RELATIONSHIP BETWEEN ACADEMIC ACHIEVEMENT IN MATHEMATICS AND PERFORMANCE IN SOIL SCIENCE IN ALVAN IKOKU FEDERAL COLLEGE OF EDUCATION. OWERRI. NIGERIA

Ukaegbu, E.P., Maduka, B.C. and Anya, U.O.
Department of Agricultural Science, Alvan Ikoku Federal College of Education, Owerri
E-mail: emekaprosper2@yahoo.com, 08037447922

Abstract
The study was carried out to determine to what extent O'level achievement in Mathematics could predict students' performances in Soil Science courses – S.SC. 211, S.SC. 361, VTE 411 – in Alvan Ikoku Federal College of Education, Owerri. The data of seventy six (76) students admitted into the Department of Agricultural Science of the College from 1999/2000 to 2006/2007 sessions were used for the study. The students' grades in O'level (WASC) Mathematics which ranged between B2 and E8 [with the greatest percentage of the students (42%) having C6] were correlated to their scores in the Soil Science courses, which on the other hand ranged between 40% and 82%, using Pearson's Product Moment Correlation Model. The students' O'level Mathematics achievements were found to significantly correlate with their performances in the Soil Science Courses (at 5% level of significance) with correlation coefficients (r) of 0.893, 0.673, 0.385 for the courses S.SC. 211, S.SC. 361 and VTE 411, respectively, thus underscoring the importance of Mathematics in Soil Science. The predictive validity of Mathematics achievement was thus found to vary as courses and year of study. It is recommended that O'level Mathematics achievement should inform grouping of students in their early years of study for the Mathematics requiring courses, so weak students can be given greater attention.
Keywords: Mathematics Achievement, Predictive Validity, Soil Science Performance.

Introduction
Mathematics is the science that deals with measurements, numbers and quantities. It's knowledge is considered necessary for the study of the sciences. Nnaka and Anaekwe (2003) have reported that Mathematical training facilitates student's achievement in science by helping in setting up scientific models and formulae. In addition, they further noted that mathematical notations and terms are employed in economically presenting scientific ideas. This view also agrees with Osibodu (1985) who held the opinion that attitude towards and performance in Mathematics are necessary pre-requisites towards the study of Science and technology. But unfortunately, Nigerian students have great phobia for Mathematics and have been recorded to perform badly in it (Okeke, 2006; Nwoke et al; 2012). Based on data from UNESCO Institute for statistics (2010), Offorma (2013) reported only 51% achievement in Mathematics in Nigeria. Such poor performance in Mathematics could even be worse for candidates/students studying Education. Obioma (2013) noted that pre-service teachers in colleges of education as well as faculties of education of universities are often the residuals from the population of applicants that wish to proceed to higher education hence they are admitted with very poor prequalification results. Expounding on this, he noted that the worst case scenarios are in the sciences, Mathematics and related courses.

So, making Mathematics a pre-requisite for the study of the sciences (including soil science) in Nigeria's tertiary institutions limits the numbers of candidates going for such courses. Yet, not all studies have confirmed the importance of Mathematics in the study of the sciences. Okwori (1995) noted that there are cases where some students who did not make a credit in Mathematics performed very well in science subjects. Supporting this view, Ahiakwo-Maxwell (2000) found equal the performance levels of chemistry students with and without O'level Mathematics credit at Pre-NCE programme in Federal College of Education (T) Omoku.

The seeming quantitative nature of soil science is part of the reason it is most unpopular with Agricultural Science students. But, to what extent are such fears justified?. There hasn't been any study to either justify or disprove it. Describing Evaluation research as that type of research concerned with making decisions relating to the value or worth of educational materials, methods and processes based on empirical data, Nworgu (2002) remarked that there are many unexplored areas – many programmes and systems – which no attempts have been made to evaluate. This study has therefore related students O'level Mathematics achievement to their performances in the soil science courses – Principles of soil Science (S.SC. 211), Soil Chemistry and Microbiology (S.SC. 361), Soil Erosion Management Education (VTE, 411), which are taught at the degree level in Alvan Ikoku Federal College of Education. In addition, the study has recorded the students' grades in O'level Mathematics, as well as their average scores in the soil science courses. It is believed that the exposition by this study would facilitate the teaching of the courses as well as inform curriculum planners. Anukam (2002) remarked that the importance of learning achievement lies in the fact that it sheds light on how schooling has been effective in helping pupils to meet their basic needs. Elaborating further, the author noted that learning achievement has the

potential of regenerating the school system through policies designed to solve the problems militating against the expected learning outcome.

The study was guided by the null hypothesis as stated below:

Ho: There is no relationship between Achievement in Mathematics and Performance in Soil Science.

Methodology

This study was carried out in Alvan Ikoku Federal College of Education, Owerri, Imo State, South East Nigeria. Data of students admitted into the Department of Agricultural Science of the institution from 1999/2000 to 2006/2007 sessions were used for the study. They were seventy-six (76) in number. Study is an expost-facto type. The students data were got from the records and admissions unit of the Registry Department of the College. The students' WASC O'level Mathematics grades usually reported as inverted stanine scores were used after they had been transformed into stanine scores. The students

scores in the soil science courses (S.SC. 211, S.SC. 361, VTE 411) were also converted into stanine scores. Pearson's Product Moment Correlation Model was used to determine the relationship between the student's achievements in Mathematics and their performances in soil science courses.

