International Journal of
Humanities, Education, and Social Sciences

e-ISSN : 3026-0892
p-ISSN : 3026-1422

Index : Harvard, Boston, Sydney, Dimensions, Lens, Scilit, Semantic, Google, etc

https://doi.org/10.58578/IJHESS.v2i3.4202

Effect of Diagnostic Assessment on Basic Education Students' Achievement in Basic Science in Jalingo Metropolis, Taraba State, Nigeria

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Article Info:

Submitted:	Revised:	Accepted:	Published:
Oct 25, 2024	Nov 12, 2024	Nov 25, 2024	Nov 30, 2024

Abstract

The study focused on the effect of diagnostic Assessment on Basic Education students Achievement in Basic Science in Jalingo metropolis, Taraba State, Nigeria. Two objectives guide this present study which are; to examine the problems in the used of Diagnostic Assessment Strategy based on Students' Achievement in Basic Science and find out the Mean Achievement Scores of Students' who were assessed using Diagnostic Assessment Strategy and those assessed without the use of Basic Science Students' in Jalingo metropolis. The study adopted Quasi-experimental design, using pretest and posttest design. The sample consisted of 13 science teachers and 100 students out of which 50 were males and 50 were females. Two instruments were used for the research "Students Achievement test in Basic Science (SATBS) and Teachers' Diagnostic Assessment Questions (TDAQ) for both teachers and students. The method used for data analysis were mean, standard deviation and t-test distribution. Results revealed that there is no gain in mean achievement of students assessed using DAS. At 5% level of significance, it was shown that there is Significant Difference between the Mean Achievement scores of students assessed using DAS and those without the use of DAS in the selected

schools. It was recommended that teachers need to be given training on how to use DAS effectively through providing them with Training programmes that will equipped their understanding of DAS and Also ensure each formative assessment given the classroom should contain DAS in other to allow students get used to the procedure while learning since teachers believe that Students do not find it difficult in expressing their thought.

Keywords: Assessment, Diagnostic, Assessment Strategy & Basic Science

INTRODUCTION

Assessment is a very important tool used in the educational programme to determine achievement both in teacher's major responsibility of impacting knowledge as well as students' abilities to improve in learning. The evident way to assess students is through testing. This gives the qualitative and quantitative abilities on student. Ozan and Kincal, (2018) submitted that "Educational legislators, teachers and researchers are more concerned in testing as it truly reflects students' achievement". Typically, the assessment that this present study tends to discussed is the diagnostics assessment. This method of assessment is design to locate and identify students' area of learning difficulties/weaknesses in a subject area or skill and the cause. This assessment is likely important in science especially in teaching of basic science due to it critical steps normally used to test students' learning abilities before diagnosis is been carried out by the instructor. Rustaman, (2017) recently concluded that it is mostly expected to develop higher order thinking skills in the form of valid test items as well as combination of self-and peer assessment on inquiry based instruction and meaningful student learning experience. However, Diagnostics assessment is mostly pertinent in subjects like Mathematics, Biology and Chemistry that attainment of specific skills or information is a requirement for the learning of advanced theories.

Therefore, basic science students are those students who have acquired requisite knowledge in basic science of the lower and middle basic education programme. Evenly, this are students in former junior secondary schools before the onset of the universal Basic Education programme. However, for the purpose of this research work, the interest is on programme identifying basic problems associated with the used of diagnostic assessment strategy through considering students achievement and the interviews with the selected teachers. Looking at the position of sciences in our educational institutions. Basic science

plays a significant role in the school curriculum, it important role has make it necessary and requisite in national building.

