

African Research Review

An International Multi-Disciplinary Journal, Ethiopia

Vol. 3 (2), January, 2009

ISSN 1994-9057 (Print)

ISSN 2070-0083 (Online)

Quantitative Ability as Correlates of Students' Academic Achievement in Secondary School Economics in Oyo State, Nigeria (*Pp.322-333*)

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Abstract

The introduction of quantitative topics into the secondary school economics curriculum has attracted the interest of economics educators and researchers. This concern arose from the fact that students' achievements in the Secondary School Certificate Economics have remained poor. It is against this background that this study investigated the relationship between quantitative ability (knowledge of Venn diagram; measures of central tendency; and percentage) and secondary school students' achievement in economics. The study adopted survey research design of the ex-post facto type. A purposive sampling technique was used to select sample for this. Data were analyzed using Pearson Product Moment correlation and multiple regression statistics. The findings revealed that that students' knowledge of measures of central tendency made the greatest contribution to their achievement in Economics ($\beta = .653$; $p < .05$). This is followed by Venn diagram ($\beta = .580$; $p < .05$). These two variables made contributions which

are significant. Only Students' knowledge of percentage made no significant contribution to their achievement in Economics ($\beta = .450$; $p > .05$). It is, therefore, recommended that these factors should be taken into consideration in order to enhance the understanding of economics.

Keywords: Quantitative ability, Knowledge of Central tendency, Knowledge of Venn diagram, Knowledge of Percentage and Secondary School, Achievement in economics

Background to the Problem

Education has been responsible for the upliftment of the human conditions. Alade (2004), observed that the primary concern of education is the elevation of human conditions. Through education, people are enabled to develop their knowledge and skills, adopt new behaviour and be able to survive in the society. In the same vein, Oderinde (2005), opined that all over the world, education is the key to development which clearly demonstrated that education play vital roles in the development of the individual, society and the nation as a whole.

The revised National Policy on Education (FRN, 2004), stated that no education system can rise above the quality of its teachers. This has made the subject of teacher effectiveness a perennial one in educational discourse since the quality of education at any level is highly dependent on the quality and dedication of the teachers (Ajiboye, Adu & Amosun, 2005). Both the developed and developing nations have been making huge investments on education. Anderson (2004), observed that teacher salaries still account for 70 to 90% of the education budget in most countries. This is due to the fact that it is the teacher who determines the ambience of the classroom and together with other members of staff, the ambience and expectations of the school. Some teachers plan and execute these elements more effectively than others.

Previous research findings had shown that students' achievement is affected by different factors such as learning abilities, race, gender, sex (Hanzen, 2000). Some of the researchers even tried to explain the link between students achievement, economic circumstances and the risk of becoming a drop-out that proved to be positive (Pallas, Natriello and McDill, 1989; Goldman, Haney and Koffler, 1988; and Levin, 1986). Chansarkar and Mishaeloudis (2001), explained the effects of age, qualification, distance

from learning place, etc on student achievement. According to them, the achievement of students is not affected by such factors as age, sex and place of residence but is associated with performance in quantitative subjects. It is also found that those who live near university perform better than other students.

Supporting the views above, Carol (2007) remarked that student performance in principles of macroeconomics classes was dependent on many factors. Natural ability needs to be supplemented with motivation and effort. According to him, a study by Borg and Shapiro tried to predict student's performance based on the personality type of the instructor. The results found that a student would do better in the class if the student and professor had similar learning styles.

Considering other factors which could influence students achievement in a school subject, quantitative ability had been identified (Educational Testing Service, 1995; Oyedeji, 1994; Fonska, 1992). Quantitative ability was defined as a measure of a student's "ability to apply knowledge of mathematical concepts and principles, to demonstrate flexibility in thinking, to identify critical features on new situations, to make correct generalizations, and to compare mathematical expressions" (Educational Testing Service, 1995).

