PREDICTING ASSESSMENT OF LEARNING SCORES FROM KNOWLEDGE OF ENTRY SCORES IN MATHEMATICS: THE CASE OF MERCY COLLEGE OF MEDICAL LABORATORY SCIENCE (MCMLS) MAKURDI BENUE STATE

AGI, C. I.
Department of Educational Foundations and General Studies
College of Agriculture and Science Education Joseph Sarwuan Tarka University, Makurd
ladyagi2@gmail.com

Abstract
The study predicted Medical Laboratory Science students assessment of learning scores from the knowledge of their entry scores in Mathematics. The purpose of the study was to determine students' of Mercy College of Medical Laboratory Science (MCMLS) entry assessment and assessment of learning (summative assessment) mean scores at the end of the first session for two sets which stands as their final Mathematics results in the college. Two research questions guided the study and one null hypothesis was formulated and tested. The study adopted ex-post facto research design. The population of the study was 350 students. A sample of 78 students was drawn for the research using simple random sampling technique. The Researcher adopted Mathematics achievement scores for both entrance and their summative scores. Mean and Standard Deviation were used to answer the research questions while t- test was used to test the hypothesis at 0.05 level of significance. The result showed that various students' scores exhibited a higher predictability factor. Likewise, unit gains on entry assessments demonstrated a statistically significant indicator for academic achievement on high summative assessments. It was therefore concluded that the entry scores have positively predicted students' performance on their summative assessment scores in Mathematics in the college. Based on the findings of the study, it was recommended among others that entry assessment was imperative so as to reveal, if after exposure to the contents there will be improvements in achievements for proper placement and remediation programmes of the students before they proceed to the next stage.

Key words: Assessment, Laboratory Science, Entry Scores, Summative Scores

Introduction

The revelations from large scale assessment research work on Mathematics in Nigeria have continued to create the deal of interest for researchers. The fact that the average Nigerian child seems to be poorly achieved in Mathematics is a source of serious concern to educationists, parents and the general public (Ali, Hukamdad, Akhter & Khan, 2010). Mathematics is the science that deals with the logic of shape, quantity, arrangement of numbers, calculation and provides an effective way of

building mental discipline as it encourages logical reasoning. Virtually, Mathematics is useful in all subject areas. Mathematics is all around us, in everything we do. It is the building block for everything in our daily lives, including teaching and learning, Architecture (ancient and modern), Art, Money, Engineering, and even in Medical Laboratory sciences. Mathematics occupies a central place in the Nigerian educational system. The importance of Mathematics to nation building led the Federal Government of Nigeria to make the subject a core and compulsory subject to be offered by students at primary and secondary Education levels in Nigeria (NPE, 2012). Also its inclusion as a prerequisite for admission into science and technological based courses in Nigeria tertiary institutions as it plays significant role in the study of these courses.

The compulsory nature of Mathematics carries with it a notion that every member of the Nigerian society and the world in general should have the knowledge of the subject due to its applicability in all human endeavors. In Nigeria like many other countries, Mathematics is taken as a core subject taught from early stages of education with a focus on building foundational skills and problems solving abilities. This is to enable the students to perform well in Mathematics and other subjects and courses in higher institutions of learning including Medical Laboratory Science.

Medical Laboratory Science is an institution of learning that aimed at training competent clinical laboratory service personnel to meet present and projected service needs in primary and secondary health care service deliveries in any society. According to Mercy College of Medical Laboratory Science (MCMLS) student's handbook (2017), theprogramme has been designed to carefully cover three years with intensive teaching of Basic Sciences. These Basic Sciences include: Physics, Chemistry, Biology and Mathematics. Medical Laboratory Science (MLS) is the course that deals with the knowledge of taking samples from patients and well labeled for laboratory analysis that will lead to documented interpretations for proper diagnoses and subsequently treatment of patients. Within the realm of the Mathematic Education, there is a growing dependence on the development of High-Order Thinking (HOT) abilities in addition to mastering the basic Mathematical concepts. These skills normally require students to interpret, analyze, synthesize and or manipulate. It implies that HOT goes beyond simple memorization and top most of its requirement is engaging students in critical thinking, analysis, synthesis and evaluation. These basic components are major to graduates of MLS students.

According to National Research Council (2018) developing HOTS in Mathematics is crucial for equipping students with the abilities to think critically, solve problems, and apply Mathematical concepts in various contexts includinglaboratory applications. In the same view, Makmuri and Kharis (2021) submitted that the importance of HOTS for students results from the demands of the 21st century curriculum that are increasingly requiring students to solve a non-standard problem that cannot be solve by mere memorization of the pre-learned steps of the process. In a nutshell therefore, Mathematics is considered a fundamental

subject in the Nigeria educational context and its proficiency is crucial for students' academic and professional successes particularly laboratory works and applications. Even the volume of liquid sample can be measured and quantified numerically in order to know the exact quantity needed to be used in specific test analysis. On this note therefore, the imperativeness of Mathematics as a compulsory subject in Medical Laboratory Science College. All these and many others can be done in Medical Laboratory Science with the knowledge of Mathematics. For these reasons, Mathematics is being taught in the first year upon entry and within the two semesters in a session and follow with comprehensive practical in medical laboratory components. This is to enable the lecturers assess the students upon admission, during and at the end of the session for decision making either for further placement or remediation programme.

