics

Introduction

Assessment of students' academic achievement is a basic step in any educational system because assessment of students' learning outcomes is cardinal to the realization of the objectives of education in any country. Assessment is important because it provides information about learning that can be used to: diagnose learner strengths ,weaknesses and needs; provide feedback on teaching and learning; provides a basis for instructional placement; inform and guide instruction; communicate learning expectations; motivate and focus learner attention and effort; provides practice applying knowledge and skills; provides a basis for learner evaluation (e.g. grading) and gauge program effectiveness (McTighe & Ferrara, 2014). Assessment is a vital tool in the evaluation of students in any educational settings. Evaluation is the process of making value judgements for the purpose of decision making about results of learning activities. It also involves the inspection of all available information concerning the student, teacher and the entire educational programme for the purpose of making accurate judgements about the degree of change in the students and the effectiveness of the educational programme. It can also be referred to as the making of inferences based on students' performances on "authentic" learning activities, whether the inferences are for summative or formative purposes (Erwin & Knight, 2013). Similarly, Oluwatayo and Adebule (2009), sees evaluation as such activities that involve gathering of valid information on attainment of educational objectives, analysing and fashioning

information to aid judgment and effectiveness of an educational programme. According to Aduloju (2009), evaluation is the appraisal, judgmental in addition to the decision-making characteristics where the worth of something as to its desirability or non – desirability will be summarily determined. Evaluation helps to determine the efficacy of the instructional materials, the extent to which it has been used and the judgmental value on performance of secondary school students Continuous quality improvement in formal learning depends upon well conceived approaches to evaluation that have both formative and summative functions.

According to Dembo (2014) opined that there are four types of instructional evaluation that a teacher can carry out. They include: placement evaluation which is aimed at finding out students' entry behaviour before the beginning of instruction; formative evaluation which provides ongoing feedback to teachers and students regarding successes and failures during instruction; diagnostic evaluation which attempts to find out specific learning difficulties that a student may have and to formulate a plan for remedial action; and also summative evaluation, which comes at the end of instruction in a school term or year to assign grades or to measure the success by the instruction (Dembo, 2014). Evaluation processes that are utilized by classroom teachers in teaching their students have a formative function that can help teachers to improve their teaching and learners improve their learning. Formative evaluation helps teachers and students to recognize and respond to student learning in order to enhance that learning, during the learning (Akanni, 2018). Formative evaluation is diagnostic, identifying what learners do not know, as well as that which they do well enough. Formative assessment has been shown to be highly effective in raising the level of students' attainment, increasing equity of students' outcomes, and improving students' ability to learn. Utilization of formative testing in the teaching-learning process involve breaking subject content into smaller hierarchical units for instruction; specifying objectives for each units; designing and administration of validated formative tests; offering a group based remediation in areas where students are deficient before moving to other units and then administration of summative tests on completion of all the units (Cowie and Bell, 2014). The breaking of subject into small units makes for adequate preparation for the tests by the students. Moreover, such frequent testing enables the students to get more involved and committed to the teaching-learning process thereby enhancing their performance. Formative assessment methods are therefore important in raising overall levels of student achievements.

Quantitative and qualitative researches on formative assessment have shown that it is perhaps one of the most important interventions for promoting high-performance ever studied. Hastings and Madaus (2013) pointed that formative evaluation is useful to both the students (as a way of diagnosing students' learning difficulties and the prescription of alternative remedial measures) and to the teacher (as means of locating the specific difficulties that the students are experiencing within subject matter content and forecast summative evaluation result). According to Gronlund and Linn (2012) formative evaluation serves three specific purposes, that is, to plan corrective action for overcoming learning deficiencies; to aid in motivating learners and to increase retention and transfer of learning. According to them, students' responses to a formative test could be analyzed to reveal group and individual errors needing correction. Alonge (2010) had reported that the result of investigation into the extent to which cognitive entry characteristics and formative evaluation measured students' academic performance is germane in any educational settings. This is because formative evaluation requires that the teacher collects a lot of information on learners' performance through observations, classroom oral questioning, homework assignments, quizzes as well as informal inventories (Ebel & Frisbie, 2011).

