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QUALITY ASSURANCE IN SECONDARY EDUCATION: IMPLICATIONS OF TEACHING STRATEGIES AND STUDENTS' ATTITUDE ON ACADEMIC ACHIEVEMENT IN BASIC TECHNOLOGY

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ABSTRACT

Quality Assurance is important in the application of management procedures to ensure qualitative education to the satisfaction of the stakeholders. This paper investigated the effect of teaching strategies and students' attitude on academic achievement in Basic Technology as a quality assurance process for the teaching and learning of the subject. Teaching strategies investigated were the interactive, independent and dependent teaching strategies.. Three null hypotheses were tested at $P < 0.05$ using two instruments; Basic Technology Achievement Test (BTAT) and Students' Attitude Questionnaire (SAQ). The data were analyzed using ANCOVA. Results showed that teaching strategies and students' attitude have significant effect on students' achievement; the joint effect of teaching strategies and students' attitude was significant on students' achievement. The interactive teaching strategy was recommended for teaching the subject and the students should be exposed to practical, computer literacy to stimulate interest, attitude, and curiosity to enhanced quality.

KEY WORDS: Quality, Assurance, Secondary, Education, Teaching, Technology

INTRODUCTION

In Nigeria, there is growing dissatisfaction over students' academic achievement in many of the school subjects especially in the sciences and universal AABasic Technology subjects. These subjects are the foundation on which further learning are built, hence it has become necessary to investigate some critical variables which enhances teaching learning processes in Basic Education (UBE). There is need therefore to put in place Quality Assurance to guide the educational delivery and bring it in line with national goals, global expectation and changes in science and technology. Basic Education in Nigeria is 6years primary school (Lower Basic Education) and 3years junior secondary school JSS 1 – 3 (Upper Basic Education).

Quality assurance focuses on all aspects of the education process namely, teacher factor, student's factor, and environmental or organizational factor. This is with a view to determining the level or quality of input necessary to achieve the desired output. Obamanu (2001) has identified factors which affect students academic achievement in school subjects to include students factor, teacher factor, societal factors, efforts have not been made to investigate the potency of these factors on students' academic achievement in each of the subjects. Idialu (2013) and Uwameiye (2011) have equally identified gender factor, students' factor and environmental factor on students' academic achievement. These should form a basis of quality assurance in the teaching and learning of each subject. With the absence of appropriate teaching and learning variables put together, the results have been ineffective teaching, poor students' academic achievement and in the case of basic technology, poor students' attitude and lack of students' interest in the subject. Quality assurance in education seeks to achieve the most cost effective variables put together for the attainment of the stated educational objectives. It looks at different teacher – student factors, how they affect quality individually and their combined effect on educations. This study investigated the teaching strategies and students' academic achievement in basic technology as a means of quality assurance in Univerasal Basic Education (UBE). Basic Technology (BT) is a preliminary phase of Technology. Basic Technology according to the National Policy on Education (FRN, 2004) involves the academic and practical study of materials, sources of energy and natural phenomena with ultimate intention of applying these to the services of man.

Basic Technology is a part of the general education for all students in the JSS 1 – 3 irrespective of their future career desire. The teaching and learning of basic technology like other subjects require knowledge, skills and appreciation. The objectives of BT as a subject in UBE is to enable the student have orientation and exploration of the world of work through appreciation of technology in the use of tools and materials. It is one of the pre-vocational subjects intended to develop the skills and knowledge necessary for employment, self reliance and opportunity for admission for further studies in tertiary institutions (FRN, 2004).

Needless to say that these objectives have not be met and that students dislike the subject and develop negative attitude towards it (Idialu, 2013). So far, there is no serious effort by Nigerian Government and researchers towards using quality assurance to guide the teaching and learning of the subject. Thus, no findings to suggest ways of improving the teaching and learning of the subject.

Quality Assurance

The concept of quality assurance has its origin in manufacturing. It is a system of procedures, checks, audits and corrective actions to ensure that all design environmental monitoring; research sampling and technical reporting activities are of the highest achievable quantity (Wikipedia, 2007). According to the commonwealth of learning cited by Okebukola and Shabani (2001), quality assurance is an approach to organizing works that:

- (i) Ensure the institution's mission and aims are clear and known to all;
- (ii) Ensure the systems through which work will be done are well thought, full proof and communicated to everyone;
- (iii) Ensures everyone's responsibility are clearly understood;
- (iv) Define and document the institution's sense of quality;
- (v) Set in place system to check that everything is working according to plan; and
- (vi) When things go wrong, there are good ways of putting them right (pg. 24)

Quality assurance focuses on the process while quality controls is concerned with the product. In Upper Basic Education (JSS 1- 3), the definition above also apply; that means, the application of management procedures to ensure qualitative education to the satisfaction of the stakeholders. The pre – vocational subjects (Basic Technology, Business studies, Agricultural Science and Home Economics) are key components of the curriculum of Upper Basic Education.