Theoretically, the study hinges on Sadler's Conceived Entry Assessment Theory (CEAT). The main crux of this theory is that entry assessment is a feedback loop to close the gap between the learner's current status and the desired goal. In this study, the goal is to have graduates that are mathematically inclined and well-groomed with the Basic Science subjects that would apply technically what they have learnt in both theoretical and practical application in laboratory practices. Timely prediction of scores facilitates early intervention to identify and bring out students that may need special attention to be monitored closely for remediation programme. This programme will facilitate corrective measures for learners that may be found wanting. Furthermore, the products from this college will be dealing with collection of specimens/ sample analysis for possible diagnosis and prescription of medication. Sometimes too, early detection from predictor could help to provide insights early into the attrition rates. In such schools you discover, massive withdrawals of students from pursuing the course. With prediction of scores particularly of Mathematics that is an anchor for the basic foundation of the Basic Sciences required of the graduates, calls for such studies in order to explore ways of curbing the effects as well as forestall the gravity of the damages they will go out to cause on human lives after graduation, what the researcher termed the "multiplier effect" of not attending to obvious side effects early amounting to chain reactions. For this reason and many others not mentioned, assessment scores particularly in Mathematics on entry and as student progresses to the end should be of concern for lecturers/teachers and should relate with each other.

Generally, assessment is the practice of systematically collecting reviewing and using information about educational programmes to improve student's learning and development. The role of assessment is important as it guides the teacher in choosing learning task and approaches to optimize the use of those tasks. At classroom level, Mathematics assessment focuses on measurement of student's performances in learning and inform teachers about status of learning for adjustment of instruction for improvement. In so doing teachers can nurture HOTS in students they will need to succeed in an increasingly complex world at this 21stcentury.

Conceptually, assessment is the process of investigating the status or standard of learner achievement/attainment or achievement of group of learners where in some cases group interaction prevailed with reference to expected outcomes which has been previously identified in measurable terms. According to Nasri, Roslan, Sekuan and Bakar (2010), assessment encompasses four steps which are measuring students' achievement, defining students' performances, summarizing what students can do and inferring what students could do. It enables the teachers to gather information about the students learning progress, programme goals and objectives as well as determining the extent to which method of instructions deployed in the classrooms are helping the students to achieve these goals. This demands that a number of assessments be used by classroom teachers to evaluate students before (entry bahaviour), during (formative assessment) and at the end of course (summative assessment)

Entry assessment places the teacher in a better position to identify gaps that existed prior to course and summative assessment score that is revealed at the end of the session. This will better inform the assessors of these students, who should proceed and who should stand back for remediation, especially that one major principle of assessment is to facilitate learning and improvement of standard particularly in laboratory science, where the learning goals involve the acquisition of skills that can be demonstrated through action practically.

The method of student's assessment before, during and after their studies is to be done according to the rules and regulations set out by the domicile training institutions. All the Basic subjects are to be assessed at the entrance. This is because it is expected that students should have elementary knowledge of all the science subjects. The scores obtained from the entry assessment will be used for admitting students in 100level. But if the scores of any subject has not meet up the anchor point, such student will be placed on remedial to acquire the necessary knowledge before admission.

Summative assessment is the evaluation that comes at the end of the course. Emaikwu (2011) defined summative assessment as an assessment that comes at the end of a unit of instruction to determine if the student has sufficiently mastered the content and warrant moving the learner to the next unit of instruction. It is used to determine the extent to which instructional objectives have been achieved. Summative assessment primarily determines the achievement of objectives at the end of the course of study. On this note therefore, it is expected that entry scores should predict summative scores.

Empirically, several studies have been carried out on prediction, for instance, Adamu, Anza and Hananiya (2019) conducted research on the Relationship between Entry Qualification and Students' Academic Achievement in Gombe State Tertiary Institutions, considering O' level grades, mode of entry and students' CGPA as the indices of the study. Ali and Igba (2013) determined the effect of formative assessment on students' achievement in science at grade level eight. Statistical

analysis of the students' mean achievement scores on a post-test showed that the overall performance of the experimental group was significantly better than that of the control group. Also, Faleye (2015) investigated the Predictive Validity of Students' Entry Qualifications into Mathematics Programme in Osun and Oyo States' Colleges of Education with attention on age, sex and semester results in Mathematics. In all, the results of the findings revealed that students who were admitted into the university through direct entry performed better than their counterparts admitted into the university through JAMB. The findings of the study also revealed that students' entry qualification and students' mode of entry have significant relationship with students' academic achievement in tertiary institutions, and further recommended that students from certificate entry qualification need monitoring and mentoring to ensure better academic performance. Empirically, the result was also revealed that there was no significant relationship between students' entry qualifications and mathematics performance at the College of Education (COE) The researcher concluded that either entry qualification or entry examination performance could singly predict mathematics performance at the COE. Therefore, it is against this background that this study investigated the summative assessment scores of Medical laboratory science students from the knowledge of their entry assessment scores in Mathematics.