According to Smith (2015), the key activities that formative assessment involves are: Students being engaged in expressing and communicating their understanding and skills through classroom dialogue, initiated by open and person-centred questions; Students understanding the goals of their work and having a grasp of what is good quality work;

Students being involved in self-assessment so that they take part in identifying what they need to do to improve or move forward; Feedback to students that provides advice on how to improve or move forward and avoid making comparisons with other students; Teachers using information about on-going learning to adjust teaching so that all students have opportunity to learn and Dialogue between teacher and students that encourages reflection on their learning. Riddel (2016) identified the different types of formative assessment as : Observations during in-class activities; of students non-verbal feedback during lecture; Homework exercises as review for exams and class discussions); Reflections journals that are reviewed periodically during the semester; Question and answer sessions, both formal planned and informal spontaneous; Conferences between the instructor and student at various points in the semester; In-class activities where students informally present their results; and Student feedback collected by periodically answering specific question about the instruction and their self-evaluation of achievement and progress. Having said that, the importance of evaluation in mathematics is of immense benefits in order for students to do well and achieve academic success, Mathematics is perceived as the foundation for scientific and technological knowledge that is cherished by societies worldwide. It is an instrument for political, socioeconomic, scientific and technological developments (Githua &Mwangi, 2013).

Importantly, mathematics is a compulsory subject for all learners in primary and secondary schools in Nigeria. Mathematics is one of the core subjects taught in all schools throughout the world due to its relevance to other subject most especially in the development of science and technology. It is an integral part of life because it is needed by everyone for successful living. Mathematics is an indispensable tool in the study of sciences, humanities and technology. Its usefulness to man activities cannot be over emphasized. Man uses it directly or indirectly in everyday life or activities. Agwagah (2005) stated that mathematics involves thinking, modelling, conjecturing and describing all aspects of reasoning about situations. The study of the subject was introduced to schools in order to produce competent persons who are skillful in applying mathematical knowledge in solving everyday life problems. Fajemidagba, Slaman and Ayinla (2012) describe Mathematics as a core science subject and a tool for the development of any science- based discipline. These include technology, astronomy, graphics, industry and analytical reasoning in daily living. Ayinla (2011) also posited that Mathematics is the pillar of all knowledge, showing its relevance to all disciplines. Onwuachu and Nwakonobi (2009) notes that Mathematics is the foundation on which the whole essence of living revolves and the platform for scientific and technological innovation. Mathematics is also viewed as a valuable tool for academic enhancement and career choice of individual regardless of gender and age. The National Policy document on education (Federal Republic of Nigeria, 2013) shows that improvement in the teaching and learning of Science, Technology and Mathematics (STM) is necessary in order to create the basis for technologically sound workforce in life with the nation's developmental needs (Onwuachu and Nwakonobi, 2009).

Interestingly, Adediran, (2003) also identifies the following goals that Mathematics seeks to achieve, if its concept is well taught in secondary schools. These are: Helping the child to explore and understand the world around him by developing competency and understanding the basic skills for dealing with numbers and shapes; Helping the child to be able to compare and contrast objects quantitatively thereby develop the habit of effective thinking; Helping the child to communicate his thought through symbolic expressions and graph; and Helping the child to develop the ability to distinguish between relevant and irrelevant data (Ebeh, 2000). To realize the objectives of mathematics at any level of the educational system in the society, there is the need to monitor and maintain the quality of the educational processes and products. One major way of monitoring the quality and standards of the teaching and learning of mathematics in schools is through the assessment of the learning outcome of the pupils. The essence of using tests and other evaluation instruments