Basic Sciences are defined as the scientific disciplines of mathematics, physics, chemistry, and biology. In basic education, is taught as a subject which develop in skills to students that prepares them ahead of senior secondary school Education in Nigeria. Evenly, Basic Education comprises primary education (first stage of basic education) and lower secondary education (second stage). Expressively, basic sciences in basic education in Nigeria Education provides a fundamental understanding of natural phenomena and the processes by which natural resources are transformed. The Merriam-Webster dictionary define Basic science as any one of the sciences such as Anatomy, Physiology, Bacteriology, Pathology or Biochemistry which is fundamental to the study of medicine. It helps researchers understand living systems and life processes. The acquisition of appropriate skills and the development of mental, physical and social abilities and competencies for the individual to live in and contribute to the development of the society in which he lives, has been a major concern of Basic science.. According the National Policy on Education, (2013) observes the following as the objectives of teaching basic science in Nigerian Education:

i. Help students observe and explore the environment;
ii. Make students develop basic science process skills including observing, classifying, experimenting and manipulating;
iii. Develop a functional knowledge of basic science concepts and principles;
iv. Develop scientific attitudes; including curiosity, honesty, perseverance, willingness to change opinion and critical reflection;
v. Lay a good foundation for the learning of science in the future.

Indeed, teaching basic science in school today come with different assessment problems such as; teachers poor knowledge of the content, change in examination pattern and grading. Generally, is a programme taught in primary and junior secondary schools in Nigeria. Laudable, as the objectives of teaching basic science are enumerated above, one is not sure whether these objectives are achieved as documented evidences (Hancer, 2006). This make it possible to assess diagnostic assessment strategy, it's impacts and problems among upper basic science students. Chong, (2008) explained diagnostics assessment strategy (DAS) as that Strategy that can provide insight into how students understand specific ideas by analyzing their responses. He mentioned two things to consider in the

used of Diagnostics assessment strategy which are: A propositional knowledge statement and the explanation. Furthermore, Chong, (2008) undertook a research on the topic 'Issues and problems concerning the use of Diagnostic Assessment strategy (DAS) and formative Assessment in Brunei Schools. The researcher used quasi-experimental design and developed 26 DAS instrument questions some of the problems he highlighted after test score analysis, interviews with teachers and students, and classroom observations are; DAS designed for mental capacity and language proficiency higher than the level of lower secondary students; Inability of some teachers to use them effectively; some teachers lacking knowledge on the subject matter; classroom culture that does not work well with interactive styles requiring honest feedback.

Thus, the ability of a teacher to analyze the testing maybe interpreted in terms of students, ability and type of concept and for each question and then reported feedback, as such, this make it a task for teachers of basic science difficult due to class size and differentiated classroom. Esomonu and Eleje, (2017) recently find that diagnostic tests are effective when used with feedback and remediation. They further addressed that to the best of their knowledge, until time of their report studies only finding by Bett, Hahn & Zau, (2015) and Ofem, Idika & Ovat, (2017) on the effect of diagnostic testing on academic achievement have been researched on. Based on this, one expects that this present study investigates the effect of diagnostic Assessment on Basic Education students Achievement in Basic Science in Jalingo metropolis, Taraba State, Nigeria will cover the existing gaps and add to knowledge. The present study adopted Donald Kirkpatrick assessment theory. Kirkpatrick rudedeveloped a model in 1959, the four level training evaluation model was designed to objectively measure the effectiveness of training. The levels are: Reaction, learning, behavior and results.

Statement of Problems

Unfortunately, well recommended assessment strategy to improve learning among students/pupils comes with great sophistication. However, assessment on the goal to achieved positive learning, can be seen as: that of learning, for learning and as learning. Whereas based on its function can either be a formative or summative assessment. Clearly, the attempt by the researcher in this study specifically is to identify the problems of using diagnostic assessment strategy based on the goal and function it plays in basic science programme. Prior to the foregoing, Diagnostic assessment gazes rearward instead of

