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INVESTIGATING ACHIEVEMENT OF CONTINUOUS ASSESSMENT TECHNIQUES ON STUDENTS' DISCOVERY IN MATHEMATICS PERFORMANCE AT SSSI LEVEL AT GDSS BWARI, BWARI AREA COUNCIL, ABUJA, FCT

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Abstract: The efficiency of Continuous Assessment in guided discovery can be judged through periodic observation and collection of information from specific tasks assigned to students during their discovery learning process. The current research is aimed at exploring outcomes of continuous assessment that enhance the academic achievement of SSSI students. Sixty one (61) students were sampled out from SSSI in a co-educational school – Government Day Secondary School (GDSS), Dutse Alhaji, Bwari Area Council of FCT, Abuja for the experiment. They were all involved in the study of Pure Mathematics as a compulsory subject. Post-test design of control and experimental groups was adopted. An achievement test was used to collect the information from respondents. Independent sample t-test was also applied as test of significance. It was concluded that continuous assessment had positive effects on students' achievement in discovery learning. It was recommended that teachers who are well versed in evaluation and assessment techniques should be encouraged and their expertise utilized to enhance students' performance at the SSSI level. In addition, training should be given to the instructors.

Key Words: Instructors, Continuous Assessment, Guided Discovery; Experimental Control; Students' Performance; SSSI Level; Effect of Continuous Assessment Techniques; Students' Discovery;

I. INTRODUCTION

Discovery Learning takes place in problem-solving situations where the learner is engaged in drawing on his/her own experience and knowledge. It is also a method of instruction by which students interact with their environment through exploring and manipulating objects, grappling with questions and controversies (Wikipedia, 2018). Assessment is an action which involves passing judgment about someone or something, while continuous assessment is used to determine the attainment or reading targets. It is a form of educational examination adopted to evaluate the progress of students throughout a prescribed course as an alternative to the final examination system. Therefore, the assessment of discovery learning is not a one-time movement, but a progressive process which includes checking on, reflecting and modifying the learning techniques in an organized and cautious manner.

Teaching is not learning as observed by Mariappan on Twister (2018), but discovery is learning. Continuous assessment is an on-going or continual means through which a teacher carries out classroom investigation on students' performance in discovery (Prouty & George, 2003). In other words, observations are made frequently to collect data on the level of students' knowledge in discovery practice, understanding of a given concept and their achievement in performance. This could be done through assigning specific tasks to students based on their previous achievements in the classroom. The conduct of students is observed by the teacher to decide on the level of their performance in and out of the classroom. It can also be of help in determining what the learners have discovered or learnt on their own.

Continuous assessment is part and parcel of the instructional process; an educational tool for learning that has been taken as a key in quality assurance in Mathematics discovery (Abejehu, 2016). Continuous assessment as an approach, should present a comprehensive range of sources and methods that teachers can apply in collecting, interpreting and synthesizing information about students' discovery (Airasian, 1991). The information helps teachers to better understand their student, sketch and observe their teaching to create a feasible discovery culture. Viewed from Baker & Stites (1991), continuous assessment should include a usual assessment of students' affective structures and motivation they will need to express their will-power intensely; their work-force readiness to discover; and their skills in team or group performance environment. A child can remain on discovery throughout life without coming out with facts, when a closed assessment is not given the discovery get easier when a close assessment is given.

Why Continuous Assessment?

Iqbal, Samiullah & Aysha (1993) stated that the purpose of Continuous Assessment in Mathematics Discovery is for the teacher to continuously assess students' discovery learning outcomes in all the three domains -- Cognitive, Affective and Psychomotor -- with regard to knowledge and understanding, routine knowledge (making comparisons, estimating, performing calculations and applying formulas), problem-solving and other higher organized skills. Continuous assessment provides information about the discovery ability and progress of each student that will help teachers know, plan, redesign their teaching in accordance with their students' needs. It diagnoses information on strengths and weaknesses of students' discovery in learning; and provides criticism to teachers for adjustment of curriculum targets and text-books. It also facilitates grouping of students for discovery through the use of various activities as well as provides criteria for counselling students and their parents, grading and promoting them. It decides the nature of training for the teachers, faculty or staff in a programme (Gipps, 1990). Continuous assessment in a classroom where majority of the students are given opportunity to discover facts themselves will increase the skills of students in that classroom. In many countries which stress the success of each student, continuous assessment is considered the only way to certify that all of them have the opportunity to succeed in school. In most of the classrooms, the range of intelligence varies from slow through average to fast learner. By means of continuous assessment, teachers adapt their teaching techniques in accordance with the needs of all learners to enable them have the opportunity of learning and succeeding. Properly applied, by frequently observing the aptitudes of the learners' discovery, what they know and what they can do, teachers can ensure the success of each student when they are provided with the opportunity to succeed (Prouty & George, 2003).