The present Senior Secondary School Curriculum demands that varieties of assessments should be carried out before and in the course of instruction to guide effective teaching. Sequel to this, the Federal Government of Nigeria in the NPE (2012), introduced the Continuous Assessment (CA). The introduction of the Continuous Assessment in schools is to ensure that assessments of students should be done before, during and after exposing students to the material. This demands that a number of tests be used by classroom teachers to evaluate students before (entry assessment), during (formative assessment) and at end of each term (summative assessment). The researcher who has monitored closely assessment processes in MCMLS for some times has observed that the failure of students in summative examination in Mathematics particularly is alarming. Students normally do well in their Secondary School Certificate Examination (SSCE) and the same set of students fail in the summative examinations. This raised the questions on what could have been the problem; Could it be that the students do not master the subject? Does it mean that the teachers are incompetent? The reason may be that there is no proper entry assessment among the students before admission. The entry scores may not be able to predict the students' scores in summative examination. It is on this note that the researcher seeks to determine predictive validity of the two forms of assessment (entrance and summative) for assessment of students of the College. The problem therefore, is predicting summative assessment scores from the knowledge of the entry scores of Mercy College of Medical Laboratory Science (MCMLS) Makurdi, Benue State. The main purpose of this study is to predicting Medical Laboratory Sciences Students Assessment of Learning Scores from knowledge of entry scores in Mathematics Specifically, the study:

1. determined the Mean Mathematics scores of students on entry and summative assessment in MCMLS

2.Used entry assessment mean scores of students in Mathematics to predict the students mean scores of summative assessments in MCMLS.

Research Questions

The study was guided by the following research questions:

1. What is the Mean Mathematics score of students on entry and summative assessment in MCMLS?

Research Hypothesis

Hypothesis One: Entry assessment scores will not significantly predict students summative assessment scores in MCMLS

Methodology

The study adopted ex- post facto research design. The population of the study was three hundred and fifty (350) students of MCMLS, Makurdi Local Government Area of Benue State. The sample size of seventy-eight (78) students' scores was used. The sample size was drawn using simple random sampling technique. The researcher adopted the scores of students from MCMLS as instrument for data collection. Mean and Standard Deviation were used to answer the research questions, t-test was used to test the hypothesis at 0.05 level of significance.

Results

Research Question One: What is the Mean Mathematics score of students on entry and summative assessment in MCMLS?

Table 1 answered the research question 1 and 2

Table 1: Mean and Standard Deviation of Entry and Summative Assessment score in Mathematics (N = 78)

Variable	N	Mean	SD
Entry assessment	78	48.87	16.87
Summative Assessment	78	53. 83	13.63

Table 1 shows the Mean scores of entry assessment of 48.87 with Standard Deviation of 16.87 and Summative Assessment of 53.83 with Standard Deviation of 13.63. It implies that the mean Mathematics score of students on entry assessment is below average while their summative assessment mean in MCMLS is above average

Hypothesis One: Entry assessment scores will not significantly predict students' summative assessment scores in MCMLS

Table 2: The t-test statistics of Entry and Summative Assessment scores in Mathematics

Variables	N	df	r-value	p-value	Remark
Entry Assessment	78	77	0.74	0.00	Rejected
Summative Assessment	78				

Table 2 above showed r-value of 0.74 with p-value of 0.000. r-value of 0.74 implies a positive and high prediction of students' entry assessment scores on their summative assessment scores in MCMLS. This positive high prediction was also confirmed by p-value of 0.00 which is less than 0.05 (0.00 <0.05) alpha level. The null hypothesis which was stated that entry assessment scores will not significantly predict students' summative assessment scores in MCMLS is rejected. Hence, entry assessment scores significantly predict students' summative assessment scores in MCMLS. Therefore; the entry assessment score is a good predictor of summative assessment score.