forward. Worthy to verify is to investigate whether diagnostic testing that provides detailed diagnosis of students' strengths and weaknesses affects students' achievement positively. Thus, since there are differentiated classroom, students' strength and weaknesses can be one of the difficult task teachers can have when strategizing proper assessment procedure. Furthermore, teachers grading system, lack of content knowledge, attitudes, inability to consider individual difference and teaching method in classes has lots of implications in assessment strategy. Observably, Stanley (2008) even purports that several researches carried out for the improvement of students' academic achievement in science did not solve the problem as a result of teacher's persistence in the lecture method in teaching of Basic Science. It is believe that our schools in the country suffers some portions of challenges which has contributed to students' poor achievement in school. It is obvious, many science teachers records poor results, as such, It is out of this ways (students' strength and weaknesses in attempting test) bring to the attention of the researcher to investigate on the effect of diagnostic Assessment on Basic Education students Achievement in Basic Science in Jalingo metropolis, Taraba State, Nigeria, to find out those weaknesses of the students.

Purpose of the Study

The main Purpose of this study intend to investigate the effect of diagnostic Assessment on Basic Education students Achievement in Basic Science in Jalingo metropolis, Taraba State, Nigeria. The objectives of the study are as follows:

i. To identify the problems in the used of Diagnostic Assessment Strategy based on Students' Achievement in Basic Science.
ii. To examine the Mean Achievement Scores of Students' who were assessed using Diagnostic Assessment Strategy and those assessed without the use of diagnostic assessment strategy among Basic Science Students' in Jalingo metropolis.

Research Questions

i. What is the mean scores Achievement of students' who were taught using Diagnostic Assessment strategy and those without the use of diagnostic assessment strategy?
ii. What are the problems in the used of DAS based on students' achievement in Basic science in Jalingo metropolis?

Research Hypothesis

HO_1: There is no Significant Difference between the Mean Achievement scores of students assessed using DAS and those without the use of DAS.

METHODS

The study adopted a Quasi-experimental using pretest and posttest design. The reason for adopting quasi-experimental designs typically allow the researcher to control the assignment to the treatment condition, but using some criterion other than random assignment. This design is also effective because researchers are able to use the 'pre-post testing. In line with the present study, the pre-test is considered to be students who are assessed without the use of Diagnostic assessment and post-test is consider those students who were assessed using Diagnostics assessment strategy. The study population consisted of 4000 students of Basic Education in Jalingo metropolis offering Basic science where 2300 were male and 1700 were female based on the outcomes gathered. The study sample consisted of 13 science teachers and 100 students out of which 50 were males and 50 were females. The selected schools which have finished the teaching and learning of Basic Science and are not in the same location within the study area were selected using purposive sampling techniques while simple random sampling techniques was used to allocate the four selected schools namely; Government Day Comprehensive secondary school Jalingo, Government Day school Nukkai, Government Science secondary school Jalingo and Government College Jalingo. However, 2 schools were given a diagnostic assessment questions for the post-test and also 2 schools were not given diagnostic assessment questions. Two instruments were used for the research findings titled "Students Achievement test in Basic Science (SATBS) and While the other one is Teachers' Diagnostic Assessment Questions (TDAQ). The SATBS contains some selected multiple choice questions which was used as the pretest and posttest to the study answered by the students and while TDAQ was structured to teachers based on the problems in the used of DAQ on students Achievement in Basic Science among Basic Education Students in Jalingo metropolis. The researcher used likert 4 points scale for strongly agree (SA) Agree (A), disagree (D) and strongly Disagree (SD). It was used to gather important data for the study from the selected teachers. Collected data were analyzed with t-test and the rejection or acceptance of the tested hypothesis was at 0.005 level of significance.

RESULTS

Research Question I

What is the mean scores Achievement of students' who were taught using Diagnostic Assessment strategy and those without the use of diagnostic assessment strategy?

Table 1: Mean Achievement of Students Assessed Using DAS (Posttest) and Without DAS (Pretest) Among Basic Science Students in Jalingo Metropolis.

Group	N	$\bar{x}$	SD	Mean Difference
Posttest	50	11.28	4.6906	
Pre-test	50	13.28	4.3956	2.00

Results from table 1 indicates that the mean scores of students in the post-test assessment was less than that of pre-test assessment as analysis shown 11.28 and 13.28 points respectively. Is clear indication, that there is differences in mean achievement of students assessed using DAS and those assessed without DAS, since the mean scores of the posttest is less than pretest mean scores in the selected schools.

