

Teacher's Pedagogical Knowledge and Students' Mathematical Ability as Correlates of Achievement in Economic Analysis Concepts in Economics in Ibadan, Nigeria

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Abstract

This study explores two variables (teachers' pedagogical knowledge and students' mathematical ability) as correlates of students' achievement in basic tools for economic analysis concepts in Economics in Ibadan, Nigeria. It adopted the survey research design. Random sampling technique was used to select five schools from Ibadan North Local Government. Thirty students who are offering Economics were also selected randomly from each of the five schools selected for this study and likewise, a teacher from each of the five schools were also purposively selected to participate in the study because they are teaching Economics for the level concerned in this study. Instruments used were teachers' pedagogical knowledge rating scale ($r=0.71$), students' mathematical ability test ($r=0.82$) and basic tools for economic analysis concepts achievement test ($r=0.76$). Data were analysed using descriptive statistics and Pearson product moment correlation at 0.05 level of significance. The study revealed that students' mathematical ability ($r=0.63$) had positive significant relationships with students' achievement in basic tools for economic analysis concepts in Economics, while teachers' pedagogical knowledge ($r=0.09$) did not. It recommended that student's mathematical ability factor should be taken into cognisance for improved achievement in basic tools for economic analysis concepts in Economics

Keywords: Teachers' pedagogical knowledge, Mathematical ability, Achievement Economic Analysis

Introduction

Economics is a subject in senior secondary school and a course of study at tertiary institutions. As a school subject, it has immeasurable contributions to learners' lives. Economics is a practicable subject which is relevant to our day-to-day activities. Economics deals with human beings and the satisfaction of their numerous wants with their limited available resources. As a result of the fact that the resources within the limit of human beings are not abundant, it becomes necessary for us to study Economics and decide the alternative uses of these scarce resources, in order to satisfy our human wants.

In Nigeria, Economics is taught in senior secondary school using Economics senior secondary school curriculum. Economics curriculum has to do with all the experiences and activities provided by the teacher/school to the students in course of handling Economics subject in order to achieve the objectives of the subject (Economics). As documented by the Federal Ministry of Education (FME), (2008) the guiding principle of the Economics curriculum is the need to equip graduates of senior secondary school with the basic knowledge and skills that will enable them to better appreciate the nature of economic problems in any society and adequately prepare them for the challenges in the Nigerian economy.

Aremu (2001), was of the view that academic

achievement is a fundamental criterion by which all teaching-learning activities are measured, using some standards of excellence and the acquisition of particular grades in examinations to measure student's ability, mastery of the content, and skills in applying the knowledge acquired to a particular situation. According to Ernest Ehibudu and Opurum (2013), the measure for assessing students' level of academic achievement is through achievement tests/examinations and observations. In spite of the importance of Economics and the government's provision in terms of instructional materials and qualified teachers (Federal Ministry of Education, FME, 2008), students' achievement in Economics seems not to be encouraging. The West African Examination Council Chief Examiner's Report (2008 through 2012) revealed that the academic achievement of students in Economics at the end of secondary education has remained poor. Alaka and Obadara (2013) also noted that there has been persistent poor achievement of students in West African Senior Secondary Certificate Examinations (WASSCE). Ojelabi, (2009) observed that researchers' concern has risen due to the fact that students' achievements in the Secondary School Certificate Economics have remained poor.

This poor achievement of students in Economics, a subject that aids in developing students' critical and creative thinking is very

disheartening. Various factors have been adduced for this poor achievement of students in Economics such as teaching methods and gender among others (Adu and Ayeni, 2004; Ewumi, 2009; Olatoye and Adekoye, 2010; Emaikwu, 2012; Idris and Rajuddin, 2012; Ifeanyi-Uche and Ejabukwa, 2013; Jensen and Owen, 2013). Previous research findings had shown that students' achievement is affected by different factors such as learning abilities, race, gender, sex (Hansen, 2000). Chansarkar and Michaeloudis (2001), explained the effects of age, qualification, distance from learning place, among others 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. Teaching methods can make or mar students' potentialities to learn and achieve. Teaching strategies have been put forward as one of the factors affecting students' academic achievement. Emaikwu, (2012) noted that the fall in standard of performance at secondary school level is incontrovertibly attributable to pedagogical approaches adopted by teachers in schools. WAEC Chief Examiners Report 2012–2016 showed that students' performance in basic tools for economic analysis related concepts continue to be not encouraging.

