

Quantitative and Verbal Aptitudes as Predictors of Senior Secondary School Students' Performance in Economics

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Abstract

This study examined the predictive power of quantitative and verbal aptitudes on the performance of senior secondary school students in Economics. The study arose from the poor performance of students in the Senior School Certificate Examination and the General Certificate in Education Economics. The study adopted descriptive survey research design. Multistage sampling technique was employed in selecting a total of three hundred and thirty senior secondary two Economics students from ten schools comprising of five private and five public schools. Data were gathered with three test instruments, namely the Economics Achievement Test, the Quantitative Aptitude Test and the Verbal Aptitude Test. The reliability coefficient was established using Pearson Product Moment correlation coefficient and was found to be 0.86 for the first test, 0.81 for the second and 0.93 for the last. Data were analyzed using ANOVA and multiple regression of the SPSS. The findings revealed that quantitative and verbal aptitudes have predictive power on the performance of senior secondary school students in Economics. However, quantitative aptitude has more predictive power ($B = 0.339$) than verbal aptitude ($B = 0.206$). Based on the findings, it is recommended that school authorities should provide learning materials that will promote the acquisition of quantitative and verbal skills; teachers should use appropriate teaching methods and promote high-order thinking and logical reasoning in the students; and government should recruit adequate and qualified teachers to teach Economics, quantitative and verbal related subjects.

Keywords: quantitative aptitude, verbal aptitude, predictor, economics performance.

Introduction

The essence of schooling is to provide learners the opportunity of acquiring requisite education and training that will enable them to adjust meaningfully in the society and contribute to the development of the nation. Education is a means for national transformation. Coetzee (2011) noted that the success of a nation's educational system is measured by the academic achievement of the students. Dambudzo (2009) opined that a lot of emphasis has been placed by the society on the academic achievement of its citizens for the past couple of decades (as cited in Coetzee, 2011). In fact, academic excellence remains the major index used to evaluate the quality of education offered in schools.

Ascertaining the academic achievement of students involves the determination of the extent to which they have benefitted from exposure to instruction and other academic tasks. This is done using different methods or techniques. The results from this measurement are useful in decision making.

The academic achievement of senior secondary school students is an important factor that determines their future academic pursuit. In Nigeria, the Senior School Certificate Examination (SSCE) – which is conducted by the West African Examinations Council (WAEC), National Examination Council (NECO) and National Business and Technical Examinations Board (NABTEB) – is a prerequisite for entry into a tertiary institution. To be considered eligible for tertiary education, candidates are expected to obtain at least credit grades in five subjects (especially for university admission) in the SSCE. Economics is one of the subjects offered in this examination. According to the National Open University of Nigeria (2006), Economics was first taken in the West African School Certificate Examination as a school subject in 1967. It further stated that the teaching of Economics as part of the Nigerian school curriculum probably started in 1966, after most other subjects had been introduced. Since the introduction of the subject in secondary schools, there has been an astronomical increase in the number of schools that teach it and the number of students that enroll for the examination. Economics is among the most popular subjects in secondary schools (National Open University of Nigeria, 2006).

The importance of Economics in any nation cannot be over-emphasized. It seeks to allocate scarce resources towards the satisfaction of unlimited wants. In other words, it seeks to address economic problems facing our society (Anyanwuocha, 2006). The economic changes in the world today require people who can cope with varying situations and adapt to harsh economic realities. With increasing economic problems, particularly in developing countries like Nigeria, the task is for citizens to be equipped with the skills that will enable them to move out of these situations and contribute to the development of appropriate policies aimed at mitigating the effects of these challenges. Adu, Galloway and Olabisi (2014) noted that knowledge from the study of Economics could provide solutions to economic problems. The teaching of the subject should reflect on development issues that occupy the minds of policy makers and business people considering that it deals with real-world economic systems (Ongeri, 2009). Therefore, Economic literacy helps to build better citizens who will emerge as good managers of their own resources and that of the nation. Besides, as a commercial subject, Economics is important to secondary school students desirous of studying commercial disciplines in the university and other tertiary institutions.

