

FACTORS INFLUENCING STUDENTS' MATHEMATICS PERFORMANCE IN SOME SELECTED COLLEGES OF EDUCATION IN GHANA

¹Justice Enu*, ²Osei K Agyman, ³Daniel Nkum

Department of Mathematics and ICT, College of Education, Komenda- Ghana

ABSTRACT: *Academic performance is affected by a number of factors including admission grade, social economic status, school background and many more. Students' personal factors and school based factors are the focus of the study described in this paper. The study was a descriptive study in which a survey research design was adopted. Three Colleges were randomly selected for the study. A total of 50 students from these Colleges participated in the study. Data for the study was collected through student's questionnaire. The findings revealed that inadequate teaching and learning materials as well as lecturer method of instruction are some of the factors which affect students' performance. The study also revealed that teachers and students' self-motivation also influence mathematics performance. On the basis of the findings, the following recommendations were made; interactive method of teaching which are core to improving students' holistic understanding of mathematical concepts needs to be used by mathematics teachers. Also stake holders need to provide adequate teaching and learning resource to the Colleges of education.*

KEYWORDS: Factors, Mathematics, Performance

INTRODUCTION

Mathematics as a subject affects all aspects of human life at different levels. Mathematics is seen by society as the foundation of scientific technological knowledge that is vital in social-economic development of a nation. It is in realization of the vast applications of mathematics that made Eraikhuemen (2003) to posit that a disciplined and ordered pattern of life can only be achieved through the culture of mathematics. Unfortunately, students' achievement in this important subject over the years has not been encouraging at the primary, secondary and tertiary levels of education in Ghana. According to the institute of Education, University of Cape Coast (U.C.C) Chief examiners report, the worst performance in the 2013 / 2014 academic year first semester examination for Colleges of Education in Ghana was in Mathematics (Numbers and Basic Algebra). The reports made available to the Colleges of Education indicated that 32.9% of the candidates who took the mathematics paper (Numbers and Basic Algebra) had the grades D or D⁺ and 20.9% failed in the subjects. Educators, trainers, and researchers have long been interested in exploring variables contributing effectively for quality of performance of learners. These variables are inside or outside school and affect students' quality of academic achievement. These factors may be termed as student factors, family factors, school factors and peer factors (Crosnoe, Johnson & Elder, 2004).

It is therefore an irrefutable fact that the successfulness of learning the subject is contingent on myriad of factors. School, students and teacher factors all impinge on the learning of mathematics. It is against this the paper seeks to analysis some factors affecting students mathematics performance in Colleges of Education in Ghana.

Objective of the study

The objectives of the study were to;

1. Establish students' personal factors that affect their performance in mathematics in Colleges of Education in Ghana.
2. Determine school based factors that affect students' performance in mathematics in Colleges of Education in Ghana.

REVIEW OF RELATED LITERATURE

The figure below shows some of the factors that contribute to students' poor performance in mathematics.

