Full Length Research Paper

Prediction of attitude and interest of science students of different ability on their academic performance in basic science

Sunday Olufemi Adodo[1]* and L. O. Gbore[2]

[1]Science and Technical Education Department, Adekunle Ajasin University, Akungba Akoko P. M. B. 001, Ondo State, Nigeria.
[2]Guidance and Counseling Education Department, Adekunle Ajasin University, Akungba Akoko P. M. B. 001, Ondo State, Nigeria.

The study measures and predicts the effect of attitude and interest of students on academic performance in science. It investigates which of the variables, as essential attribute to study integrated science, will predict students' performance. Its aim is also to find out which one of the variables is influenced first under a particular teaching method. Three instruments were used for the study. They are, Science Oriented Attitude Scale (SOAS), Science Vocational Interest Inventory (SVII) and Achievement Test in Integrated Science (ATIS). The study is a quasi-experimental type. The sample of the study consisted of 30 Junior Secondary School one Students in Nigeria. Multiple regression was used to analyze the hypothesis raised for the study and the outcome shows that Science Interest possessed the strongest strength for predicting performance than attitude among the students in their different ability level group. It is therefore recommended that, teachers should use good innovative methods that will stimulate students' interest in an attempt to make learning of science more meaningful to the learners and thereby generating improved leaning outcomes that will lead to a change of attitude to science.

Key words: Students attitude, academic performance, basic science, vocational interest, prediction.

INTRODUCTION

The significance of students' attitudinal variables as performance predictors have been emphasized by many researchers who indicated that student attitudes and interests could play a substantial role among students studying Integrated science. Ormerod and Duckworth (1975) supported this view by their suggestion that the attitudes of students are likely to play a significant part in any satisfactory explanation of variable levels of performance shown by students in their school science subjects.

Integrated science is an approach to teaching of science in which concepts and principles are presented, so as to express the fundamental unity of scientific concepts without any bias to the compartmentalized

Science. It is a subject which embraces all science subjects, namely Biology, Chemistry, Physics and Mathematics, therefore, is a subject that cuts across the school curriculum and needed in all branches of science, applied science and social science (Adewumi, 1982). This implies that no student should be denied of the proper grasp of Integrated Science at the foundation level of the primary and the junior secondary classes in the Nigeria 9-year basic science and technology programme.

Students' attitude toward learning Integrated Science

On attitudes, Ary et al. (1972) claimed that 'Attitude is the sum total of a person's inclination toward a certain type object, institution or idea', while Gronlunds (1976) provided the widest meaning of attitude as that which embraces all aspects of personality development such

---
*Corresponding author. E-mail: so_adodo@yahoo.com.

as individual interest, motives, values, vocational adjustment derived from vocational pursuits and other phases of one's daily lives. This shows that, Gronlund's submission could be inferred from overt behavior both verbal and non-verbal which may have its implication on the academic performance which is the subsequent result of the learning problem of any student at any educational level. If this is the case, it depicts that Crissy was quoted by Ifayefunmi (1984) that rigid stereotyped attitudes can affect achievement in a subject where flexibility of outlook (particularly science subjects) is necessary, could be proved right. According to Ifayefunmi 'poor attitudes were important factor causing failure in subject like mathematics and other sciences and hence, students in extreme cases developed fear and hatred to the teaching-learning process in the school as a whole and that is why a number of students are fond of being absent from school often and often.

Considering the attitude of Nigerian students to Science, it could be observed that very few students have love for studying the subject and those who study it are mostly those who want to use it as a 'job ticket', As Integrated Science is made up of these various science subjects which many students regard as 'hard' subjects having been miss-informed by senior students who are not interested in the science subjects. Students also develop a negative attitude towards a certain aspects of Integrated science, that is, those topics that relate to Chemistry and Physics. Many researchers studied have confirmed that students develop negative attitude to science learning. This may after all be due to the fact that teachers are unable to satisfy the students' aspiration or goal. Sometimes, some of the things some teachers teach in science have no bearing on the students' practical life or their goal and sometimes do not provide the career incentives and opportunities for them to appreciate the role of the scientist. This has often led to variations in goals between learners, teachers, parent and industries.