Economics has been witnessing poor performance in recent years, particularly in public examinations in Nigeria. An analysis conducted by Adu, Ojelabi and Hamed (2009) on the

West African Senior School Certificate Examination (WASSCE) May/June and Nov/Dec Economics from 1996 – 2005 revealed a sharp decline in performance. Alade, Nwadingwe and Igbiosa (2014) lamented that this poor performance has been an issue of great concern to the government, parents and well-meaning Nigerians. Although researchers have been examining factors responsible for this anomaly, not much attention has been paid to likely contributory factors, particularly verbal aptitude.

The need to investigate these variables (quantitative and verbal aptitudes) as likely factors influencing performance in Economics became necessary based on the assertion of Anyawuchi (2010) that Economics problems could be solved using three approaches which are quantitative, graphical and theoretical (as cited in Mawak and Wakdos, 2017). The theoretical approach has to do with the use of verbal language. It therefore means that to excel in Economics examination, candidates should demonstrate numerical and verbal abilities as well as mastery of the subject knowledge. Quantitative and verbal skills come into play because candidates are expected to answer computational questions, as well as present answers in a logical and analytical manner. Also, candidates are expected to use appropriate terms, draw relationships between concepts, and interpret information/data clearly. Cohen and Cohn (1994) argue that Economics students must present their economic arguments in a logical sequence using verbal and graphical forms (as cited in Nguyen & Trimarchi, 2010). This is in addition to the use of numerical language because the subject involves deductive and abstract reasoning (National Open University of Nigeria, 2006).

Quantitative aptitude refers to the ability to solve numerical problems (Adu et al, 2009). It means applying numerical and problem-solving skills in dealing with calculative tasks. This aptitude is needed by Economics students when responding to tasks or questions that have to do with mathematical and graphical presentation and analysis. Colander (2000) noted that introductory Economics is often perceived by students as being boring because they are not familiar with mathematical concepts (as cited in Onger, 2009). Similarly, Adu et al (2009) stated that the introduction of mathematical elements into the new Economics syllabus has posed serious problem for senior secondary school students due to their poor attitude towards mathematics. A lot of students have a phobia for figures which impacts negatively on their learning outcomes in Economics (Ayeni & Olanikanmi, 2015).

Verbal aptitude encompasses the ability of a student to spell words correctly, use correct grammar, understand word meanings, understand word relationships and interpret detailed written information. Andrew, Cobb and Giampietro (2005) noted that verbal ability (or aptitude) is when a person is skilled at putting ideas into words, both in oral and written forms. Verbal aptitude facilitates the interpretation of information in a logical and analytical manner. Such ability helps in organizing words coherently (Andrew et al, 2005).

Some of the reasons why students fail examinations could be due to the inability to frame responses to questions and spell words correctly. Obe (1996) listed weakness in comprehension and the inability of students to express themselves, among others, as factors responsible for mass failure in examinations (as cited in Adeyimi & Adeyimi, 2014). Economics requires verbal skills as students are expected to analyze their answers, spell relevant terminologies correctly, understand concepts, give detailed explanation, among others.

The chief examiners' reports of the WAEC on candidates' performance in Economics tend to highlight the importance of quantitative skills (Eleje & Esomonu, 2018) and also verbal

skills. For instance, the reports for 2010 and 2012 May/June Economics pointed out the following weaknesses of the candidates:

- Poor grammatical expression: candidates could not express themselves in simple, clear and correct language;
- Scanty explanation: they merely listed the points without explaining them;
- Poor knowledge of drawing graphs and inability to carry out simple calculations;
- The use of wrong terminologies.

Adegbile and Alabi (2007) state that students' grades to a large extent, are associated with verbal ability. Lamenting on the poor language skill possessed by black South Africans, Stephen, Welman and Jordan (2004) reported a study conducted by Stanley (1998) at a tertiary institution in South Africa which showed that over 90% of black students lacked comprehension skills for successful completion of their courses. The success of students in an examination is greatly dependent on the ability to comprehend the examination questions and provide the required answers. Iyamu (2005) stated that most research on school improvement and academic achievement in Nigeria have not given adequate attention to verbal ability as a factor that most likely affect students' performance.