Continuous assessment involves the collection of data for long periods, which are beneficial to teachers, learners, educators and parents alike as it yields more reliable data which motivate teachers to modify their teaching methods. This also plays an active role in identifying the remediation areas of students' weaknesses if correctly secured by what happens in the classroom where learners' discovery is properly assessed. Continuous assessment is a tactic that details the students' overall performance in Mathematics discovery. It is the responsibility of the relevant authorities and teachers to analyze students' achievement and correct the highlighted problems (Alausa, 2004). Teachers are kept at the centre to assess all students' activities in the classroom. It inspires more teachers to take part in assessment and grading of their learners (Paris, et al., 1991). Continuous Assessment Techniques on guided discovery in mathematics help students' performance in the subject. Through assimilation of assessment activities, teachers will be able to integrate assessment with their instructional practices. They may largely incorporate assessment of learning framework and provide evidence related to how assessment information is applied to inform and guide in the selection of teaching methods for individual learners. With the aid of continuous assessment, teachers will enhance their teaching and should discuss discovery criteria for good learners' work with colleagues and parents. According to Lewis (1997), all students must have an opportunity to succeed in school with the use of continuous assessment.

1.2. STATEMENT OF THE PROBLEM

It has been observed that the techniques of handling Mathematics are not carefully adopted and taken care of. Therefore, students who are to discover things themselves for better retention, despite the use of discovery methods, find it difficult to do so due to lack of continuous assessment.

This study focused on observing the implications of continuous assessment techniques on guided discovery methods in Mathematics on the academic performance of SSSI students.

1.3. OBJECTIVES OF THE STUDY

The objectives of this study are:

1. To investigate effects of continuous assessment on guided discovery on achievement of SSSI students in Mathematics.
2. To explore the effects of continuous assessment on the retaining level of top-scorer in Mathematics education.
3. To highlight the effects of continuous assessment on the retaining level of low-scorer in guided discovery method in Mathematics.

1.4. RESEARCH QUESTIONS

The following research questions were undertaken in the study:

1. Is there any difference between the use of continuous assessment on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics?
2. Is there any difference in the use of continuous assessment technique on the retention level of high-achiever on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics?
3. Is there any difference in the use of continuous assessment techniques on the retention level of low-achiever on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics?

1.5. THE RESEARCH HYPOTHESES

1. There is no significant difference between the use of continuous assessment on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics.
2. There is no significant difference in the use of continuous assessment on the retaining level of top-scorer on control and experimental groups under guided discovery method in SSSI Mathematics.
3. There is no significant difference in the use of continuous assessment on control and experimental groups under guided discovery method on the retaining level of low-scorer in SSSI Mathematics.

II. METHODOLOGY AND PROCEDURE

The study used experimental design, post-test only, having four weeks of students' involvement. SSSI students constituted the population of the study from GDSS, Bwari. The sample consisted of 61 students of SSSI studying Mathematics. Sampling was done observing the results of students in basic nine final examinations that brought them to SSSI class to the commencement of the experiment. The rationale for the selection of two full sections was that the researchers wanted to justify the differences between the achievements of experimental and control groups. If students were selected from all the sections that were taught by different teachers, the effects of different teaching methods would be a mystifying variable. To avoid this confusion, both the experimental and control groups were selected from the two classes taught by the same teacher. The designated section had ninety-five (95) students, of which sixty-one (61) were selected. The students of the selected section were further divided into two groups of thirty and thirty-one each; that is, experimental group (30) and control group (31), all studying Further Mathematics. One of the groups was strictly guided by continuous assessment. The groups were equated on the basis of basic nine final examination scores of the students in Further Mathematics. Two teachers of equal academic qualifications (B.Sc.Ed & B.Ed) with at least one year experience were selected and assigned to control and experimental groups randomly. Achievement test and questionnaire were used as instruments for collection of data after implementing intervention. A panel of four experienced Mathematics teachers from Nasarawa State University. Keffi and University of Abuja validated the test prior to the conduct of the study. The data were analyzed using t-test.