during the instructional process is to guide, direct and monitor students' learning progress towards the attainment of the course objectives (Akanni,2018:Alonge, 2014; Kolawole, 2010). Hence, it is good for mathematics teachers to monitor and assess their students' progress using proper evaluation techniques. Evaluation of students' mathematical work involves teachers' qualitative judgment of how well or how satisfactorily a student is performing or progressing in learning mathematics tasks (Hamachek, 2014). However, motivation to learn subject matter refer to the internal drive or external force that initiate, maintain or causes to cease a learner's behaviour towards learning subject matter that is targeted, which is the learner's goal. Extrinsic motivation is directed towards getting rewards that are external to the learner such as teachers' encouragement, positive feedback on learner's performance on skills or tasks, while intrinsic motivation is directed towards the inner self. How ready are the students from within the inner self to learn new subject. Hence, psychological readiness is a vital condition of successful self-realization in student life (Bean & Eaton, 2015). It involves a conscious choice in accordance with the person's skills and abilities, awareness of his/her own needs, demands of the society and the person's team, set goals, manifestation of their intellectual, emotional and willed processes, the correlation between personal capabilities, level of aspiration and necessary achievements in something. A person's psychological readiness for professional development in a chosen profession determines his/her competitiveness and potential for success. Therefore, cognitive achievement is a significant matter for readiness.

Psychological readiness refers to the potential units of individuals to perform well in combat or in other military operations. It is usually measured by assessing a subset of hypothetical elements or components of effectiveness (Whiting, Van-Burgh & Render, 2015). Thus, readiness represents an estimate or prediction of effectiveness .Students' psychological readiness is the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent achievement in the complex and unpredictable environment of modern military operations (Marsh, 2017). College readiness is the level of achievement a student should attain to be ready to enroll and succeed, without remediation, in credit-bearing postsecondary courses. The concept of readiness has multiple dimensions, but educators and policy makers have identified important academic characteristics of students prepared for postsecondary educational opportunities including achievement in reading, mathematics, and science (Stiggins, Arter, Chappuis & Chappuis, 2016). Psychological readiness on the one hand includes a stock of knowledge and skills, and on the other – personality traits: beliefs, skills, interests, professional memory, thinking, attention, professional orientation of thought, performance, emotional and moral potential of the individual that will provide for the successful fulfillment of professional functions (Conley, 2017).. It envisages readiness for training, direct process of mastering the knowledge and skills, existence of personal traits corresponding to the nature of activity (personal readiness) and adaptation to the profession after training (professional adaptation). The readiness of students is determined by the skills and ability to carry out the tasks in the process of activity, particularly in education (Berne, 2016). It is determined by the following characteristics: intellectual openness, curiosity, the ability of texts and data interpretation, accuracy of thinking, relevant skills. It requires three main elements: basic academic knowledge and skills, the ability to apply these skills in specific situations for functioning at the workplace and in everyday life, the application of special skills necessary in any field. Within the structure of students' readiness for studying and working, the following elements are singled out: cognitive strategies, knowledge, academic behaviour conceptual knowledge and understanding, Cognitive strategies are the central element (Conley, 2017).

n the opinion of Bardwell (2016), readiness is a mental state characterized by mobilization of resources for performance of the activity. Formative evaluation encompasses

lesson plans with on-going classroom oral questioning, discussions, quizzes, evaluation, assignments and tests, that keep students and teachers informed of students' progress towards meeting learning objectives (Marzano & Haystead, 2013). It also includes weekly tests, immediate feedback and remediation and re-teaching of concepts that were not learnt. The utilization of formative assessment in the teaching-learning process involves breaking up the subject content into smaller hierarchical units for instruction, specifying objectives for each unit, designing and administering formative tests, offering group based remediation in areas where students are deficient, and finally administering a summative test on completion of all the units. This is based on the assumption that regular assessment of students' progress assists greatly in monitoring their progress and improving their learning and performance. Formative assessment approaches are very efficient in improving learners' achievement in mathematics instruction. The concept of academic achievement is regarded as participants' examination grades at the end of a particular term or programme (Egbule, 2014). It could also be seen as the level of achievement in a particular field of study. Higher scores indicate better academic achievement (Egbule, 2014). Similarly, Kohn (2012) sees academic achievement as the outcome or result obtained by pupils or students in educational activities. He maintains that the achievement of individual students in school work is more often determined by the family, environment and the teaching methods adopted by individual teachers. This opinion implies that, both the family and the school are responsible for either high or low academic achievement of students. Academic achievement of a student can be regarded as the observable and measurable behaviour of a student in a particular situation (Platz&Kopiez, 2013). Students' academic achievement consists of the scores at any particular time obtained from a teacher- made test.