Quantitative skills are marked by an ability to solve numerical problems easily. People who are good at figuring out a tip are tapping into their quantitative abilities. But for some people, quantitative ability also means that they are able to separate a whole into its constituent parts more readily than others. Quantitative ability includes arriving at mathematical solutions to problems, as well as basic adding, subtracting, multiplying and dividing. Based on the ability and the maturity of the students, three major areas of knowledge of Venn diagram, measures of central tendency and percentages were selected for testing. They were consequently incorporated into the

Quantitative Ability Test Instrument

Despite the relevance of Economics to every day life in the area of commerce and industry, the teaching of the subject in Nigeria is characterized by many inadequacies. Nigeria secondary school teachers of Economics have a few materials on the teaching of Economics to work with. Audio-visual aids are either not available in sufficient quality, or what is available is usually

inappropriate. These have affected the effectiveness of teachers of Economics (Adu, 2002; Obemeata, 1991).

Although, there is an increase in the number of students that are offering the subject, achievement in Economics has not been as good as it has been before the introduction of a new Economics syllabus which incorporated some elements of Mathematics into the subject. The situation has been posing serious problem for the students in the Senior Secondary School classes partly as a result of the carry over effects of the negative attitudes which they have towards Mathematics and ineffectiveness on the part of the teachers. The ineffectiveness results from low student – teacher interaction. Students’ failure to ask questions and the use of lecture method were identified as the main cause of poor achievement in Economics (Adu & Ayeni, 2004). They demonstrated that achievement of candidates in Economics is not only poor generally but continues to fall over the years in a study on an “appraisal of trends in achievement of students in Economics at the Senior Secondary Certificate Examination in Oyo State”.

In addition, the facts and figures presented in Tables 1 and 2 for May/June 1996 – 2005 and November/December 1996-2005, Senior School Certificate Examination results tend to support this claim.

The figures in these tables show that students’ achievement in the subject (Economics) is poor; this should be a concern to policy makers, administrators, principals, teachers, parents and students themselves.

Statement of the Problem

There has been a trend of poor achievement in Economics in Secondary Schools. It is therefore necessary to gear research work in Economics Education towards finding solutions to the factors responsible for students’ failure in the subject. Hence, this study investigated the relationships between quantitative ability and students’ academic achievement in Economics. The study also investigated the relative contributions of each of the three (3) variables such as: knowledge of Venn diagram; measures of central tendency; and percentages (quantitative ability) to the variance of achievement in Economics. Furthermore, it sought to find out the variables that could predict senior secondary school students’ achievement in Economics.

Research Questions

Based on the problem stated above, the study sought answers to the following research questions.

1. What is the significant composite effect of the quantitative ability variables viz: knowledge of Venn diagram; measures of central tendency; and percentages on students' achievement in Economics?
2. What are the relative effects of the three quantitative ability variables (knowledge of Venn diagram; measures of central tendency; and percentages) on students' achievement in Economics?
3. Which of the quantitative ability variables (knowledge of Venn diagram; measures of central tendency; and percentages) would predict students' achievement in Economics?

Methodology

The study adopted survey research design of the ex-post facto type. The study aimed at the composite and relative effects of quantitative ability variables on the student achievement in secondary school Economics. The population for the study consisted of all the senior secondary school Economics students in all public senior secondary schools in the thirty three Local Government areas of Oyo State.

Five (5) schools were randomly selected in each local government which gave a total of thirty (30) schools that were involved in the study while twenty (20) senior secondary school class II Economics students were randomly selected in each school. This gave a total of six hundred (600) students that were involved in the study. The choice of SSII students was borne out of their maturity and to allow for follow up. They had been exposed to Economics in SSI, thus they already had some good knowledge of the subject.

The data collected were analyzed using both descriptive and inferential statistics. Descriptive statistics, involving frequency counts and percentages were used to present the characteristics and responses of the respondents descriptively. Also, inferential statistics, involving Pearson Product Moment Correlation and Multiple regression analysis were used to determine the relationships among the independent variables and the dependent variable. All tests were carried out at $\alpha = .05$.

Results and Discussion

Research Question 1:

What is the composite effect of the quantitative ability variables viz.: student knowledge of Venn diagram; measures of central tendency; and percentages on students' achievement in Economics?