The danger inherent in this trend is that we might have been succeeding in producing science students and graduates without those attributes and skills we claim science could impart. Science education can provide such attitudes as honesty, patience, respect for evidence, etc. Today it is quite evident that many science teachers are not capable of making their students appreciate these value of life as many of the students are always in a "hurry" which is very clear from their action. It is high time teachers started to assess student's aspiration and the extent to which the science they teach could help the students to attain their goals and ambitions in life. The situation whereby science students acquire data without the ability to apply such data to solve personal domestic problems required the urgent attention of the science teachers. The research of independent science educators, (Goodlad, 1984), showed that the most common method of teaching is from a textbook. This

suggested that the solution to attitude change lies in the hands of the teachers. They believed that teachers should start introducing other teaching methods, as this changes will not only bring about a more positive attitude toward science for their students; but will give their students the scientific skills required to perform experiments and use logic to solve problems.

Odunbunmi and Balogun (1985) examined the attitude of some Nigerian Students towards Integrated Science. The sample used comprised of 660 students. The result shows that urban school students generated favorable attitudes than those from rural schools. Olotu (1992) in his work on student's attitude to Agricultural Science said that negative attitudes are major causes of students' under achievement or poor performance and that the same effect exists in all other subjects, including Integrated Science. Generally, it could be submitted that students positive attitude toward a particular subject might be by establishing the potentials inherent in that subject, that such student will definitely relate to the subject student learning interest and his academic performance in the subject.

Student interest to learn science

On interest, though a personality factor is considered for use in this study as that variable which could predict the level of learning difficulty of the student in a particular area of study. According to Bolarin (1988), 'interest in more than a discipline, is the key to education successes'. For this submission, Bolarin (1988) observed that, 'at any level of graduation, learners will learn better in subjects or courses if they have some degrees of likeness for such subjects or the courses'. This implies that learners will fail to learn little if they do not like the subjects. Interests therefore at a higher stage become a subjective feeling of value which is experienced when striving. This feeling implies an end-point-on object, a reward, purpose or situation in which one is interested and for which an individual strives at (Johnson, 1972). This means that when one is interested in a thing, one is ready to devote attention.

Thomas, in his study of the educational interest according to Bolarin (1988) found that with the ability held constant, through statistical techniques, students with educational interest have grade point averages in specific related courses than with low interest scores. The aforementioned therefore, is in agreement with the submission of Lavin (1965), that 'there is a reciprocal relationship between interest and learning achievements as each reinforces the other. This then indicates that interest measure can serve as a motivating factor of attention and thus enhancing good memory to the learners. Therefore, the level of learning difficulty of students is minimized for those with good personalities, right attitudes and high level of educational interest in a

particular subject. Consequently, effort must be made to see that students develop the right attitude to learning and where such is hindered by the teacher or any other factors, attempt must be made for necessary adjustments. Uyoata (2002) investigated the effects of cooperative small group instructional mode on primary school pupils' attitude towards science.

The study adopted a quasi-experimental design which made use of the pretest, posttest control group design while the study population consisted of eighty two (82) primary 5 pupils in Uyo Local Education Authority in Akwa Ibom State. Using t-test for the data analysis, the study showed that cooperative small group instructional mode prove to be more potent in stimulating pupils' interest to developing more positive attitude towards science and technology than the conventional method of teaching. Opara (2002) also investigated the efficacy of self-regulation process of students' interest in quantitative chemical analysis. A quasi experimental pretest-post test control group design was used for the study. The sample consisted of two hundred and eighty four (284) Senior Secondary Class III students drawn from four secondary schools in Orlu education zone of Imo state. The data gathered were subjected to ANCOVA. It was found that teaching method was significant on the interest of students in quantitative chemical analysis. This confirms that self- regulation enhanced the interest of students in the experimental group more than the students in the traditional group. The reason for this observation could be due to the fact that the stages used in the process of self-regulation were meant to actively involve the learner, as well as create an environment in which equilibration can occur in the minds of learners. Local materials used were meant to capture the interest of students and to help them link materials in the environment with activities in the classroom.

The result agreed with Hassan (1975) who investigated the influence of some selected variables including instructions on the development of students' interest in science. He found that certain instructional factors are important in the development of science interest among the secondary students. Attitude to science and interest could play a substantial role among the student studying science, but the problem of which of the two variables will possess the strongest strength for producing performance in science still remain inconclusive. These necessitate the imperativeness of such variables for further verification in this study. The purpose of the study is to investigate which variable is an essential attribute to the study of science, which will predict students' performance in integrated science. To find out which one out of the variables (attitudes and interest) is influenced first under a particular teaching method.