Information from this study is vital in shaping the teaching and learning of Economics at the secondary school level. Understanding the influence of quantitative and verbal aptitudes could help teachers in designing their lessons by using appropriate teaching methodologies that would simplify concepts considering the abstract nature of the subject and encourage students to develop higher-order thinking skills. Schools and the government could utilize findings from this study to invest more in academic tasks that would promote the acquisition of quantitative and verbal skills by the students.

Literature Review

Investigations into the factors affecting performance of students have dominated research in recent times. This is because the goals of learning or education can only be achieved when learners are doing well as evidenced by the level of their academic achievement. Efforts are constantly being made by researchers and educators to examine multiple-variables that influence performance in Economics. Studies have attributed performance in the subject to parents, schools, teachers, learning materials and students' characteristics such as emotional intelligence, interest, curiosity and aptitude.

Adesoji and Oginni (2012) in their study noted that students' aptitude is a factor responsible for poor performance. They lamented that studies have not paid adequate attention to students' aptitude while concentration has been on teachers, schools and the learning environment as variables responsible for this poor performance. Adeyemo (2010) recommended that the development of students' abilities (aptitudes) should be of great importance as it shows a high and positive significance in problem solving which also relates to effective learning and bring about high achievement. However, the aptitudes of interest in this study are quantitative and verbal aptitudes.

Adu et al (2009) argued that no student will do well in Economics without quantitative ability (or aptitude). In their study, which sought to determine the correlation between quantitative ability and achievement in secondary school Economics in Oyo State, Nigeria, they

concluded that any student who possesses good quantitative ability would perform better in any Economics examination.

Schuhmann, McGoldrick and Burrus (2005) conducted a study to determine the correlation between quantitative literacy and economic literacy of university students. Their findings showed that quantitative literacy is a very important determinant of economic literacy. They concluded that the ability to perform quantitative tasks would result in higher economic knowledge. Students without basic quantitative skills may find it difficult to understand and interpret economic concepts. Quantitative ability implies that students are able to separate concepts in its constituent parts (Eleje et al, 2018) and relate abstract concepts to various phenomena.

Bray and Spaulding (2014) reported a study conducted by Stock, Siedgried and Finegan (2011) on the predictive validity of the Graduate Record Examination (GRE) scores on Economics Ph.D. The findings revealed that GRE–Quantitative (or GRE-Q) scores showed the probability of completing the programme. It therefore means that GRE-Q has more predictive power in determining success of doctoral students in Economics than GRE-verbal (or GRE-V). However, Mitchell, et al (1994) asserted that measures of verbal ability should predict, to some degree of accuracy, relevant performance criteria (as cited in Adegbile & Alabi, 2007). A study conducted by Rothstein, Paunonen, Rush and King (1994) in Sujata (2005) showed that verbal reasoning and numerical ability had significant influence on the academic achievement of students in various academic programmes.

Corengia, Pita, Mesurado and Centeno (2013) carried out a study to analyze whether educational aptitudes can predict academic performance and attrition among undergraduate students. The Differential Aptitude Test (DAT) was employed as a measure of educational aptitudes. The result showed that verbal reasoning and numerical ability were among the independent variables that related significantly to academic performance of the students in Business (Accounting and Business Economics). From their study, they noted that the reason why verbal reasoning was one of the best predictors of academic performance could be that it evaluates the basic reasoning issues of learning process. Oliver (2008) maintained that Economics students require four cognitive skills (knowledge, comprehension, application and analysis) in order to perform well in the subject (as cited in Wyk, 2012). These cognitive skills promote critical thinking and reasoning ability.

Most of the available studies (Schuhmann et al, 2005; Stock et al, 2011, as cited in Bray & Spaulding, 2011; Rothstein et al, 1994, as cited in Sujata, 2005; Corengia et al, 2013) on quantitative and verbal aptitudes (or abilities) are based on university achievement in Economics in developed countries. With regards to Nigeria, there are limited studies on the influence of quantitative ability or aptitude on performance in Economics and no study on the influence of verbal aptitude was found in the literature. Some researchers who examined verbal variable in other subjects or areas made generalizations regarding its effect on academic performance. Therefore, this study sought to address these gaps. It is expected that this study can add to the limited empirical findings and provide a springboard for future studies in Nigeria, with regards to verbal aptitude.