In the case of Basic Technology, quality assurance should be a procedure, checks or audits, which will ensure that the subject is effectively taught and learned. It is a procedure aimed at realizing the objectives of the subject, which include exposure of students to career awareness by their exploration of useable options in the world of work, and stimulation of their curiosity and creativity in industrial and technological concepts. It is a means of ensuring that students develop positive attitude to things of technology by using tools and equipment to make simple products, which they can use. Quality assurance ensures customer satisfaction, since it leads to a product that fits the purpose, and making of the product according to pre-determined standards (Dashen and Jacob, 2002). The question now is whether or not the objectives of Basic technology are met as pre-determined in the National Policy on Education (FRN, 2004), whether the “customers” (Stakeholders) are satisfied with the teaching and learning of the subject.

STATEMENT OF THE PROBLEM

In spite of governments “huge budgetary to education” the public is generally not satisfied with student’s academic achievement as evident in massive failure and unemployment of school leavers and their inability to secure admission for further studies in the tertiary institutions. Accordingly, there has been persistent calls on teachers by parents to have another look at their teaching approaches with a view to evolving strategies and methods that will stimulate student’s interest, attitude and curiosity, which are characteristics capable of improving academic achievement. The problem of poor academic achievement of students is even more serious with Basic Technology. This is so because since the introduction of basic technology curriculum in the Nation’s secondary education, it has not been accepted by all because many see it as education for the “dropouts” or for “low achievers” (Beal, 2000 and Akpan, 2002). This has lead to students’ negative and lack of interest in the subject, coupled with other fundamental management problems. It is the view of this paper that these problems can be addressed by instituting quality assurance parameters and standards/benchmarks on teachers’ competence, teaching strategies, instructional resources (tools, machines and materials), infrastructural facilities and evaluation.

PURPOSE OF STUDY

The purpose of this study was to investigate the effect of teaching strategies (dependent teaching strategy (DTS), independent teaching strategy (ITD) and interactive teaching strategy (INTS) and students’ attitude on students’ academic achievement in basic technology. Specifically, the objectives were to:

- i. Determine the effect of teaching strategies (DTS, ITS and INTS) on students’ academic achievement in basic technology;
- ii. Assess the effect of students’ attitude on their academic achievement in basic technology
- iii. Determine the joint effect of teaching strategies (DTS, ITS and INTS) and students’ attitude on their academic achievement in basic technology

RESEARCH QUESTIONS

The following reaserch questions guided this study:

- (i) To what extent does students’ academic achievement in basic technology differ when they are expose to DTS, ITS and INTS teaching strategies?
- (ii) To what extent does students’ academic achievement in basic technology differ with respect to their attitude to the subject?
- (iii) To what extent does the joint effect of teaching strategies and students’ attitude affect students’ academic achievement in basic technology.

HYPOTHESES

Three hypotheses formulated and tested at 0.05 level of probability guided the study.

- Ho₁ : There is no significant difference in academic achievement of students taught with INTS on basic technology and those taught with DTS and ITS teaching strategies
- Ho₂: There is no significant difference in academic achievement of students with positive attitudes and those with negative attitudes towards basic technology
- Ho₃: there is no significant joint effect of teaching strategies (INTS, ITS and DTS) and students' attitudes on academic achievement of students' in Basic Technology.