Therefore, we can equate academic achievement with the observed behaviour or expectation of achieving a specific statement of or statement of educational intention in a research.). Academic achievement has been described as the scholastic standing of a student at a given moment (Bandele, 2012). This scholastic standing could be explained in terms of the grades obtained in a course or groups of courses. Simkins (2011) commented on this scholastic standing and argued that achievement is a measure of output and that the main outputs in education are expressed in terms of learning, that is, changes in knowledge, skills and attitudes of individuals as a result of their experiences within the school system.

Achievement in school is evaluated in a number of ways. For regular grading, students demonstrate their knowledge by taking written and oral tests, performing presentations, turning in homework and participating in class activities and discussions (Lyons, 2013). Teachers evaluate in the form of letter or number grades and side notes, to describe how well a student has done. At the state level, students are evaluated by their achievement on standardized tests geared toward specific ages and based on a set of achievement students in each age group are expected to meet. The subjectivity of academic achievement evaluation has lessened in recent years, but it has not been totally eliminated (Lyons, 2013). It may not be possible to fully remove subjectivity from the current evaluation methods, some teachers are biased toward students that respond best to traditional teaching methods. Standardized testing is best responded to by students that excel in reading, mathematics and test-taking, a skill that is not in itself indicative of academic worth. The standardized test fails to recognize students with learning and physical disabilities that do not allow them to complete the test in the same manner or amount of time as other students. Evaluations from classroom teachers, though they give the most detailed information, may still retain bias if individual differentiation and learning styles have not been taken into account. The emphasis of testing, evaluations, and assessments in the past has generally being to provide a mechanism for teachers and institutions that allow them to distinguish between students. These mechanisms attempt to provide a summative score known by most every students and teachers as a grade. Studies have argued that this approach has been

too dominant and that emphasis should be given to allowing assessment to assist in the learning process and not to only serve the purpose of grading.

However, assessment-centered teaching can have profound effects on student learning and motivation (Gronlund & Linn, 2012). Well-designed formative assessment is associated with major gains in student achievement across all ages and subjects, and has its greatest positive impact on students who struggle in mathematics. Formative assessment requires teachers to elicit students' existing ideas as students make their thinking visible to help further understanding. In mathematics, it is often difficult to interpret students' understanding, knowledge, and learning of complex content. Interpretations of student work as evidence of learning may be powerfully influenced by teachers' own understanding of mathematics concepts and how the concepts can be communicated, and expectation regarding the performance of whole classrooms and individual students (Hastings &Madaus, 2013).

Cognitive achievement is a significant matter for readiness. Psychological readiness refers to the potential units of individuals to perform well in combat or in other military operations. It is usually measured by assessing a subset of hypothetical elements or components of effectiveness (Whiting, Van Burgh & Render, 2015). Thus, readiness represents an estimate or prediction of effectiveness. Students' psychological readiness is the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent achievement in the complex and unpredictable environment of modern military operations (Marsh, 2017). Students who are actively building their understanding of new concepts (rather than merely absorbing information), who have developed a variety of strategies that enable them to place new ideas into a larger context, and who are learning to judge the quality of their own and their peer's work against well-defined learning goals and criteria, are also developing skills that are invaluable for learning throughout their lives (Tahir, Tariq, Mubashira & Rabbia (2016). Research shows that the use of formative assessment has a positive effect on student achievement (Popham, 2015). However, much of the available evidence concerning the effectiveness of formative assessment instructional practices for improving student achievement remains inconclusive and one of the reasons is that the uncertainty in judging the impact of formative assessment may be due to inconsistency in how formative assessment practices are implemented (Thum, 2015It is against this background that this study investigated the influence of formative evaluation on the psychological readiness and achievement in mathematics among adolescents students' academic achievement inIkorodu Local Government of Lagos State, Nigeria