From Table 3, it could be observed that students' knowledge of Venn diagram has a negative and significant relationship with student achievement in Economics ($r = -.582$; $p < .05$). However, their knowledge of measures of central tendency has a positive and significant relationship with achievement ($r = .048$; $p < .05$). Furthermore, the results show that knowledge of percentages has a negative but significant relationship with achievement ($r = -.097$; $p < .05$). Taken together, the composite effect of the quantitative ability variables is presented on Table 4.

Table 4 shows that the quantitative ability variable [knowledge of Venn diagram, measure of central tendency and percentages] taken together, correlate positively with student achievement in Economics ($R = .584$). Also, the variables could explain 34.0% of the total variance in the dependent variable (adjusted $R^2 = .340$). The remaining 66.0% is due to other factors considered in this analysis.

Table 5 tests the significance or otherwise of the composite effect. From Table 5, the R value of .584 is significant ($F_{(3,2156)} = 371.770$; $p < .05$). This shows that the R value is not due to chance.

Research Question 2:

What are the relative effects of the quantitative ability variables viz: knowledge of Venn diagram, measures of central tendency and percentages on students' achievement in Economics?

Table 6 shows that students' knowledge of measures of central tendency made the greatest contribution to their achievement in Economics ($\beta = .653$; $p < .05$). This is followed by Venn diagram ($\beta = .580$; $p < .05$). These two variables made contributions which are significant. Only Students' knowledge of percentage made no significant contribution to their achievement in Economics ($\beta = .450$; $p > .05$).

Research Question 3:

Which of the quantitative ability variables [knowledge of Venn diagram, measures of central tendency and percentages] would predict students' achievement in Economics?

From Table 6, student knowledge of Venn diagram ($B=-.612$; $t=-3.839$; $p<.05$) and measures of central tendency ($B=-.977$; $t=10.871$; $p<.05$) could predict student achievement in Economics. Only students knowledge of percentage could not predict the dependent variable ($B=-8.17E-03$; $t=-.562$; $p>.05$).

Discussion

Considering quantitative ability of the students, the findings revealed that students who had good knowledge of Venn diagram; measures of central tendency; and percentages were able to achieve better in Economics. This is as a result of the fact that quantitative aspects have been introduced into the new syllabus of Economics at the Senior Secondary School Examination level while section A of the terminal examination at SSS level usually consists of two questions which are made compulsory. This shows that any student who has good quantitative ability would easily perform better in any Economics examination. Moreover, such a student would not have phobia for Mathematics like other students who may not have good quantitative ability. Consequently, the findings have emphasized the role which quantitative ability could play in students' achievement in Economics. Thus, for any teacher to be effective in impartation of knowledge in the students in Economics, he/she should be able to look into how students could develop good quantitative abilities. This is so, because, without good quantitative ability, no student will be able to achieve well in Economics. This study corroborates the findings of studies such as Adu (2002), Uduosoro (2000), Fajola (1999) and Ajelabi (1998), which revealed high significant main effect of quantitative ability on students' achievement in some subjects like Economics, Biology and Mathematics.

Summary of Findings

- Knowledge of Venn diagram has a negative and significant relationship with student achievement in Economics.
- Knowledge of Measures of central tendency has a positive and significant relationship with achievement.
- Knowledge of Percentage has a negative and significant relationship with student achievement in Economics.
- The variables [knowledge of Venn diagram, measures of central tendency and percentages] have positive multiple correlation with student achievement in Economics.

- The composite effect of the quantitative ability variables on student achievement in Economics is positive and significant.
- Knowledge of Measures of central tendency made the greatest contribution to student achievement in Economics. Knowledge of Venn diagram made the next in order to magnitude of contribution to student achievement. The two variables made contributions which are significant. Only Knowledge of percentage made no significant contribution to student achievement in Economics.
- Knowledge of Venn diagram and measures of central tendency could predict student achievement in Economics.

Conclusions

The study has shown that two out of the variables contribute to the prediction of the variance of secondary school students' achievement in Economics. Therefore, appropriate measures should be taken to ensure that the variables are adequately and appropriately managed so that their contributions to Economics teaching and learning would be positive rather than negative.