LITERATURE REVIEW

Teaching Strategy and Students' Achievement

Several studies (Udofot, 2000 and Mbaba, 2006), have shown a relationship between teachers' teaching strategy and students' achievement in many school subjects. According to Mbaba (2006) teaching Strategies which involves the students directly in the learning process are more beneficial than the traditional modes of instruction used in colleges. Ibe – Bassey (2000) identified four teaching strategies as dependent strategy, independent teaching strategy, interactive teaching strategy and initiatory teaching strategy. Ibe – Bassey (2000) further stressed that the dependent teaching strategy is used when the students greatly depend on the teacher for guidance – a sort of teacher – dominated classroom, while the independent strategy is used when the students tend to work on their own with little or no guidance from the teacher. The initiatory strategy is one in which the Student or teacher formulates or initiates communication concerning instruction which is sent across either by the student or teacher, there is no serious feedback in this strategy. The interactive strategy however, is one in which the students and teachers communicate reciprocally such that there is interactive behaviour in support of the instructional situation. Ugwuanyi (2005) showed that students who were taught by discovery performed significantly better than students taught by expository method, and female students performed better than their male counterparts. This is in line with Anderson and Block (2000), who suggested the learners – centered instructions that enable students to take a major share of responsibilities from their learning and participate actively in it. They indicated that when students are involved physically and mentally in the learning experiences, their level of learning and achievement are significantly higher. However, Effiong (2004) did not see any relationship between teaching strategies and the pupils style. According to Akinsola (2009), the instructional strategy employed by the teacher appeared overbearing because it is most easily manipulated.

Students' Attitude and Academic Achievement.

According to Adekunle (2001), the wide spread low level achievement and negative attitude towards basic technology in schools have largely been ascribed to teaching problems. In support of this position, Mbaba (2006) asserted that, occupational skills development depends greatly upon one's personal ability, interest, ideal, appreciation, attitude and orientation. Idialu (2013), reported that gender, age, parent's procession and technological climate at home correlated with students' attitude and concept of technology. According to Kpangban (2004), attitude is a readiness of the individual to react towards or against a psychological object to a particular degree. Bolaji (2003) had shown a strong relationship between students' attitude and their academic achievement in various subjects

METHOD AND PROCEDURE

Design of the Study

The study was a quasi – experimental study as three intact classes in three secondary schools were used. The design was the randomized pre – test, post – test control group with two experimental and one control group.

Population for the Study

The study has implications for all the secondary schools offering basic technology. However the 14 secondary schools of Ika South Local Government Area of Delta State with a JSS 3 student population of 9,441 were used for the study.

Sample and Sampling Technique

One hundred and twenty JSS 3 students from three intact classes in three different schools were used for the study. Though there were more than 40 students in each intact class who were allowed to participate in the study, 40 students' papers were randomly selected per class and graded for the subjects amounting to 120 students.

Instrument for Data Collection

Two instruments were used for the collection of data for the study. They were:

- Basic Technology Achievement Test (BTAT) and
- Students Attitude Questionnaire (SAQ)

The BTAT consisted of 60 questions which were covered during the six weeks of the instruction using the three teaching strategies, the BTAT was administered as pre – test before the study commenced. The SAQ consisted of 20 items which sought to determine students' attitude to the subject. Students were requested to indicate their response on a four point scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2) and Strongly Disagree (SD = 1). Scores from 1 – 49 were considered negative while 50 – 80 were considered as constituting positive attitude for the total items.

Validity and Reliability of Instrument

Both instruments were subjected to face and content validation by experts. The BTAT was validated by two secondary BT teachers and two lecturers at the department of Educational Foundation in the Faculty of Education while the SAQ was validated by four lecturers from the department of Educational psychology (Measurement and Evaluation). Their comments and suggestions helped to modify the instrument in terms of ambiguous questions, excessive wordiness, number of items, difficult vocabulary, e.t.c. The reliability of the BTAT was established using Kuder – Richardson 20 (KR – 20) because the BTAT was a multi – choice test that was scored dichotomously (correct or wrong). The reliability of the SAQ was established using Cronbach Alpha formula. Cronbach Alpha is a useful means of estimating reliability when items are not scored dichotomously (when items are not scored as right or wrong). The SAQ was trial – tested using 40 students that were not used for this study but with similar characteristics with the subjects used for study. The coefficient reliability was calculated and it yielded 0.96.

PROCEDURE

Three intact JSS 3 classes of Ika south Local Government Area in Delta State were used for the study. First, the SAQ was administered to the three groups namely: Experimental group 1, Experimental group 2 and control group simultaneously using basic technology teachers and research assistants. Secondly, the BTAT was administered as pre – test to all the three classes. Thirdly, the INTS was used in the experimental group 1 for six weeks (2 periods per week of 40 minutes a period), the ITS was used in experimental group 2 for same six weeks while DTS was used for the control group for the same period simultaneously. Fourthly, the BTAT was administered as post – test to all the three classes simultaneously and data collected were analyzed.