Purpose of the Study

The main purpose of the study was to examine the predictive power of quantitative and verbal aptitudes on the performance of senior secondary school students in Economics.

Research Questions

1. Does quantitative aptitude significantly predict the performance of senior secondary school students in Economics?
2. Does verbal aptitude significantly predict the performance of senior secondary school students in Economics?
3. Does the combined effect of quantitative and verbal aptitudes significantly predict the performance of senior secondary school students in Economics?

Methodology

The population of the study comprised senior secondary two (SS2) Economics students in Oshodi-Isolo Local Government Area of Lagos State, Nigeria. This included both public and private school students. The study adopted descriptive survey research design. Multistage sampling technique was employed in selecting a total of 330 senior secondary two Economics students from 10 schools comprising five private and five public schools. Data was gathered with three test instruments namely the Economics Achievement Test (EAT), the Quantitative Aptitude Test (QAT) and the Verbal Aptitude Test (VAT). The reliability coefficient of the instruments was established using the Pearson Product Moment correlation coefficient and was found to be 0.86 for EAT, 0.81 for QAT and 0.93 for VAT respectively. Data was analyzed using ANOVA and multiple regression of the SPSS.

Results

Table 1 shows an F-value of 72.451 and a p-value of 0.000. This finding indicates that quantitative aptitude significantly predicts the performance of senior secondary school students in Economics and this has answered research question number one.

Table 1: ANOVA of quantitative aptitude as a predictor of performance of senior secondary school students in Economics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2790.118	1	2790.118	72.451	.000(a)
	Residual	12631.336	328	38.510		
	Total	15421.455	329			

Table 2 shows an F-value of 45.113 and a p-value of 0.000. This finding indicates that verbal aptitude also significantly predicts the performance of senior secondary school students in Economics and this has answered research question number two.

Table 2: ANOVA of verbal aptitude as a predictor of performance of senior secondary school students in Economics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1864.601	1	1864.601	45.113	.000(a)
	Residual	13556.853	328	41.332		
	Total	15421.455	329			

Table 3 shows an F-value of 45.041 and a p-value of 0.000. This finding indicates that the combined effect of quantitative and verbal aptitudes significantly predicts the performance of senior secondary school students in Economics and this has answered research question number three. The table shows R^2 values of 0.216, indicating that 21.6% of the variance in the achievement of senior secondary school students in Economics is accounted for by the combined effect of the two variables.

Table 3: ANOVA, model summary and coefficients of the multiple regression analysis of the combined effect of quantitative and verbal aptitudes in predicting performance of senior secondary school students in Economics

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3330.734	2	1665.367	45.041	.000(a)
	Residual	12090.721	327	36.975		
	Total	15421.455	329			

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.465(a)	.216	.211	6.081

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	7.750	1.550		5.001	.000
	verbal aptitude	.239	.063	.206	3.824	.000
	quantitative aptitude	.352	.056	.339	6.297	.000

From the table, quantitative aptitude ($B = 0.339$) has more predictive power on the academic performance of senior secondary school students in Economics than verbal aptitude ($B = 0.206$).

Discussion

The result of the analysis in table one revealed that quantitative aptitude predicts the performance of senior secondary school students in Economics. This finding agrees with the findings of Adu et al, (2009); Schuhmann et al, (2005); Stock et al, 2011, as cited in Bray et al, 2014) and Corengia et al, (2013) that reported that quantitative aptitude or ability influences academic performance in Economics. As Adu et al (2009) noted from their study, no student can perform well in Economics without good quantitative ability. Similarly, Schuhmann et al (2005) maintained that higher economic knowledge is dependent on the possession of quantitative skills. Economics is taught using quantitative language and so this finding demonstrates the importance of quantitative skills in facilitating learning outcomes.

The result of the analysis in table two showed that verbal aptitude predicts the performance of senior secondary school students in Economics. This finding is in line with the findings of Rothstein et al (1994), as cited in Sujata (2005) which showed that verbal reasoning significantly influenced academic achievements in various undergraduate programmes and also those of Corengia, et al (2013) which showed that verbal ability significantly predicted performance in Business Economics. As asserted by Mitchell, et al (1994), as cited in Adegbile, et al (2007), verbal ability should have some level of predictive power on academic performance.

