

**THE RELATIONSHIP BETWEEN ACHIEVEMENT IN MATHEMATICS AND THE  
ACADEMIC PERFORMANCE OF THE ECONOMIC EDUCATION STUDENTS IN  
COLLEGES OF EDUCATION**

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**Abstract**

Economics is one of the social science subjects that play an important role in the technological development and industrial revolution of any Nation. The knowledge of scientific skills in economics is tremendously used in solving diverse problems of humanity and providing solutions to natural and artificial problems in the world at large. The mathematical language by nature is concise and precise. Hence by using mathematics we can restate the economics theory in a more compact form like the law of demand. The biggest advantage of mathematical economics is its ability to handle a large number of variables at a given point in time. Academic achievement is interestingly an important issue, a fundamental premium upon which all teaching-learning activities are measured using some criteria of excellence. The study revealed that a good background in mathematics denoted by mathematics grade significantly affects student's achievement in economics. The researcher recommended that economics teachers should be highly exposed to mathematical concepts and principles, especially during their training periods to equip them with the necessary skills, needed to handle the quantitative aspects of Economics for meaningful development.

**Keywords:** Achievement, mathematics, economics education, colleges of education.

## **Introduction**

Many words in economics have been used in different senses by different writers, at different times, and in different contexts. Until recently, it was felt that the analysis of economic events needs only a good sense and sound logical reasoning. The recent experience in the development of economic science however has convinced most of us that there is a need for a better understanding of the subject matter. No doubt, this improved understanding can be brought about only through a scientific approach. In the process, one must bring the date old verbal economic theories within the framework of technical competence that makes it possible to use the up-to-date mathematical and statistical techniques. Economics is a quantitative subject in the sense that most of the economic variables like prices, income, employment, etc., are always measured and stated in quantitative terms. Economic theories often deal with the analysis of relationships between some of these variables. When such relationships are stated in a specific format they form economic theories or otherwise called economic principles. For example, the inverse relationship between the price charged and the quantity demanded is popularly known as the law of demand. Similarly, the relationship between inputs and outputs, solely determined by the state of technical knowledge of the vintage concerned, is called the production function. In all these relationships, the involved variables are measured and stated in quantitative terms.

## **Theoretical Foundation of Achievement Motivation**

For over 20 years, McClelland and his associates at Harvard University researched high achieving individuals. Studies by McClelland and others led to a theory of achievement motivation that identified cognitions and behaviors of high achievers. Findings targeted a prototype of the high achieving individual who consistently utilizes assets of thoughts and behavior strategies when approaching a task. McClelland used the Thematic Apperception Test (TAT) and other imaging methods to measure achievement motivation. The research identified 10 thoughts associated with high achievers that students are taught to use in achievement motivation training programs (Smith & Troth, 1975). These thoughts are:

- Achievement Imagery (AI)—A desire for excellence revealed through one of the following: competition with others (CO), competition with self (CS), unique accomplishments (UA), long-term involvement (LTI);
- Need (N)—Deeply wanting to achieve something
- Action (ACT)—Planned action toward achieving excellence
- The hope of Success (HOS)—Expecting success before it is achieved
- Fear of Failure (FOF)—Worry about failing before it happens
- Success Feelings (SF)—Good feelings after the success
- Failure Feelings (FF)—Bad feelings after failure
- World Obstacles (WO)—World obstacles interfering with success
- Personal Obstacles (PO)—Personal obstacles interfering with success; and
- Help (H)—Help sought and obtained to achieve success.

In addition to thoughts consistently used by high achievers, four action strategies have been identified that characterize these individuals. Action strategies often taught in achievement motivation training programs include:

- **Moderate Risk Taking (MRT):**In a new situation where a person must rely on one's own skill, the high achiever takes carefully calculated moderate risks. They set goals that are challenging rather than goals that are unreasonably difficult or are too simple and undemanding.
- **Use of Immediate Concrete Feedback to Modify Goals (ICF):**High achievers like to know how they are doing. They seek situations that offer immediate concrete feedback concerning their progress or lack of it. They use feedback to modify goals or behaviors.
- **Personal Responsibility (PR):**Individuals with a high need to achieve like to test how much they can personally accomplish. They like situations where they can take personal responsibility for their success and failures. They initiate activities in which they can assume personal responsibility.
- **Researching the Environment (RE):**Persons with high levels of achievement motivation approach new situations with an alert, curious, and intentional style. They size up situations, checking out the limits and the possibilities—with the end in mind of accomplishing or moving toward a goal. Achievement motivation training programs

emphasizing achievement thoughts and behaviors have been successfully implemented in the business sector with the use of outcome measures such as thetas and productivity indicators (McClelland, 1961). Alschuler (1971) advocated applying for achievement motivation training programs within educational settings. Subsequently, achievement motivation training programs have been successfully implemented with school-aged children at the elementary and secondary levels (Alschuler, 1973). Outcome measures used by counselors to assess the effectiveness of achievement motivation training in educational settings have included grade point average, students' written responses to picture cues, and paper-pencil instruments. There is a need to continue developing methods to assess achievement motivation to assist counselors who are researching training program effectiveness.