Procedure for Interactive Teaching Strategy (INTS). It involves:

- a) Introducing the lesson topic
- b) Brief review of previous but related knowledge
- c) Stating the objectives of the new lesson
- d) The teacher presents the new task
- e) Students (in group) discuss the task among themselves highlighting possible solutions and areas of weaknesses
- f) The teacher review major ideas with students by referring to specific instructional materials to be used
- g) Students help one another over aspects of specific learning tasks which appear difficult and over testable materials

- h) Provision of progress evaluation/test until students reach the mastering standard set.
- i) Students are given feedback on the test by the teacher.
- j) Students' individual scores are pooled and average, the average score represents the score of each student in a group.

Procedure for the Independent Teaching Strategy (ITS). This involves:

- a) Introducing the lesson topic
- b) Brief review of previous but related knowledge of the topic
- c) Stating the objectives of the new lesson
- d) Students are shown different tools equipment components and process connected to the topic, to explain what, how, where and why things are done the way they are done.
- e) A few demonstration is first done by the teacher
- f) Students are not guided but allowed to work by themselves to master and discover facts, theories methods and practices
- g) Progress evaluation

Procedure for the Dependent Teaching Strategy (DTS). This involves:

- a) Introducing the lesson topic
- b) Brief review of previous knowledge
- c) Stating the objective of the new lesson through direct teacher interaction with students
- d) Some use of questioning is made
- e) Class exercises decided by the teacher
- f) Progress evaluation.

RESULTS

Research Question 1

To what extent does students academic Achievement in basic technology differ when they are exposed to INTS, ITS and DST teaching Strategies.

Table 1: Students' Pre – test and Post – test Scores of INTS, ITS & DTS taught Students

TS		Pre –Test	Post –Test	Mean Gain
INTS	\bar{X}	20.90	38.97	18.07
	N	40	40	
	S	5.47	7.39	
ITS	\bar{X}	17.20	22.40	5.20
	N	40	40	
	S	3.38	5.39	
DTS	\bar{X}	19.35	26.07	6.72
	N	40	40	
	S	5.33	6.11	
TOTAL	\bar{X}	19.15	29.15	10.00
	N	120	120	
	S	5.02	9.52	

Table 1 shows the mean achievement of INTS students in the Pre – test as 20.90 and 38.97 for the Post – test with a mean gain of 18.07. It shows the mean of the ITS students as 17.20 and 22.40 for the pre – test and post – test respectively, with a mean gain of 5.20. It further shows the mean of DTS students as 19.35 and 26.07 for the pre-test and post – test respectively, with a mean gain of 6.72. The results clearly shows some difference in the mean achievement of students taught with the three strategies with an order of facilities of INTS > DTS > ITS

Research Question 2

To what extent does students academic achievement in basic technology differ with respect to their attitude to the subject when exposed to INTS, ITS, and DTS?

Table 2: Student’s Pre – test and Post – test Scores with respect to SAQ

TS		Pre – Test	Post – Test	Mean Gain
Negative	\bar{X}	17.74	25.98	8.24
	N	50	50	
	S	4.89	7.69	
Positive	\bar{X}	20.15	31.41	11.26
	N	70	70	
	S	4.89	10.09	
Total	\bar{X}	19.15	29.15	10.00
	N	120	120	
	S	5.02	9.52	

Table 2 shows that 50 students with negative attitude to the subject had mean achievement of 17.74 and 25.98 in the pre – test and post – test respectively with mean gain of 8.24, while the 70 students with positive attitude had 20.15 and 31.41 on the pre – test and post – test respectively and a gain of 11.26. This means that students’ academic achievement in BT increases as their attitude to the subject tends towards positive.

Testing of Hypotheses

Ho₁: Hypothesis one stated that there is no significant difference in academic achievement of students taught with INTS in BT and those taught with DTS and ITS

Table 3: Analysis of Co – Variance (ANCOVA) of Students Academic Achievement (BTAT) taught with INTS, DTS & ITS

Sources of Variance	Df	SS	Ms	F	sig. of F
Covariates(Pretest)	1	727.65	727.65	21.11	.00
TS	2	4540.42	2270.21	65.87*	.00
Error	116	3998.69	34.46		
Total	120	112754.00			

*Significant at P = .05

The analysis on Table 3 shows an $F_{cal.}$ of 65.87 being significant at an alpha level of .05. This means that students' academic achievements are significantly different in the three teaching Strategies.