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Table 1: Senior School Certificate Examination Results in Economics (May/June 1996 – 2005)

Year	Total Entry	Actual Number	Credit & Above (1-6)	Pass (7-8)	Fail (9)
1996	244,595	240,224	81,846 (31.1%)	83,136 (34.6%)	75,242 (31.3%)
1997	317,827	313,072	87,165 (27.8%)	112,215 (35.8%)	113,692 (36.3%)
1998	451,571	443,841	188,852 (42.5%)	143,112 (32.3%)	111,877 (25.2%)
1999	489,880	480,513	134,301 (27.9%)	171,307 (35.7%)	174,905 (36.4%)
2000	439,174	434,315	65,433 (15.0%)	144,010 (33.2%)	244,872 (51.8%)
2001	490,073	484,508	94,740 (19.5%)	145,160 (30.0%)	244,608 (50.5%)
2002	589,279	582,926	81,897 (14.0%)	161,175 (27.7%)	339,854 (58.3%)
2003	659,124	651,426	143,900 (22.1%)	202,463 (31.1%)	305,063 (46.8%)
2004	744,810	732,532	208772 (28.5%)	229282 (31.3%)	294478 (40.2%)
2005	849084	840325	272265 (32.4%)	211762 (25.2%)	356298 (42.4%)

Source: WAEC Research Division, Lagos

Table 2: Senior School Certificate Examination Results in Economics (Private) (Nov/Dec. 1996 – 2005)

Year	Total Entry	Actual Number	Credit & Above (1-6)	Pass (7-8)	Fail (9)
1996	190,509	174,808	65,631 (37.5%)	54,692 (31.5%)	54,485 (31.2%)
1997	296,967	261,805	158,253 (60.4%)	72,736 (27.8%)	30,816 (11.8%)
1998	343,016	308,772	99,766 (32.4%)	121,817 (39.4%)	87,189 (29.2%)
1999	475,417	432,454	200,149 (46.3%)	152,300 (35.2%)	80,005 (18.5%)
2000	384,888	362,392	179,058 (49.4%)	121,121 (33.4%)	62,218 (17.2%)
2001	345,068	324,013	139,822 (43.2%)	117,117 (36.1%)	67,074 (20.7%)
2002	439,840	417,863	84,391 (20.2%)	129,809 (31.1%)	203,663 (48.7%)
2003	394,544	375,393	92,714 (24.7%)	126,246 (33.6%)	156,433 (41.7%)
2004	454,600	442,148	156,520 (35.4%)	93,294 (21.1%)	192,334 (43.5%)
2005	432,166	422,183	132,143 (31.3%)	117,789 (27.9%)	172,251 (40.8%)

Source: WAEC Research Division, Lagos

Table 3: Pearson Correlations of Students' knowledge of Quantitative Ability Variables and Achievement in Economics

VARIABLES		Achievement	Venn diagram	Measure of central tendency	Percentages
Pearson Correlation (r)	Achievement	1.000	-.582*	.048*	-.097*
	Venn diagram	-.582*	1.000	-.105	.092
	Measure of central tendency	.048*	-.105	1.000	-.052
	Percentages	-.097*	.092	-.052	1.000

* Significant at P<.05

Table 4: Summary of Regression Analysis on Students' knowledge of Quantitative Ability

R	R Square	Adjusted R Square	Std. Error of the Estimate
.584	.341	.340	1.5730

Table 5: ANOVA Table for Regression on Students' knowledge of Quantitative Ability

Source of variance	Sum of squares	Df	Mean Square	F	Sig.
Regression	2759.522	3	919.841	371.770	.000*
Residual	5334.411	2156	2.474		
Total	8093.933	2159			

* Significant at P<.05

Table 6: Relative Effects of Quantitative Ability Variables on Achievement

Source of variance	Unstandardized coefficients		Standardized coefficients	Rank	t	Sig.
	B	Std. Error	Beta			
(constant)	29.093	.365			79.789	.000
Venn diagram	-.612	.019	.580	2 nd	-3.839	.000*
Measure of central tendency	-.977	.011	.653	1 st	10.871	.000*
Percentages	-8.17E-03	.003	.450	3 rd	-.562	.610

* Significant at p<.05