The basic tools for economic analysis in secondary school economics curriculum helps teach students the crucial skills they need to thrive in an increasingly data-driven world. Decisions and predictions are often based on data. These decisions or predictions would be easy if the data always sent a clear message but the message is often obscured in variability, therefore the basic tools for economic analysis help in describing the variability in data and in making informed decisions.

To the best knowledge of the researcher there are few studies addressing the poor performance of students in basic tools for economic analysis concepts in Economics. Oyewole (2018) conducted similar studies in which the researcher attributed the poor performance of students in graphical concepts in Economics to students' quantitative ability, availability and utilisation of instructional materials. Hence, there is a need to look into factors that could be responsible to students' poor achievement in basic tools for economic analysis concepts in Economics.

This prepares one adequately for life in modern society. For the purpose of this research, the following variables are considered as correlates of achievements in basic tools for economic analysis concepts in Economics; teachers' pedagogical knowledge and students' mathematical ability.

Pedagogical knowledge is the deep knowledge about the processes and practices or methods of teaching and learning and how it encompasses, among other things, overall educational purposes, values, and aims. The selection of appropriate teaching approaches for a particular classroom situation enables the teacher and his/her students to accomplish specific goals (Kennedy, 2011). As such, Finkelstein (2011) stated that student's achievement outcomes are of primary importance and are hypothesized to be mediated by changes in teacher's knowledge and application of pedagogical practices in teaching-learning process. Observing the importance of teaching methods in teaching-learning process, Hussain and Ali, (2012) postulated that the content to teach is just like the body and the method is just like the soul in the body; the body without soul is of no importance, therefore teaching without the proper method of teaching has zero value. This implies that ineffective or non-students-participatory teaching methods result to little or no learning and the end product – poor or no achievement.

The idea of pedagogical content knowledge is consistent with, and similar to, Shulman's idea of knowledge of pedagogy that is applicable to the teaching of specific content. Since the 1980's, however, the analytic distinction between teachers' subject matter knowledge and teachers' knowledge of pedagogy has begun to fade, in large part due to Lee Shulman's (1986; 1987) seminal work on teachers' "pedagogical content knowledge." Shulman argued that a distinctive form of teachers' professional knowledge that he called pedagogical content knowledge exists, and that this form of knowledge builds upon, but is different from, teachers' subject matter knowledge or knowledge of general principles of pedagogy. Pedagogical content knowledge is concerned with the representation and formulation of concepts, pedagogical techniques, knowledge of what makes concepts difficult or easy to learn, knowledge of students' prior knowledge, and theories of epistemology. This variable was included in this study to determine if it has something to do with

students' poor achievement in basic tools for economic analysis concepts in Economics

Mathematical ability is 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). Mathematics is the study of numbers, quantities and shapes. It is a mental activity which involves mental construction of figures, shapes, numbers in various subjects (Nizolomam, 2013). Mathematical skills are marked by an ability to solve numerical problems easily. Mathematical ability also means being able to separate a whole into its constituent parts more readily than others. Mathematical ability includes arriving at mathematical solutions to problems, as well as basic adding, subtracting, multiplying and dividing. Economics problems could be solve using three basic approaches. These include quantitative, graphical and theoretical approaches (Anyawuchi, 2010). Hence, the quantitative approach involves mathematical computation. Similarly quantitative economics is a representation and analysis of information about the direction of change in some economics variables. Again quantitative aspects of Economics is an aspect of economic that deals with computation of values, it involves topics such as basic tools for economics analysis, simple linear equations, theory of cost, theory of consumer behavior, demand and supply among others (FRN, 2008). Hence, for any student to perform well in economics, he/she has to do well in quantitative economics as observed by Hernandez (2014). This means the student must possess mathematical skills. There are several mathematical skills. Among them are; computational skill, geometry skill, tables and graph interpretation skill and statistics skill, which are important and required for the achievement of the knowledge of basic tool s for economic analysis. Oyewole (2018) also affirmed that students' achievement predicted by students' quantitative ability in graph-related concepts in Economics. This study aimed to look into how students' mathematical ability correlated with students' achievement in basic tools for economic analysis concepts in Economics.

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. Reports showed that the students' performance in the quantitative aspect of economics like basic tools for economic analysis concepts in Economics continue to be low. The reports revealed that students loose valuable marks with regards to questions relating to basic tools for economic analysis concepts in economics. In a situation where the students are blamed for poor performance in the concepts, emphasis is placed on the students' cognitive or intellectual ability. Little or no attention is given to the fact that teachers' pedagogical knowledge and students' mathematical ability can affect their achievement in the basic tools for economic analysis concepts in Economics.