### **Literature Review**

Academic achievement is commonly measured through examinations or continuous assessments but there is no general agreement on how it is best evaluated or which aspects are most important procedural knowledge such as skills or declarative knowledge such as facts. Furthermore, there are inconclusive results over which individual factors successfully predict academic performance, elements such as test anxiety, environment, motivation, and emotions require consideration when developing models of school achievement. Now, schools are receiving money based on their student's academic achievements. A school with more academic achievements would receive more money than a school with less achievement. Non-cognitive factors or skills are a set of "attitudes, behaviors, and strategies" that promotes academic and professional success such as academic self-efficacy, self-control, motivation, expectancy and goal setting theories, emotional intelligence, and determination. To create attention on factors other than those measured by cognitive test scores sociologists Bowles and Gintis coined the term in the 1970s. The term serves as a distinction of cognitive factors, which are measured by teachers through tests and quizzes. Non-cognitive skills are increasingly gaining popularity because they provide a better explanation for academic and professional outcomes. Self-efficacy is one of the best predictors of academic success. Self-efficacy is the belief you can do something. Stajković et others looked at the Big Five traits on academic success as well and saw that conscientiousness and emotional stability were predictors of self-

efficacy in over half of their analyses. However, self-efficacy was more indicative of academic performance than personality in all of the analyses. This suggests that parents who want their children to have academic achievement can look to increase their child's sense of self-efficacy at school.

Mathematics can simply be seen as the process of calculating to solve problems using numbers and symbols. Devlin defined Mathematics as; “the science of numbers and shapes”. For many students, mathematics is perceived as an abstract subject. Though Mathematics has some abstract attributes is not entirely abstract. As such have practical aspects. To greek philosophers, the whole life is synonymous with mathematics. The Greeks believe that everything can be mathematics. Thus, one can conclude that mathematics touches all aspects of human endeavours. In support of this, the Federal Republic of Nigeria (2004) made mathematics a core subject that is to be offered by all students up to the tertiary levels of education. The assumed implication of this compulsory nature of mathematics is that the knowledge of the subject is imperative and essential for all numbers of society. As a subject, mathematic has a special and peculiar position in the world's social, political, and economic discourse. To this, noted that no nation can make any meaningful progress in the information technology age, particularly in economic development without technology which has science and mathematics as its foundations.

Aiyedun (2000) pointed out that mathematics is the gate and key to science. Mathematics can be seen as the language of sciences since most science disciplines cannot exist in its isolation. According to Woodrow (2003) as a ‘language of science’ mathematics had long assumed power and influence as the terminology of science but during the last half-century, it has permeated many of the social sciences including not only economics but also such social areas of debate as wealth distribution (poverty and affluence) or crime and its causes and consequences.

Economics is one of the academic subjects offered at the colleges of education level as prescribed by the national policy on education. Its curriculum is based on equipping train teachers with basic knowledge and skills to appreciate the nature of economic problems in society and adequately prepare them for the challenges in the Nigerian economy. The philosophy of its curriculum is to present economics as a subject that has relevance in everyday

life and could prepare graduates for an entrepreneurial career in the future. According to the National Open University (NOUN) 2006, Economics education involves the use of appropriate teaching methodology in enhancing the understanding of economics as a concept and facilitates the in-depth residual knowledge of the learners to make them contribute meaningfully to the growth and development of the society. Onwukwe and Agwu(2002), hold that economics knowledge teaches the household and sector that is individual consumers how best to use their scarce resources. It also enables a consumer to make a rational decision concerning maximizing his total satisfaction. Also, to Awoderu (2002) the study of economics serves a useful purpose in modern life. It gives us facts and shows us what may be expected to be the outcome of certain lines of conduct and also helps us to decide which of several alternatives to choose.

Economics as a field of study has enjoyed much scholastic attention both within and outside the discipline ranging from economists, politicians, statisticians, mathematicians, philosophers to mention a few and all in a bid to define it. This suggests that the influence of economics cuts across different disciplines and affects all businesses of life. In support of this, Onwukwe and Agwu (2002) stated that “Economics knowledge is of practical importance in business because the understanding of the overall operation of the economic system puts the business executive (irrespective of the type of business) in a better position to formulate good policies that would ensure profit maximization for his organization”. This might account for the reason why the economy is behaving like a course for science, art, vocational and technical education, and commercial Courses, over the years can be seen as the third most popular secondary school subject offered and taken by students in sciences, social sciences and commercials. Adu and Ayeni (2004) assert that tough 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.