III. ANALYSIS AND RESULTS PRESENTATION

The results were analyzed and presented based on the raised research questions and hypotheses. Independent sample t-test was used to compare mean scores of experiment group and control group. In order to ascertain the significant or no- significant difference between the performance of control and experiment groups, correspondence null hypotheses were tested. The analysis of the data was presented as follows:

3.0.1 Analysis of Research Question One/Hypothesis One

Q_1. Is there any difference between the use of continuous assessment on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics?

HO_1: There is no significant difference between the use of continuous assessment on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics.

Table 1: T-test Analysis on Guided Discovery Method's Post-test on SSS1 Students in Mathematics

GROUPS	N	$\bar{X}$	δ	DF	$\bar{X}$DIF	SE	T_{CAL}	T_{CRI}	P	REMARKS
Experimental	30	6.63	2.26							
			59	2.78	0.57	4.88	1.96	0.05		Significant
Control	31	3.85	2.19							

Table 1 shows that the mean performance of Experimental group is 6.63 with standard deviation of 2.26, while the mean performance of control group is 3.85 with standard deviation of 2.19. The table also reveals that t_{cal} (4.88) falls within the critical region of (1.96) at a confidence interval of 0.05 level of significance. Therefore, the null hypothesis of no significant difference is hereby rejected, showing that there is a significant difference between the use of regular continuous assessment in discovery method and non-regular discovery method in the achievement of SSSI students in Mathematics.

3.0.2 Analysis of Research Question Two/Hypothesis Two

Q_2. Is there any difference in the use of continuous assessment technique on the retention level of high-achiever on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics?

HO_2: There is no significant difference in the use of continuous assessment on the retaining level of top-scorer on control and experimental groups under guided discovery method in SSSI Mathematics.

Table 2: T-test Analysis on Comparison of High Achievers of Control and Experimental Groups on Post-test Scores

GROUPS	N	$\bar{X}$	δ	DF	$\bar{X}$DIFF.	SE	T_{CAL}	T_{CRI}	P	REMARK
Experimental	15	6.63	2.18							
			28	2.06	0.91	2.26	1.96	0.05		significant
Control	15	4.57	2.37							

From Table 2, the experimental group has its mean score as 6.63 with standard deviation of 2.18, while the control group has a mean score of 4.57 with standard deviation of 2.37. It was shown that the mean difference between high-achiever students taught with experimental group and control was 2.06 in favour of experimental group.To calculate the null hypothesis, Table 2 indicates that the calculated t-value was 2.26 greater than t-critical (1.96) at a 0.05 significant level. This shows that t-cal falls within the critical region. Therefore, the null hypothesis of no significant difference is hereby rejected because the t-cal > t-crit. This is a clear indication that high-achiever students in regular continuous assessment (experimental) of guided discovery in achievement of Mathematics have the potential of doing better than those in control group.

3.0.3 Analysis of Research Question Three/Hypothesis Three

Q_3. Is there any difference between the use of continuous assessment on control and experimental groups under guided discovery method in the achievement of SSSI students in Mathematics?

HO_3 There is no significant difference in the use of continuous assessment on control and experimental groups under guided discovery method on the retaining level of low-scorer in SSSI Mathematics.

Table 3: t-test Analysis on Comparison of Low Achievers of Control and Experimental Groups on Post-test

GROUPS	N	$\bar{X}$	δ	DF	$\bar{X}$DIFF	SE	T_{CAL}	T_{CRI}	P	REMARK
Experimental	15	6.90	1.95							
			29	2.50	0.76	3.27	1.96	0.05		significant
Control	16	4.45	2.30							

Table 3 shows that the mean performance score of experimental group in continuous assessment under guided discovery of low achievement in Mathematics was 6.90 with standard derivation of 1.95, and that of control group was 4.43 with standard derivation of 2.30. The difference between experimental and control group was 2.50 in favour of experimental group. Also, Table 3 reveals that the calculated t-value (3.27) falls within the critical region of 1.96 at a 0.05 level of significance. At this level, the null hypothesis of no significant difference is hereby rejected. This reveals that there is significant difference between Experimental and Control Groups on Post-test in continuous assessment techniques on the retention level of low-achievers in Guided Discovery Method of SSI achievement level of Mathematics.