Statement of the problem

The importance of mathematics to an individual and society is acknowledged worldwide. Unfortunately, learners' performance in the subject at national examinations at the end of primary and secondary schools education is some all over Nigeria. The consistent mass failure of most secondary school leavers in May/June Examination conducted by the West African Examinations Council (WAEC), the National Examination Council (NECO) and the National Business and Technical Examination Board (NABTEB) has prompted the Federal Government to set up panels to investigate mass failure of students, of all the number of candidates who sat for May/June SSCE, above 80% failed Mathematics (Information on Nigeria Education, 2014). The import of this on the candidates' future and the nation's manpower development should be a concern for the country's leaders, stakeholders in the education industry and the nation as a whole. Undoubtedly, there is need to opined that poor performance in English language and Mathematics on teachers' insensitivity to the nature of the subjects when planning instructional activities in the classroom) some reasons why students fails includes: poor learning styles, lack of vision, lack of passion, lack of personal

work, school, family balance: lack of maturity and discipline. Importantly, frequent failure of Nigerian students in Mathematics has been the concerned of all stakeholders in Education industry. One of the major problems identified is poor evaluation method adopted by many Mathematics teachers in senior secondary schools. Therefore, the need to investigate the impact that formative evaluation would have on the psychological readiness and students' academic achievement in Mathematics in senior secondary school in Ikorodu Local Government Area of Lagos State,

The table below shows the results of senior secondary school students' in the West Africa Senior School Certificate Examination (Nigeria), (WASSCE, 2010-2018).

Table 1: Statistics of Performance in Senior School Certificate Examination (Nigeria)

YEAR	Total No. Who sat	No. of Students that Obtained Credit & Above (A1-C6)	% of Students with Credit & Above (A1-C6)	No of Students with (D7-F9)	% of Students with (D7-F9)
2010	1,351,557	453,447	33.55	898,110	66.45
2011	1,540,250	819,390	38.93	952,620	61.07
2012	1,675,224	819,390	49.00	852,834	51.00
2013	1,543,683	555,726	36.00	987,957	64.00
2014	1,692,435	529,732	31.30	1,162,703	68.70
2015	1,593,442	544,638	34.18	1,048,804	65.82
2016	1,544,234	597,310	38.68	946,924	61.32
2017	1,559,162	923,486	59.22	630,676	40.78
2018	1,572,396	786,016	49.98	786,380	50.02
		MEAN	**41.20%**	**MEAN**	**58.20%**

Source: WAEC Research Division.

Purpose of the Study

The general purpose of the study is to determine the extent to which formative evaluation has impact on psychological readiness and students' academic achievement in Mathematics in senior secondary school in Ikorodu Local Government Area of Lagos State. Specifically, the study sought to:

1. investigate the impact of formative evaluation on students' academic achievement in Mathematics.
2. determine the impact of formative evaluation on psychological readiness amongst secondary school students.
3. examine the interaction impact of formative evaluation on psychological readiness and students' academic achievement amongst secondary school students.

Hypotheses

The following null hypotheses were postulated and tested to guide the study

1. There is no significant impact of formative evaluation on students' academic achievement in Mathematics.
2. There is no significant impact of formative evaluation on psychological readiness amongst secondary school students.
3. There is no significant interaction impact of formative evaluation on psychological readiness and students' academic achievement amongst secondary school students.