Results and Discussion

The records of the college showed that the students considered for this study had their grades in Mathematics ranging between B2 and E8. However, most of the students (77%) had between C4 and C6. This is shown in Table 1 below. That not many of the students had high grades in Mathematics agrees with the reported (Ehindero, 1979; Okeke, 1979; Bajah, 1979; Ivowi, 1983) poor performances of students in the science subjects. It could as well mean that the candidates who apply to study Agricultural Science in the College are mostly those that do not have high grades in O'level Mathematics, thus supporting the claim of Obioma (2013) that students admitted to study Education in tertiary institutions in Nigeria have very poor prequalification results, particularly in the Sciences and Mathematics.

Table 1: Percentages of Students' Population Scoring the Various Grades

WASC Grades	No of Students	Percentage of Population (%)
A1	-	-
B2	5	6.6
B3	5	6.6
C4	16	21.1
C5	11	14.5
C6	32	42
D7	5	6.6
E8	2	2.6
F9	-	-
Total	**76**	**100**

The students scores in the Soil Science courses are given in Table 2 below.

Table 2: Ranges and Means of students' scores in the Soil Science courses

Course	No of Students	Range of Scores (%)	Total Scores	Mean Scores (%)
S.SC. 211	76	40 – 75	4235	56
S.SC. 361	76	40 – 82	4432	58
VTE 411	76	40 – 70	4346	57

Table 2 shows students scores to range between 40% and 82%. The mean scores for the various courses are 56% (S.SC. 211), 58% (S.SC. 361), 57% (VTE 411). By the grading system of the College all the mean scores are within grade 'C', rated as good.

Table 3: Relationship of students WASC grades in Mathematics and their scores in Soil Science courses expressed in terms of Correlation Coefficient (r).

Course	Cal. 'r'	Table 'r'
S.SC. 211	0.893	0.232 (at 0.05 level of sig.)
S.SC. 361	0.673	
VTE 411	0.385	

With calculated 'r' being greater than table 'r' in all cases (Table 3) it indicates a significant relationship between the students grades in Mathematics and their scores in the Soil Science courses, at 5% level of significance. The null hypothesis is thus rejected. This finding therefore underscores the importance of knowledge of Mathematics in the study of Soil Science. The positive significant relationships (Tables 3) mean that students with higher grades in Mathematics performed better in the Soil Science courses. That is to say that Mathematics achievement at O'level is predictive of students' performances in the Soil Science courses.

The study thus supports the view of Osibodu (1985) and others that performance in Mathematics is a necessary pre-requisite towards the study of Science and Technology. Similarly it agrees with Kahle (1983) who claimed that achievement of students in Mathematics was a critical factor in the choice of courses in science and technology. However, it disagrees with Ahiakwo-Maxwell (2000) who found no significant difference in the performances of Chemistry students with and without O'level Mathematics Credit in the Pre-NCE Programme at FCE (T) Omoku. In the same way it disagrees with Egbo and Ogomaka (2005) who found no significant correlation between O'level Examination Grade and first year Grade Point Average (GPA) in Science in Alvan.

The study by Ahiakwo-Maxwell (2000) was at Pre-NCE level where Mathematics demand might have been low. It is also worthy of note that GPA represents sum of performances in all courses offered. The courses vary in their demands for knowledge of Mathematics. In the present study, the courses S.SC. 211 and S.SC. 361 with highest Correlation Coefficients (0.803 and 0.673 respectively) involve more calculations than VTE 411 with least Correlation Coefficient (0.385). The course 'Soil Erosion Management Education (VTE 411)' was taught from the agronomic perspective which de-emphasized calculations. The present study has thus shown that the more there are calculations in a course, the more the likelihood of performance in it being predicted by an earlier achievement in Mathematics. But, when overall average for all courses done are considered, the courses that demand less Mathematics would weaken the relationship between the average grade and say O'level Mathematics achievement.

Some situational factors might as well have influenced the relationships. It can be seen that the first year course (S.SC. 211) had the strongest relationship (r = 0.893), while the final year course VTE 411 had the weakest (r = 0.385). Majasan and Bakare (1974) remarked that quality of University teaching, the students' personal adjustment to University life, the presence or absence of emotional tension or crises in the students life and the students study habits and attitude to academic work, are some situational factors in the three or four years of university study which tend to reduce the predictive validity of entry qualifications. Similarly, Yara (2009) noted that Teacher's attitude towards science is a significant predictor of pupils' science achievement as well as their attitude towards science. He went further to explain that students' positive attitude towards science could be enhanced by teachers' enthusiasm, resourcefulness and helpful behaviour, teachers' thorough knowledge of the subject matter and their making science quite interesting. Apart from the above, the mathematics course(s) done in the College might also have weakened the predictive validity of the achievement at O'level.