The result of the analysis in table three showed the significant combined effect of quantitative and verbal aptitudes in predicting the performance of senior secondary school students in Economics. This finding agrees with the findings of Rothstein, et al (1994), as cited in Sujata (2005) and Corengia, et al (2013) which revealed that verbal reasoning and numerical ability had significant influence on the academic achievement of students in various undergraduate programmes, including Business Economics. However, the finding from this study showed that quantitative aptitude has more predictive ability than verbal aptitude. The study conducted by Stock, et al (2011), as cited in Bray, et al (2014) revealed that GRE – Quantitative (GRE – Q) scores showed the probability of completing PhD Economics programme, meaning that GRE-Q has more predictive power than GRE-verbal (or GRE-V) at that level of studies. The predictive ability of verbal aptitude in the study of Stock, et al (2011), as cited in Bray, et al (2014) appears to be in contrast with the study of Corengia, et al (2012) where it was reported that verbal reasoning was among the best predictors of achievement in undergraduate Economics. It should be noted that the study carried out by Stock, et al (2011), as cited in Bray, et al (2014) focused on PhD studies in Economics where much of the contents cover quantitative and graphical topics, requiring greater quantitative skills. The same can be said of undergraduate programmes in Economics when compared with secondary school Economics. It is therefore quite surprising that verbal aptitude has a lower predictive ability in this study compared to quantitative aptitude considering that few quantitative topics are covered in Economics at the secondary school level in Nigeria. Most of the tasks in Economics at this level of education are theoretical – more of writing than calculation. More empirical findings are needed as to which variable has more predictive power at the secondary school level. Regardless of the fact that the predictive ability of verbal aptitude is not as strong as that of quantitative aptitude in this study, an improvement in verbal aptitude or skill will contribute towards the performance of students in Economics. As Adegbile, et al (2007) noted, students' grades to a large extent are associated with verbal ability. Going by the assertion of Oliver (2008) that Economics students require four cognitive skills (knowledge, comprehension, application and analysis) in order to perform

well in the subject (as cited in Wyk, 2012), achievement outcomes will improve if these cognitive skills are properly applied as they are related to verbal aptitude.

Recommendations

From the findings of the study, the recommendations are as follows:

School authorities should provide learning materials that will help improve quantitative and verbal skills of students.

Students should be encouraged to be more liberal in their learning by availing themselves of every opportunity to sharpen their reasoning, verbal and numerical (quantitative) skills. They should read widely, consult materials on these variables, and pay attention to the learning of English and Mathematics as well as other subjects.

Teachers should encourage learners to develop higher-order thinking skills by presenting questions and tasks that demand logical and critical reasoning. They should also explore all areas that will help students to sharpen their verbal and quantitative skills. Apart from having a mastery of the subject matter, it is necessary that they simplify concepts, especially mathematical and graphical topics, by utilizing different instructional methodologies and using appropriate teaching aids.

The government should ensure that adequate and well qualified teachers are employed to teach Economics, and quantitative and verbal related subjects. Some researchers have suggested the introduction of critical thinking as a subject in senior secondary schools. If this is done, it will enhance the learning of students in quantitative subjects.

Conclusion

This study was necessitated by the growing concern over the poor performance of secondary school students in Economics, especially in public examinations as reported from previous studies and the limited empirical findings on the variables investigated in Nigeria. There is scarcely any study on the verbal variable as it pertains to performance in Economics to the best of the researcher's knowledge. Findings from the study have revealed that quantitative and verbal aptitudes predict performance in Economics at the senior secondary school. Economics is a subject that utilizes mathematical, graphical and theoretical or abstract languages in examining and explaining concepts which makes the subject appear to be difficult for many students. This is why the teaching and learning of the subject should be simplified and students encouraged to develop quantitative and verbal skills. The study therefore concludes that possession of these aptitudes or skills by students will enhance their performance in the subject. Considering the effects of these variables on Economics, it is necessary for more empirical studies to be made available in Nigeria using a larger sample size.

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