Discussion of Findings

The findings in this study revealed that entry assessment scores significantly predict students' summative assessment scores in MCMLS. The finding corroborated with the findings of Faleye (2015) who found that there was no significant relationship between students' entry qualifications and mathematics performance at the College of Education (COE). The researcher concluded that either entry qualification or entry examination performance could singly predict mathematics performance at the COE. Also the findings is in lines with Adamu, Anza and Hananiya (2019) who found that students' entry qualification and students' mode of entry have significant relationship with students' academic achievement in tertiary institutions, and further recommended that students from entry point need monitoring and mentoring to ensure better academic performance. The finding of the current study was as it was probably found because the admission conducted based on the entrance score was on merit.

Conclusion

Assessment is a tool use in making educational decisions such as entry assessment decisions and summative decisions. If instructional decisions are to be made from classroom assessment them it is very important that such assessment be

combined with teaching and learning process. The outcome of this study revealed that entry assessment is effective in improving the academic achievement in Mercy College of Medical Laboratory Science Makurdi.

Recommendations

Sequel to the above findings from this study, the following recommendations are made:

Teaching and learning at the tertiary schools should be improved by conducting entrance assessment so that only the qualified should be admitted and also remediation for learners to improve their academic achievement.

The school administrators should allow and provide incentives for teachers to attend seminars, workshops, conferences and in-service trainings on how to use entry assessment for proper placement and remediation in any course of study.

References

Adamu,M., Anza, A. & Hananiya, P. (2019). Relationship between entry qualification and students' academic achievement in Gombe State tertiary institutions. Nigeria. *Specialty Journal of Knowledge Management*. 4, (4), 37-43.

Ajogbeje O.J. (2012). Path – Analytic Model and the Effect of Some Teaching Strategies of Variables Affecting Achievement in Junior Secondary School Mathematics in Ondo State. Unpublished Ph.D. Thesis, Ekiti State University, Ado-Ekiti, Nigeria.

Ali, I., &Igbal, M.H. (2013). Effect of Formative Assessment on Students' Achievement in Science. *World Applied Sciences Journal, 26*(5), 677-687.

Ali, A., hukamdad, Akter, A. & Khan, A. (2010).Effect of using Problem Solving Method in Teaching Mathematics on the Achievement of Mathematics Students. Social science, 6(2): 67-72 retrieved on august 16,2 0 1 0 from:*http>//ccsenet.org/jopurnal/ondex.php/ass/article/viewfile/5040/4181*

Emaikwu, S.O. (2011). Fundamentals of Test, Measurement and Evaluation with Psychometric Theories.Makurdi, selfers academic press: 39 David mark bye-pass.

Faleye, B. A. (2015). Predictive Validity of Students' Entry Qualifications into Mathematics Programme in Osun and Oyo States' Colleges of Education. *Electronic Journal of Research in Psychology.* 5-3(11), 131-144.

Federal Republic of Nigeria (2012). *National Policy on Education.* Yaba Lagos: NERDC Press.

Gronlund, N. E. (2006). Assessment of student achievement. (8th ed). Boston: Allyn and Bacon.

Joshua, M.T. (2013). National Assessment of learning system and National Transformation. *Nigerian Journal of Educational Research and Evaluation,* 12(1), 1-17.

Makmuri, T.A.A. &Kharis, S. A. A. (2021). Characteristics of problem for developing higher-order thinking skills in Mathematics. Journal of Physics: Conference series, 1882012074 (1-7).

Mercy Collage of Medical Laboratory Science (MCMLS) student's handbook (2017)

McManus, S. (2008). Attributes of Effective Formative Assessments. In T. C. o. C. S. S.Officers (Ed.), *Formative*

Mawak, J. L., &Ugodulunwa, T. (2012). Formative assessment and the improvement of middle school science learning: The role of teacher accuracy. *CRESST Report 740*: National Center for Research on Evaluation, Standards, and Student Testing (CRESST).

National Research Council,(2018), How people learn II: learners, contexts and cultures. Washington, DC:The National Academic press. Retrieved from

Nasri, N., Siti Norhidayah Roslan, S. T., Mohammad Iskandar Sekuan, M. I., KasmahAbu Bakar, K. (2010). Teachers' Perception on Alternative Assessment . Procedia Social and Behavioral Sciences 7(C) (2010) 37–42Available online at www.sciencedirect.com [accessed Jun 03 2024].

Ojugo A.A. (2013). Effect of Formative Test and Attitudinal Types on Student's Achievement in Mathematics in Nigeria. *African Educational Research Journal*, 1 (2). 113-117.

Olagunju, A. M. (2015). The effect of formative assessment on Students' achievement in secondary school Mathematics. *International Journal of Education and Research.* 3 (10), 481-490

Smith, L. (2008). Using formative assessment results to predict student achievement on high stakes tests. Unpublished Dissertation, Liberty University, Virginia.

Ugodulunwa, C. A., &Uzoamaka, P. O. (2015). Effect of Formative Assessment on Mathematics Test Anxiety and Performance of Senior Secondary School Students in Jos, Nigeria: *Journal of Research and Method in Education.* 5 (2), 38-47.