All in all, students that are weaker in Mathematics should be paid more attention in teaching the Soil Science courses, as well as other courses that involve more calculations. Teaching Mathematical operations relevant to a course prior to its introduction will enhance the students' performances. Anaekwe and Ali (1997) showed that by identifying requisite Mathematical skills for any Chemistry topic and teaching such to students prior to its application in the relevant Chemistry lesson enhanced students' achievement. To effectively do this, students' O'level achievements in Mathematics should inform their grouping for effective teaching of Soil Science, particularly in the early years of their studies. This is supported by Oladele (1998) who noted that students can be grouped according to past achievements in an area of study based on the assumption that past performance is indicative of future attainment.

Conclusion
The students' O'level achievements in Mathematics predicted their performances in Soil Science courses, but the predictive validity was influenced by course content and year of study. It is recommended that students' O'level Mathematics grades should inform their grouping in the early years of their study for Soil Science and other Mathematics requiring courses, so that weak students can be given more attention through remedial training.

References
Ahiakwo - Maxwell, O.G. (2000). Mathematics Achievement and Academic Performance in Chemistry. *The Nigerian Teacher Today* (tntt) vol. 8 nos 1 & 2:77-83.

Anaekwe, M.C. and Ali, A. (1997). Effect of Supplementary Mathematics learning on students' achievement in Chemistry. *The Jos Journal of Education*, 2(1), 25-28.

Anukam, I.L. (2002). Assessment of Mathematics/Numeracy Learning

Achievement of Primary School Pupils. *Imo State University Journal of Educational Studies*, Vol. 1, 69-77.

Bajah, S.T. (1979). Correlates of students' extrinsic school environment factors with level of attainment in a standardized test in Chemistry. *Journal of Science Teachers Association of Nigeria*, 8(1):49-63.

Egbo, I. and Ogomaka, P.M.C. (2005). AR Grade Point Average: A case study of Alvan Ikoku College of Education, Owerri. *The Journal of Occupation & Training*, 2(1):14-19.

Ehindero, O.J. (1979). Formal operational precocity and achievement in Biology among some Nigeria High School Students. *Science Education*, 63(2):231-6.

Ivowi, U.M.O. (1983). Achievement level in understanding Physics Concepts in Secondary Schools. *Journal of Research in Curriculum,* 1(2):23-34.

Kahle, J.B. (1983). "Factors Affecting the Success and Retention of Girls in Science: A quantitative and qualitative Assessment". Paper presented at the 2nd International Girls and Science and Technology Conference, Norway, September, 12.

Majasan, J.A. and Bakare, C.G. (1974). The Predictive Validity of Ibadan University Entry Qualifications. *African Journal of Education*, 2(1):120-32.

Nnaka, C.V. and Anaekwe, M.C. (2003). Influence of school location on Mathematics Integrated Science Training Course: Implications for Rural Development. *Journal of Contemporary and Science Education.* Vol. 1, No. 1:219-227.

Nwoke, B.I., Unamba, E.C. and Onyekpandu, M.N. (2012). Comparative study of Pupils Performance under the Class-Teaching Method and Personalized Systems of Instruction in the Teaching of Primary Mathematics. *Journal of Occupation and Training*, 5(3):54-5.

Nworgu, B.C. (2002). Theoretical and Empirical Dimensions of Evaluation Research. *Imo State University Journal of Educational Studies*, Vol. 1, 61-68.

Obioma, G. (2013). Transforming Teacher education and development for Global Competitiveness. *25th Convocation Lecture,* Alvan Ikoku Federal College of Education, Owerri, held 3rd Dec., 2013.

Offorma, G.C. (2013). Funding education, Fast tracking development, and United Nation's prescription for Nigeria. *Special Lecture Forum no. 1*, Golden Jubilee Celebration of Alvan Ikoku Federal College of Education, Owerri, held Nov. 7, 2013.

Okeke, E.A.C. (1979). Sex differences in the understanding of some important biological concepts. *Nigerian Journal of Education*, 2(1):120.

Okeke, M.C. (2006). Mathematics Phobia: Causes, treatment and prevention. *Bulletin of Schools of Mathematics, A.I.F.C.E. Owerri. Vol. 2, p. 6.*

Okwori, R.O. (1995). Mathematics Achievement and Academic Performance of Science Students. *Journal of Quality Education*, 2(1):11-20.

Oladele, J.O. (1998). *Fundamentals of Psychological Foundations of Education*. 4th Edn. Lagos: Johns-Lad. Pub. Ltd.

Osibodu, B. (1985). "Technology Education and Girls Participation in Nigeria". *Proceedings of GASAT 3 Conference*. London; Chelsea College of University of London.

UNESCO Institute for Statistics (2010). Trends in tertiary education: Subsaharan Africa. www.uis.unesco.org/Factsheet/Documents/fs10-2010-en.pdf.

Yara, P.O. (2009). Relationship between Teachers' Attitude and Students' Academic Achievement in Mathematics in some selected Senior Secondary Schools in South Western Nigeria. *European Journal of Social Sciences*, 11(3):364-369.