Research questions

In addressing   this   problem,   the   following research questions were raised;

1. To what extent would science oriented attitude (SOA) and science vocational interest (SVII) when taken together predict students achievement in Integrated Science?
2. What is the relative contribution of the independent variables to the prediction?

METHODS

The study is a quasi-experimental type that employed the use of factorial design involving non-randomised control pretest posttest group design. A sample of 10 students comprising 10 high ability, 10 middle ability and 10 low ability groups. Two schools from Ondo State were randomly selected from which an intact Junior Secondary School (JSS III) class was each selected and the students were subjected to pretest using SOAS, SVII and science ability test, to find out the area of learning difficulties of the students, attitudes and interest toward learning Integrated Science. The students were post-tested after seven weeks. All the treatment sessions took place after school hours.

The main instruments for the study were science oriented attitudinal scale (SOAS) adapted from Omirin (1999), science vocational interest inventory (SVII) adapted from Bakare (1977) and ATIS adapted from the Ondo State Ministry of Education Junior Secondary School Certificate examination. These instruments were re-validated and the psychometric properties were found to be satisfactory as the reliability indices indicated 0.65, 0.66, and 0.71 for SOAS, SVII, and ATIS respectively. The students were given pretest before treatment commenced. After the treatment, the students were then post-tested.

Data analysis

The data collected for the study were analysed using multiple regression.

RESULTS AND DISCUSSION

HO: SOAS and SVII will not significantly predict academic performance of students with different ability levels in Integrated Science.

Table 1a indicated that there was a linear relationship between the predicator variables and the criterion variables (ATIS Academic performance of the Diagnostic Remediation group of JSS III students. The multiple correlation coefficients R were 0.534. This indicated that a moderate positive relationship exists between the predictor variables and the criterion variable. The table also indicated that R^2 yielded 0.285, that is, 28.5% of the variation in the academic performance of the (DR) group was attributable to the joint effect of the predicator variables. The analysis of variance (ANOVA) for the regression (predication) show that F-ratio was 5.394 which was significant at 0.05 alpha level as the F-table was 3.38. Table 1b gives the multiple regression equation as: Y = 28.132 (Academic performance) + 0.448(SOAS) + 1.578(SVII) SOAS 1.578.

Table 1a. Summary of regression analysis of students' predictive variable (SOA and SVII) on academic performance in Integrated Science.

Variable	SS	Df	Ms	F-cal	F-tab
Regression	2822.818	2	1411.409	5.394	3.38
Residual	7064.648	27	261.654		
Total	9887.467	29			

Multiply R=0.534, R^2=0.285, Adjusted R^2=0.233, Standard Error=14.400.

Table 1b. Test of significance of regression coefficient.

Variable	B	Standard error	Beta	t-value	t-tab
Constant	28.132	21.658	0.205	1.299	
SOAS(Posttest)	0.448	0.377	0.430	1.188	2.051
SVII (posttest)	1.578	0.632		2.495	

P=0.05, critical t=2.051.

The Table revealed the contribution of each of the SOAS and SVII to the academic performance of the subjects in the high ability level. The contribution of each of the predicator (SOAS and SVII) variables were as shown in the values of the regression co-efficient range from 0.448 to 1.578. It showed the standard errors as 0.377, 0.632 and 21.658 while the t-values were 2.495, 1.188 and 1.299. The table showed that at probability level of 0.05, the t-value for SOAS 1.188 showed a non-significant contribution to academic performance of the students in their ability level group, while the t-value for SVII 2.495 showed a significant contribution to academic performance of the students in the ability level group.

The regression equation indicated that for every unit increase or decrease in performance of students in the (DR) high ability level, there will be a corresponding increase or decrease by 0.448, 4.5 and 1.578 (15.8%). The table showed that SVII had the highest Beta weight of 0.430 and hence, it possessed the strongest strength for predicting performance among the students in their different ability level groups.

CONCLUSION AND RECOMMENDATIONS

There was a significant contribution of SVII to academic performance of the students in the group. This showed that SVII had the highest beta weight on students' performance in Integrated Science as it produces the strongest strength for predicting performance among the students. The study showed that a good teaching method (diagnostic remediation) increases or boosted the academic achievement, interest and attitude in basic science. Also, the social relationship of the students in the (DR) class setting was boosted. The outcome supports the research of Gonzales (1979), Edward and Snyder (1972), Slavin and Karwiet (1981), Ziegler (1981) and Slavin (1989). This is in support of Uyoata (2002) that co-operative small group instruction proved to be potent at stimulating pupils to develop more positive attitude and interest towards science and technology.