Research Question II

What are the problems in the used of DAS based on students' achievement in Basic science in Jalingo metropolis?

Table 2: Problems in the Used of DAS on Students' Achievement in Basic Science Among Basic Science Students in Jalingo Metropolis.

S/N	ITEMS	SA	A	D	SD	$\bar{x}$	δ	Decision Rule
1	Lack of teachers knowledge and method on topic Areas hinders good diagnostics questions	07	05	01	00	3.46	0.4024	Accepted
2	Too many options of similar Answers	02	03	08	00	2.54	0.7458	Accepted
3	Students find it difficult in expressing their thought.	01	00	02	10	1.38	0.8356	Rejected
4	Unfamiliar/unfriendly format in assessment question make the test more complicated	03	06	03	01	2.85	0.8635	Accepted
5	Teachers Attitude towards Diagnostics Assessment Questions	10	02	00	01	3.62	0.8356	Accepted
6	The assessment Do not consider individual learning differences.	02	03	08	00	2.54	0.7458	Accepted

Results of table 2 indicates that all the items were accepted at the decision rule of 2.50 points only item in S/N 3 was rejected that students do not find it difficult in expressing their thought.

Research Hypothesis

HO_1: There is no Significant Difference between the Mean Achievement scores of students assessed using DAS and those without the use of DAS.

Table 3: T-Distribution of Mean Achievement Scores of Posttest and Pretest based on Used of DAS

Group	N	$\bar{X}$	SD	Df.	t-cal.	t-crit.	Remarks
Posttest	50	11.28	4.6906				
				98	2.2000	1.984	* *
Pretest	50	13.28	4.3956				

The above analysis shows the t-test distribution of mean achievement scores of posttest and pretest based on used of DAS. However, the t-cal. > t – crit. Which means that the ultimate hypothesis was accepted that there is Significant Difference between the Mean Achievement scores of students assessed using DAS and those without the use of DAS.

DISCUSSION

Findings in this study revealed that there is differences in mean achievement of students assessed using DAS and those that were assessed without the use of DAS. The problems identify by the teachers in the selected schools were; Lack of teachers' knowledge and method on topic Areas hinders good diagnostics questions, too many options of similar Answers, Unfamiliar/unfriendly format in assessment question make the test more complicated, Teachers Attitude towards Diagnostics Assessment Questions and the assessment Do not consider individual learning differences. The study is in line with Chong, (2008) who express that DAS designed for mental capacity and language proficiency higher than the level of lower secondary students; Inability of some teachers to use them effectively; some teachers lacking knowledge on the subject matter; classroom culture that does not work well with interactive styles requiring honest feedback are the

issues and problems encounter in the used of diagnostics assessment questions in the study. Interactively, Stanley (2008) also says several researches carried out for the improvement of students' academic achievement in science did not solve the problem as a result of teacher's persistence in the lecture method in teaching of Basic Science. Further test of hypothesis at 5% level of Significance shown there is Significant Difference between the Mean Achievement scores of students assessed using DAS and those without the use of DAS in the selected schools.

CONCLUSION

In light of the findings out of the answered research questions, it is concluded in this study that students have low achievement when assessed using DAS. As, Teachers Attitude towards Diagnostics Assessment Strategy and Lack of teachers' knowledge, teaching methods on topic Areas hinders good diagnostics questions were the greatest responses from the teachers that are the problems in the used of diagnostic assessment strategy on students Achievement in basic science.

Recommendations

The following recommendations were hereby made:

i. Teachers need to be given training on how to use DAS effectively through providing them with Training programmes that will equipped their understanding of DAS

ii. Also ensure each formative assessment given the classroom should contain DAS in other to allow students get used to the procedure while learning since teachers believe that Students do not find it difficult in expressing their thought.

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