Method

This study adopted a quasi-experimental design. The population for the study consists of all the 11, 211 public senior secondary school class two (SS II) students in Ikorodu Local Government Area of Lagos State. The sample for the study was randomly selected

from a population of 11, 211 of which 2,938 are Senior Secondary Two (2) students (Ikorodu LGA Local Education Secretariat, Itaelewa, 2019). There are 25 public senior secondary schools in Ikorodu Local Government Area of Lagos State. The stratified sampling technique was used to select 200 respondents (SS2 students) consisting of 100 subjects for experimental group and 100 subjects for control group in the study. The instrument for data collection was structured questionnaire developed by the researcher titled: Psychological Readiness Questionnaire (PRQ), Mathematics Achievement Test (MAT) and Mathematics Formative Evaluation Test (MFET). The instrument was faced validated by three experts from the Department of Educational Foundations, Faculty of Education, University of Lagos, Akoka, Nigeria. The instruments have high stability co-efficient of 0.82, 0.75 and 0.79 when tested during the pilot study at 0.05 level of significance. This was a 10-item researcher constructed questionnaire to obtain data on students' readiness to learn mathematics in the treatment groups and control group. It had four optional responses vis-à-vis, Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD).

Results

Analysis of Respondents Demographic Data

Table 2: Demographic Data of the Respondents

Variables		Frequency	%
Gender	Male	100	50
	Female	100	50
	Total	200	100
Age	14 – 15 years	47	23.5
	16 years and above	153	76.5
	Total	100	100

Table 2 shows the analysis of the demographic information of respondents in each group. In each group, 50% were male while the other 50% were female, 27% were within ages 14 to 15 years while 73% were within the ages of 16 years and above.

Table 3: Summary of Descriptive Statistics of Pre and Post Test Mathematics Achievement Test (MAT) Across Groups

Groups	Pre-test scores			Post-test scores		Mean difference
	N	Mean	SD	Mean	SD	
Experimental group	100	9.71	1.36	14.76	2.13	5.05
Control	100	7.18	1.03	10.49	1.84	2.31
Total	200	8.45	1.20	12.63	2.00	2.68

Higher mean scores on the MAT scores are indicative of higher learning outcome

Table 3 indicated that experimental group recorded highest score in the learning outcome of students with mean difference of 5.05 and then followed by the control group with mean difference of 2.31.

Hypotheses Testing and Interpretation of Results

Hypothesis One: There is no Significant Influence of Formative Evaluation on Students' Academic Achievement in Mathematics. The hypothesis was tested using Analysis of Co-variance (ANCOVA).

Table 4: Analysis of Co-variance on Influence of Formative Evaluation on Students' Academic Achievement in Mathematics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	338.957[a]	2	52.164	3.413	0.000
Intercept	924.918	1	924.918	73.599	0.000
Formative Evaluation	35.964	1	35.964	2.157	0.126
Academic Achievement	426.822	1	54.519	3.567	0.000
Error	1238.043	197	15.284		
Total	42145.000	200			
Corrected Total	3176.000	200			

a. R Squared = .682 (Adjusted R Squared = 5.83)

Significant at P < 0.05; Degree of freedom = 2 and 197

The ANCOVA result in Table 4 reveals that based on experimental condition, the F-value was 3.567, P-value < 0.05 at 2 and 197 degree of freedom and 0.05 level of significance. Since the obtained P-value (0.000) is < 0.05, it affirms that formative evaluation has significant influence on students' academic achievement in Mathematics. On this basis, the hypothesis one which states that there is no significant influence of formative evaluation on students' academic achievement in Mathematics was hereby rejected. It was therefore concluded that there is a significant influence of formative evaluation on students' academic achievement in Mathematics.

Hypothesis Two: There is no Significant Influence of Formative Evaluation on Psychological Readiness amongst Secondary School Students. The hypothesis was tested using Analysis of Co-variance (ANCOVA).