Based on the above assertion, this study intends to find out the correlation of teacher's pedagogical knowledge and students' mathematical ability to students' academic achievement in basic tools for economic analysis concepts in Economics. This study was based upon teacher's pedagogical knowledge and students' mathematical ability as correlates of students' academic achievement in basic tools for economic analysis concepts in Economics.

Research Questions

The following research questions were raised to guide the study:

1. Is there any correlation between teachers' pedagogical knowledge and students' achievement in basic tools for economic analysis concepts in Economics?
2. Is there any correlation between student's mathematical ability and students' achievement in basic tools for economic analysis concepts in Economics?

Method

The study adopted descriptive survey design. The target population for this study was senior secondary school II students in Ibadan North Local Government Area who are offering Economics as well as their Economics teachers. Random sampling technique was used to select five secondary schools from Ibadan North Local Government. In each school, thirty

students who are in SS II Economics class were randomly selected to participate in the study. One teacher was selected from each school making total of five teachers. The three instruments used were:

- (1) Teachers' Pedagogical Knowledge Rating Scale (TPKRC)
- (2) Students' Mathematical Ability Test (SMAT)
- (3) Basic Tools For Economic Analysis Concepts Achievement Test (BTEACAT)

The data collected were analyzed using both descriptive and inferential statistics. Descriptive statistics, involving frequency counts

and percentages were used to present the responses of the respondents descriptively. Also, inferential statistics, involving Pearson Product Moment Correlation analysis was used to determine the relationships among the independent variables and the dependent variable. All tests were carried out at 0.05 level of significance.

Results

Research Question 1: Is there any correlation between teachers' pedagogical knowledge and students' achievement in basic tools for economic analysis concepts in Economics?

Table 1: Summary of the Pearson Product Movement Correlation on relationship between teachers' pedagogical knowledge and students' achievement in Basic tools for economic analysis concepts in Economics.

Variables	Teachers pedagogical knowledge	Basic tools for economic analysis achievement
Teachers pedagogical knowledge Sig. (2-tailed)	1	0.093 0.257
Basic tools for economic analysis achievement Sig. (2-tailed)	0.093 0.257	1

Results from Table 4.1 shows that teachers' pedagogical knowledge has no correlation coefficient with students achievement in Basic tools for economic analysis concepts in Economics ($r = 0.093, p > 0.05$). There is no statistically significant correlation between the two variables. This means that the teachers' pedagogical knowledge was not

correlated with students' achievement in basic tools for economic analysis concepts in Economics.

Research Question 2: Is there any correlation between student's mathematical ability and students' achievement in basic tools for economic analysis concepts in Economics?

Table 2 : Summary of the Pearson Product Movement Correlation on relationship between students' mathematical ability and students' achievement in Basic tools for economic analysis concepts in Economics.

Variables	Students mathematical ability	Basic tools for economic analysis achievement
Students mathematical ability Sig. (2-tailed)	1	0.628* .000
Basic tools for economic analysis achievement Sig. (2-tailed)	0.628* .000	1

*. Correlation is significant at the 0.01 level (2-tailed).

Results from Table 4.1 shows that Students' mathematical ability has correlation coefficient with

students achievement in Basic tools for economic analysis ($r = 0.628, p < 0.05$). There is a statistically

significant correlation between the two variables. Both are positively and highly correlated. This implies that there is a strong relationship between students' mathematical ability and students' achievement in basic tools for economic analysis. This means that students' mathematical ability was strongly correlated with students' achievement in basic tools for economic analysis concepts in Economics.

Discussion

The result of this finding showed that there was a significant relationship between students' mathematical ability and students' achievement in Basic tools for economic analysis concepts in Economics. This shows that any student who has good mathematical ability would easily perform better in basic tools for economic analysis concepts in Economics. Hence this confirms the view of Hernandez (2014) that there is a positive relationship between students' performance in mathematics and their achievement in other subject that are quantitative in nature such as economics, basic tools for economic analysis to be precise. It also confirmed the view of Oyewole (2018) that quantitative ability and students' achievement in graphical related concepts in Economics are significantly related.

The findings of this study revealed that there was no correlation between teacher pedagogical knowledge and students' achievement in basic tools for Economics analysis. This implies that this variable is not very germane to determine students' achievement in basic tools for economic analysis concepts in Economics.

Recommendations

Based on the findings of this study, the researcher makes the following recommendation;

1. Students with high mathematical ability should be encouraged to also take economics as an elective subject.
2. Students' confidence in their mathematical insights and abilities should be developed.
3. Teachers should make mathematics teaching more interesting so as to get the students' interest and attention which in turn helps to improve their performance in basic tools for economic analysis concepts in Economics.

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