H_{02} : hypothesis two states that there is no significant difference in academic achievement of students with positive attitudes and those with negative attitudes towards basic Technology.

Table 4: ANCOVA of Students' Academic Achievement (BTAT) with respect to their positive and attitude to BT

Sources of Variance	Df	SS	Ms	F	sig. of F
Pretest	1	133.04	1733.04	27.74	.00
SAQ	1	345.20	345.20	4.93*	.00
Error	117	8192.91	70.02		
Total	120	112754.00			

*Significant at $P = .05$

The analysis of Co – variance in Table 4 indicates a significant F – ratio (4.93) at an alpha of .05. The implication is that students' attitude significantly affects their academic achievement in the subject

H_{03} : There is no significant joint effect of teaching strategies (INTS, ITS and DTS) and students' attitudes on academic achievement of students in basic technology.

Table 5: A 3 x 2 ANCOVA of Students' Academic Achievement by TS and SAQ Variables

Sources of Variance	Df	SS	Ms	F	sig. of F
Pretest	1	486.84	486.84	16.13	.00
SAQ	1	363.67	363.67	12.05*	.00
TS	2	3964.25	1982.12	65.68*	.00
SAQ = TS	2	235.15	117.57	3.89*	.02
Error	113	3409.86	30.17		
Total	120	112754.00			

*Significant at $P = .05$

R squared = .684

Table 5 shows a significant joint effect ($F = 3.89$) of TS and SAQ on students' achievement leading to a rejection of the null hypotheses.

Discussion of Findings

Results of the study show that teaching strategies significantly affects students' academic achievement in BT. Teaching strategy having effect on academic achievement is in line with Mbaba (2006) and Ugwuanyi (2005). The implication here is that BT teachers have to select and use appropriate teaching strategies if they want to have high students' achievements. The fact that instructional strategies will also dictate instructional resources such as machines, tools and other equipment cannot be over emphasized.

In this study the interactive teaching strategy (INTS) performed best followed by the dependent teaching strategy (DTS) and independent teaching strategy (ITS). The INTS has some element of students' interaction with one another and with the teacher coupled with the feedback mechanism which allows students to know their progress. Students' attitude has also been seen in this study to affect their achievement significantly ($F = 4.93$, $P = .05$). This supports the findings of Bolaji (2003). However, this result is contrary to Uwameiye (2004), who argued that students' attitude makes little or difference in their academic achievement.

The study further showed a significant joint effect ($F = 3.89$) of teaching strategies and students' academic achievement. This is in line with Anderson and Block (2000) and the implication is that if effective teaching strategies are combined with positive students' attitude, their academic achievement could be extensively improved.

CONCLUSION

Quality assurance in BT is a procedure for meeting the curriculum objectives and giving satisfaction to the stakeholders. The procedure require instituting benchmarks/standards on the teaching and learning parameters such as teaching strategies, students' attitude, funding, equipment, evaluation and instructional resources. This study has shown, that teaching strategies and students' attitudes have significant effect on students' academic achievement in basic technology. Therefore there is urgent need to put in place quality assurance process by manipulating teaching strategies and students' attitude for effective learning of the subject and as a measure of stimulating students' interest which has already dwindled towards BT. Teaching strategies, methods, teaching aids, educational media as some of the quality assurance parameters, should enhance teachers' and students' full participation if high academic achievement is to be expected. The starting point in the quality assurance process for the study of BT is a conducive learning environment (which include tools, machines, books etc) and qualified teachers that understand the philosophy and psychology of basic technology principles and who are capable of stimulating students' attitude toward the subject.

RECOMMENDATIONS

- The interactive teaching strategy and technology friendly activities should be employed by BT teachers in the teaching and learning of the subjects to enhance students' attitudes towards the subject.
- Quality assurance in the teaching and learning of BT should properly align Students' attitudes, effective administration, evaluation and supervision, teacher's factors e.t.c.

- Activities aimed at stimulating students' interest and curiosity should be generated by the BT teacher since this will give the students the opportunity to be fully involved in the learning process.
- Government should provide the needed tools, machines, textbooks, materials and other laboratory facilities as part of a conducive environment to enhance quality teaching and learning
- Learning activities should include hands – on – experience, visits for technology oriented organizations, quiz on science and technology, exhibitions on BT products and application of computer for the solution of problems in BT.

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