Table 5: Analysis of Co-variance on Influence of Formative Evaluation on Psychological Readiness amongst Secondary School Students

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	728.812[a]	2	52.431	3.893	0.000
Intercept	1223.91	1	1223.91	78.628	0.000
Formative Evaluation	32.492	1	32.492	2.610	0.122
Psychological Readiness	805.285	1	58.207	3.526	0.000
Error	1213.3112	197	16.410		
Total	42194.000	200			
Corrected Total	3176.000	200			

a. R Squared = .601 (Adjusted R Squared = 5.04)

Significant at P < 0.05; Degree of freedom = 2 and 197

The ANCOVA result in Table 5.reveals that based on experimental condition, the F-value was 3.526, P-value < 0.05 at 2 and 197 degree of freedom and 0.05 level of significance. Since the obtained P-value (0.000) is < 0.05, it affirms that formative evaluation has significant influence on psychological readiness amongst secondary school students. On this basis, the hypothesis one which states that there is no significant influence of formative evaluation on psychological readiness amongst secondary school students was hereby rejected. Therefore, the use of formative evaluation in mathematics has a significant influence on psychological readiness amongst secondary school students. We therefore concluded that there is a significant influence of formative evaluation on psychological readiness amongst secondary school students.

Hypothesis Three: There is no Significant Influence of Formative Evaluation on Psychological Readiness and Students' Academic Achievement Amongst Secondary School Students. The hypothesis was tested using Analysis of Co-variance (ANCOVA).

Table 6: Analysis of Co-variance on Influence of Formative Evaluation on Psychological Readiness and Students' Academic Achievement amongst Secondary School Students

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	889.123[a]	2	85.452	32.508	.000
Intercept	1487.715	1	1487.715	289.815	.000
Pretest	64.162	1	64.162	9.754	.001
Psychological readiness	29.146	1	29.146	19.461	.000
Academic achievement	139.413	1	139.413	98.201	.000
Psychological readiness * Academic achievement	5.571	1	5.571	3.731	.000
Error	397.132	197	1.103		
Total	42578.000	200			
Corrected Total	2177.000	200			

Significant at P < 0.05; Degree of freedom = 2 and 197

The ANCOVA result in Table 6 reveals that based on Experimental condition, the F-value was 3.731, P-value < 0.05 at 2 and 77 degree of freedom and 0.05 level of significance. Since the obtained P-value (0.000) is < 0.05. Therefore hypothesis three that stated that there is no significant influence of formative evaluation on psychological readiness and students' academic achievement amongst secondary school students was rejected. We thereby concluded that there is a significant influence of formative evaluation on psychological readiness and students' academic achievement amongst secondary school students.

Discussion

Findings from hypothesis one revealed that there is a significant influence of formative evaluation on students' academic achievement in Mathematics. This finding is in line with Clements (2014) who noted that formative assessment approaches are very efficient in improving learners' achievement in Mathematics instruction. The finding also supports Kingston and Nash (2011) who posited that effective implementation of formative assessment practices in a Mathematics classroom results in students 'improved learning and achievement directly or indirectly. In the same vein, Kiplagat (2016) claimed that formative assessment classroom practices improve students' motivation, confidence and self esteem because of its pedagogical potential. Also, the finding is in agreement with Bernard (2013) who reported the use of formative evaluations has a positive impact on increase in student responsibility for their learning and improved motivation, confidence, and classroom achievement. Similarly, Smith (2015) reported that frequent formative evaluations can predict achievement on measures of adequate yearly progress indicators in mathematics as measured by standardized criterion-referenced competency tests.

Findings from hypothesis two revealed that there is a significant influence of formative evaluation on psychological readiness amongst secondary school students. This finding supports Smith (2015) who asserted that formative assessment builds students' learning to learn skills by emphasizing the process of teaching and learning, and involving students as

partners in that process. It also builds students' skills at peer-assessment and self-assessment, and helps them develop a range of effective learning strategies. Students who are actively building their understanding of new concepts (rather than merely absorbing information) and who are learning to judge the quality of their own and their peers' work against well-defined criteria are developing invaluable skills for lifelong learning. Kirkland (2014) also stated that formative evaluation may affect the motivational, self-confidence and anxiety level of a student while Bridgeman (2014) opined that formative evaluation motivates the students intrinsically. Erinosho (2008) also opined that a person who is informed of his successful achievement on a test would begin to develop interest in that subject and may continue to explore means of doing well in subsequent tasks. On the other hand, a negative feedback on achievement may produce one of two effects. Similarly, Chickering and Gamson (2014) asserted that formative evaluation keeps students on task by helping identify areas in which the student is not performing well. This prompt feedback also appears to inform students while they are planning their individual study plans and strategies.