There is an increase in the number of students that are offering economics as a discipline, at both O’ level and A’ level. But 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 posting a serious problem for the students in the colleges of education classes, partly as a result of carryover effects of the

negative attitudes which they have towards mathematics and ineffectiveness on the part of the future teachers in training, Supporting the claims above, reported that performance in economics at all level over the years has less than satisfactory. Achievement in economics is imperative for effective participation in economic development. For an individual to contribute towards economic development should be improved upon as this reveals the extent the learning content learner was exposed to have been comprehended and could be applied in real-life situations. To improve economics student's achievement, there is a need to examine some of the factors that might be affecting student's achievement as this will provide a guide on the approach to be adopted in handling students to enhance their academic performance and achievement.

The specific objectives of the study include the following.

- i. To show the influence of mathematics achievement on the economics achievement of colleges of education students.
- ii. To determine the relationship between mathematics and economics curriculum.
- iii. To examine the extent to which mathematics achievement influence students' achievement in economics.

The study is guided by the following research questions:

- i. What is the relationship between mathematics achievement and economic achievement?
- ii. What is the association between students' perception of mathematics and their performance in economics?
- iii. What is the relationship between student's academic achievement in mathematics and their achievement in economics?

The study was guided by the following hypotheses which were tested at 0.05 level of significance.

- H<sub>1</sub>: there is no significant difference relationship between students' achievement in mathematics and their achievement in economics.

H<sub>2</sub>: no significant relationship exists between mathematics and academic achievement in economics.

H<sub>3</sub>: there is no significant relationship achievement in economics and mathematics.

### **Methodology**

The study sought to ascertain the relationship between colleges of education student's achievement in Mathematics and Economics. Since the target population for the study was large, a descriptive survey was deemed to be more appropriate. As indicated by Macmillan (1996), "In a survey, the investigator selects a group of respondents, collects information, and then analyses the information to answer the research questions" (p.102), Also, since the study involved a survey of students' knowledge in Mathematics and Economics, the descriptive survey design as suggested by Osuala (1993) was found to be more appropriate. The descriptive survey provides opportunities for research to gain valuable insight into the existing state of a phenomenon, "providing background information about the issue in question as well as stimulating explanations"(Sarantakos, 1997).

**Research Question One:** What is the relationship between the student's performance in mathematics and economics.

		<b>Performance in mathematics</b>	<b>Performance in economics</b>
Mathematics	Pearson Correlation	1	.163
	Sig. (2-tailed)		.391
	N	30	30
Economics	Pearson Correlation	.163	1
	Sig. (2-tailed)	.391	
	N	150	150

The table shows the correlation coefficient between students' performance in mathematics and economics. The result indicates a positive relationship in the performance in mathematics and



economics courses. However, the relationship was low since the  $r= 0.163$  and not significantly related

**Research question Two:** What is the relationship between student perception of mathematics and economic performance

		Perception of mathematics	Performance in economics
<b>VAR00002</b>	Pearson Correlation	1	-.532
	Sig. (2-tailed)		.113
	N	150	150
<b>GENDRET</b>	Pearson Correlation	-.532	1
	Sig. (2-tailed)	.113	
	N	150	150

The table shows the correlation coefficient between students' perception of mathematics and economics performance. The result indicates a inverse relationship between perception of mathematics and performance in economics courses. The correlation coefficient was  $r= -0.532$  and the relation was not significant since the p-value of 0.113 was greater than the 0.05 significance level.

**Hypothesis One: there is no significant relationship between the performance in mathematics and economic courses**

	Coefficient	Std. Error	Beta	t	Sig
(Constant)	52.003	10.321		5.039	.000
Performance in mathematics	.124	.143	.163	.872	.391

The estimated regression equation is given  $y= 52.003 + .124x$

Where  $y=$  students' performance in economics

x = students' performance in mathematics

The t-value provided in the table was 5.039 with estimated parameters was significant at 0.05. the estimated regression line indicates that a student who performs well in mathematics may perform well in certain economics courses as it gives a linear relationship with an increase by .124. Therefore, performance in mathematics can be used to predict a student's performance in economics. The beta value of .163 also indicates that performance in mathematics courses has an impact on performance in economics.

### **Discussion**

The result of this study revealed that there is a positive relationship between mathematics achievement and economics achievements, which implies that high knowledge of mathematics increases the probability and chances of a student achieving a higher grade in Economics. This finding corroborates with what Dawson asserted that economics relies heavily on mathematics and statistics which play a prominent role in the research culture of the discipline.

### **Conclusion**

The research revealed that a good background in mathematics denoted by mathematics grade significantly affected student's achievement in economics.

### **Recommendations**

Based on the conclusion of the study, the paper suggested as follows:

- i. Since some mathematical concepts have been integrated into economics, economics educators should also be exposed to basic principles and concepts of mathematics, especially during training in colleges of education which is an institution that produces the minimum qualification for Nigeria teachers.
- ii. There is a need to equip economics educators with the necessary skill needed to handle the mathematical aspects of the Nigerian child.
- iii. Economics educators should also make use of mathematics teachers as instructional resources to service their department where necessary.

- iv. Government and other stakeholders in education should endeavor to bridge the gap between teacher's student ratio to avoid using unqualified teachers to handle a highly analytical subject like economics.

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