This agrees with the submission of Lavin (1965), that there is a reciprocal relationship between interest and learning achievement as one reinforces the other. This then indicates that interest measure can serve as a motivating factor of attention and thus, enhancing good memory of the leaner. The outcomes of the study support the suggestion of researchers (Hueftle et al., 1983; McMillan and May, 1979; Penick and Johnson, 1983) that the solution to attitude change lies in the hands of the teachers. They believe that teachers should start introducing other interesting teaching methods in the teaching of science, as this change will not only bring about an improvement in students performance in science but will also bring about lasting and permanent positive attitude towards science.

It is therefore, recommended that the established role of diagnostic remediation method of teaching should be exploited and utilized by teachers in an attempt to make learning more meaningful to the learner and thereby generating improved learning outcomes.

REFERENCES

Adewumi DO (1982). The effect of lack of qualified teachers on the teaching of mathematics in Nigeria schools. J. Sci. Teach. Assoc. Niger. (STAN), 20(2): 85-89.

Ary D, Jacob LC, Razaviah A (1972). Introduction to Research Education, U S A wedsworth Thormson Learning.

Bakare CGM (1977). Vocational interest inventory (VII), Ibadan, Psycho-Educational Research Unit Productions.

Bolarin AO (1988). Primary school pupils liked and disliked teaching subject. J. Res. Curriculum, 6(1): 103-109.

Edward KJ, Synder JP (1972). Games and Team. A winning combination simulation and games 3, 247-269. Gonzales, A. (1979): Classroom co-cperation and ethnic balance. Paper printed at the annual convention of the American Psychological Association. New York.

Goodlad JI (1984). A place called school: Prospects for the future. New York: McGraw Hill.

Gronlunds NE (1976). Measurement and evaluation in teaching. New York Macmillan Publication co Inc.

Hassan O (1975). An investigation into factors affecting science in secondary school students. J. Res. Sci. Teach., 12(3): 255-261.

Hueftle SJ, Rakow SJ, Welch WW (1983). Images of science: A summary of results from the 1981-1982 National Association in Science. Minneapolis, M.M: Minnesota Research and Evaluation Centre.

Ifayefunmi SA (1984). Method of attitudes assessment: The teachers J. Sch. Pure Sci., Ondo State College of Education, Ikere Ekiti 1(2): 331-337.

Johnson MA (1972). Principle and practice of education. Post examination and answer. Onibonoje press publisher. Ibadan Nigeria.

Lavin DE (1965). The prediction of academic performance, 1st edition. New York, Russel sege foundation.

McMillan JH, May MJ (1979). A study of factors in influencize attitudes towards science of Junior High School students. J. Res. Sci. Educ. Washington, D.C. American Education Research Association.

Odunbunmi EO, Balogun TA (1985). The attitude of some Nigerian students towards Integrated Science. JORIC, 3(1): 17-23.

Olotu B (1992). The main causes of students underachievement in; agricultural science. J. STAN, 72(2): 76-80.

Omirin MS (1999). Construction and validation of science-oriented attitude scale for Nigerian schools. An Unpublished Ph.d thesis of the Ondo State University, Ado Ekiti (now) UNAD.

Opara MF (2002). Can self-regulation process promote sustainable development through enhancement of science interest in qualitative chemical analysis. Proceedings of the 43rd annual Conference of STAN, pp. 250-252.

Ormerod MB, Duckworth D (1975). Pupils attitude to Science: A review of research NFER Windsor.

Penick JE, Johnson RT (1983). Excellence in teaching elementary science: Some generalization and recommendations In J.E Penick (Ed.), Focus on Excellence. Vol. 1(2) Elementary Science, Washington, D.C: National Science Teacher Association.

Slavin RE (1989). Cooperative Learning and Achievement. Six Theoretical Perspective Inc Amos and M.LMaehr (eds) Advance in motivation and Achievement. Greenwich CT: JAL Press.

Slavin RE, Karweit NL (1981). Cognitive and affective outcomes of intensive students team learning experience. J. Exp. Educ., 50: 29-35.

Uyoata UE (2002). Effect of co-operative small group instructional mode (CSGIM) on primary school pupil's attitude towards science, 43rd Annual Conference of Preceding of STAN Page, pp. 436-441.

Zeigler S (1981). The effectiveness of co-operative learning teams for increasing cross-ethnic friendship: Additional evidence. Human Organization, York: Herper and Row, 40: 264-268.