IV. DISCUSSION OF THE MAJOR FINDINGS

To analyze the data of the major findings:

1. The mean score of experimental group in all the tables is greater than that of control group; that is, regular continuous assessment has significant effect on the achievement of guided discovery in Mathematics.
2. It is contingent that regular continuous assessment in guided discovery had significant effect on the achievement in Mathematics than periodic continuous assessment in guided discovery since the calculated t-value falls within the critical region.
3. It is also observed that regular continuous assessment had significant difference on the achievement of high and low guided discovery method in Mathematics than periodic assessment.

4.1. DISCUSSION

The study revealed that regular continuous assessment in guided discovery method has positive effect on students' discovery, learning and achievement in Mathematics. Considerably, better performance of regular continuous assessment group in the guided discovery of Mathematics shows that regular continuous assessment does affect the students' discovery. This conception was discussed in a previous study done by Iqbal, et al. (2017) stating that continuous assessment promotes performance of students in Mathematics in primary school. Abejehu (2016) supports the findings of this study as he has also emphasized the importance of continuous assessment as means of equipping educators and learners about the learner's progress which would eventually benefit their educational process. The method was established by Bakar (2010) as an alternative method of assessment for achievement in Mathematics which was initially used in educational systems in 1991 and after continuous reforms, evolved into continuous assessment. Furthermore the study reveals that the high-achievers and the low-achievers of regular continuous assessment in experimental group recorded extensively better performance as compared to the high-achievers and the low-achievers of the periodic control group. The divergence between the means of the low-achievers of both groups is greater than the mean variation between the high-achievers of both groups. That is, low-achievers gained more from this approach. Bayo (2005)'s view that continuous assessment has the strength of motivating and focusing learner's attention on the lesson supported this finding. Consequently, students with learning disability like lack of focus and motivation can benefit from this approach. From the findings, if teachers use continuous assessment in handling guided discovery, all the students will have a chance of learning to succeed. Inyang Abia (2004) cited a number of researchers who were having the similar conclusions that, continuous assessments play the most significant role in students' discovery. It encourages all learners to be energetically participating in discovery process. It also provides practical and rapid feed-back to all students since it helps the low-achievers of experimental group in retention.

The responses of students of experimental group revealed their liking of this approach. They opined that continuous assessment techniques encourage better understanding of the content and develops confidence and self-assessment attributes. The findings strictly correlates with a study conducted by Nxumalo (2007) emphasizing the importance of assessment in discovery, as a means of increasing self-confidence in students. Students get insight into misconceptions and proceed at their own pace. The difference between the means of the high-achievers and low-achievers of both groups on retention test is greater than the difference between means on post-test. This indicates that both the high and the low achievers of experimental group better understand the concept of mathematics than the control group. That is, continuous assessment focuses on students' retention rather than memorization. The teacher of experimental group pointed out that continuous assessment helps teachers to get better knowledge of learning needs of the students; that is, they get deeper understanding of teaching and learning strategies. The findings in the present study are similar to those of Mohammad Iqbal, et al. (2017) who conducted a study in Nigeria and found that continuous assessment has a significant effect on students' achievement in Mathematics.

V. CONCLUSIONS

To conclude the research programme, continuous assessment under guided discovery method had critical impact on academic performance of SSSI students in Mathematics. It shows that the adoption of continuous assessment had significant impact on academic performance of high- and low-achievers at the SSSI level. It was concluded too that the adoption of continuous assessment had significant impact on academic performance of SSSI students even among the low-achievers.

5.1. RECOMMENDATIONS

Going by the findings and conclusions of the study, the following recommendations are made:

1. The study reveals that continuous assessment techniques are very efficient for teaching discovery in Mathematics. For this purpose, it is recommended that training in using continuous assessments in teaching discovery in Mathematics should be given to teachers.
2. Practical training in the use of continuous assessment should be provided to Mathematics teachers; and there should be proper guidance to Mathematics teachers at all levels of education.

3. The approach should be improved at all levels of education, especially the SSS level for teaching all subjects.
4. Practical training in the use of continuous assessments on Discovery Method is highly needed; therefore, there should be regular workshop for teachers on that area.
5. The Federal, State and Local Governments should at all levels promote the use of continuous assessment and centres for developing assessment techniques in the entire existing educational environment.
6. Versed teachers in evaluation and assessment techniques should be encouraged and their skills utilized for the programme.
7. There should be awareness of different assessment techniques to parents so they can help their children in their school work.
8. In-service teachers should be given training to develop and use continuous assessments through refresher courses. Other researchers can conduct similar studies to investigate the effectiveness of continuous assessment in teaching different subjects at different levels of education.

Finally, it is needful to develop a new culture in enhancing continuous assessment for teaching and learning.

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