Findings from hypothesis three revealed that there is a significant influence of formative evaluation on psychological readiness and students' academic achievement amongst secondary school students. This finding supports Hamachek (2014) who opined that formative evaluation has the purpose of assisting learning and for that reason it is also called 'evaluation for learning'. It involves processes of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning and where they need to go and how best to get there. Also, this finding is in line with Erwin (2013) who asserted that the effect of using formative assessments in the classroom has a powerful effect on student achievement. The effect is attributed to teacher's ability to monitor what students know and how they understand it; to the specific types of feedback that teachers provide to students based on their achievement and to the specific actions that teachers take to respond to students' results and the supports that they have in place to do so.The finding also agrees with the findings of Adeyegbe (2013) that students who are systematically taught using formative assessment, perform better than those taught using the conventional method.

Conclusions

Based on the findings of this study, it was concluded that there is a significant influence of formative evaluation on students' academic achievement in Mathematics, there is a significant influence of formative evaluation on psychological readiness of the students, and there is a significant influence of formative evaluation on psychological readiness and students' academic achievement amongst secondary school students The findings of the study has shown that formative evaluation can be used to enhance psychological readiness of students to a moderate level in order to improve achievement of senior secondary school students in mathematics in general. The study also concluded that when formative evaluations are used for diagnostic purposes, it improve the academic achievement and psychological readiness of the students on the subject and also enable them to understand the contents of the subject better than the use of summative test only. Also formative test serves as a basis for finding out the sources of difficulties on the contents of the subject. In this way, the teacher is able to give necessary remediation and corrective measure to improve the understanding of students on the contents of the subject in order to improve their academic achievements in the subject concerned.

Implications of the Study for Measurement and Evaluation

The study emphasizes that regular and planned assessment incidents are parts of formative evaluation. Therefore, the implications of the study to measurement and evaluation/assessors are: There are implications for teacher's organization and lesson structure. Given the complexity of classroom life and the usual size of classes, it is generally

difficult for teachers to focus on the assessment of individuals, hence the needs for formative evaluation. Formative evaluation is an integral part of the teaching and learning process, aimed at enhancing student learning and improving teaching; There are implications for task design in formative evaluation. Tasks need to be carefully designed so that focused formative evaluation can take place. Assessors have the opportunity to maximize students learning through effectively designed formative assessment activities and formation assessment is more helpful in improving learning and modifying teaching strategies and materials because it provides feedback and information during the learning process.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The study recommended that for improvement in achievement of the students, Mathematics teachers must increase the use of formative evaluation.
2. The school administrators should emphasize to their teachers on regular basis that the teaching of Mathematic in secondary school should be carried out by using formative evaluation regularly, adequate feedbacks and remediation for students to improve their academic achievement.
3. The government and school administrators should allow and provide incentives for teachers to attend seminars, workshops, conferences and in-service trainings to enhance their performances and to acquire necessary skills for constructing formative tests, and how to blend formative assessment with classroom procedures.
4. Curriculum designers should take into cognizance while designing tasks for students that learning in Mathematics is not solely a cognitive affair. Hence, Mathematics curriculum should be designed to include the use of methods / strategies and material media which would make the learning of Mathematics very active, investigative and adventurous.
5. The environmental and social conditions in which teachers handle Mathematics formative evaluations and their feedback to learners should be conducive for both boys and girls. This would enhance learners' motivation to learn mathematics.
6. Teachers should carefully plan and administer Mathematics quizzes, out of class assignments, supervised classroom Mathematics assignments, end term and end year mathematics examinations.

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