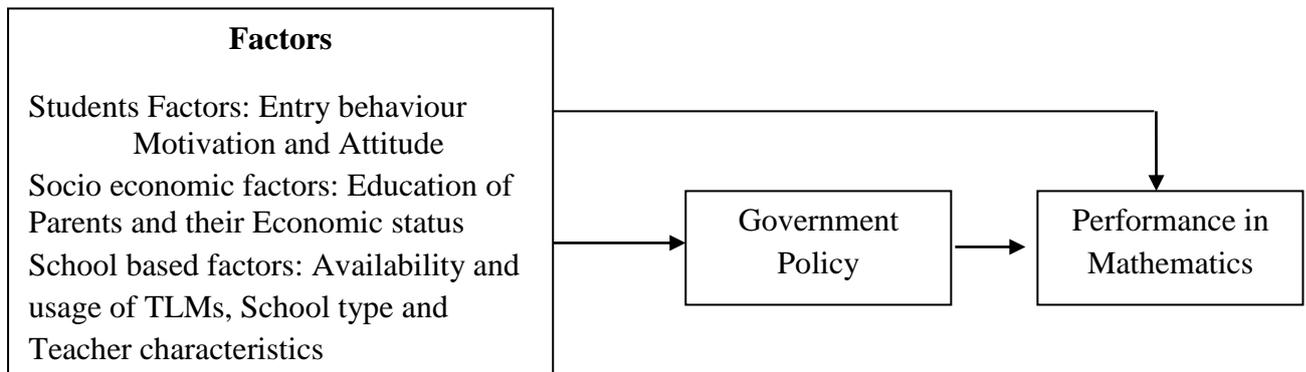


Figure 1: factors contributing to students' poor performance in mathematics

Social Economic Status

Social economic status is most commonly determined by combining parents' educational level, occupational status and income (Jeynes, 2002). In most of the studies done on academic performance of students, it is not surprising that social economic status is one of the major factors studied while predicting academic performance. According to Graetz (1995), one's educational success depends very strongly on the social economic status of the parents. Considine and Zappala (2002) argue that families where the parents are advantaged socially, educationally and economically foster a high level of achievement in their children.

Teacher Quality and Performance

Teachers play an important role in the realization of the high standards which are increasingly emphasized in schools and school systems across the world. Despite the general agreement about the importance of high quality teachers, researchers, practitioners, policy makers and the public have been unable to reach a consensus about what specific qualities and characteristics make a good teacher. The profession of teaching is becoming more and more complex and the demands placed upon teachers are increasing with the ever-changing world. Hanushek (1997) estimated that the difference between having a good teacher and having a bad teacher did exceed one grade level equivalent in annual achievement growth. It is therefore important that both pre-service and in-service training are essential for the quality professional development of the teacher.

Availability of Teaching Resources

The availability, provision and the use of teaching and learning materials go a long way to improve quality teaching which enhances academic performance. Adedjei and Owoeye (2002) found a significant relationship between the use of recommended textbooks and academic performance. According to Douglass and Kristin (2000), in a comprehensive review of activity based learning in mathematics in kindergarten through grade eight, concluded that using manipulative materials produces greater achievement than not using them. They also note that the long term use of concert instructional materials by teachers knowledgeable in their use improves students' achievement and attitudes.

Opare (1999) also asserted that the provision of the needed human and material resources goes a long way to enhance academic performance. Ankomah (1998) noted that effective teaching and learning greatly lied on the competences of its human resources as well as material resources which were needed for the impartation of knowledge

Motivation

A highly motivated person puts in the maximum effort in his or her job. According to Farrant (1968); *"Today the relationship between teachers and pupils is often up-side down; pupils come because they must and teachers teach because they are paid to. Teachers mourn that their profession is not respected and complain that they are inadequately paid for the duties they are required to do. They look over their shoulders at others professions and conditions of services for a better life"* (pg 125).

This assertion by Farrant (1968) exhibited lack of motivation on the part of both teachers and students. More so, it may contribute to ineffectiveness and inefficiency in academic work and its effects- poor performance. Studies by Lockheed (1991) cited in Etsey (2005) revealed that lack of motivation and professional commitment produce poor attendance and unprofessional attributes towards students which in turn affect the performance of students academically.

Students Attitudes towards Mathematics

Students' attitude towards mathematics influences the efforts they put in understanding and practising mathematical concepts and skills. According to the National Research Council (2000) as cited in Akey (2006), Students' beliefs about their competence and their expectations for success in school have been directly linked to their levels of engagement, as well as to emotional states that promote or interfere with their ability to be academically successful. Thus attitudes determine the effort a student is likely to put in his learning of the subject (mathematics). It is therefore necessary for mathematics teachers to strive and sustain positive attitudes towards mathematics for good performance in the upper classes (Benson, 1999).

METHODOLOGY

The population for the study consisted of all Colleges of Education in the Central and Western Region of Ghana. The sample however consisted of 50 students selected randomly from three Colleges of education from the Central and Western Region. The study was a descriptive study in which a survey research design was adopted.

The instrument used for the study was a questionnaire and data obtained was analyzed using a descriptive statistics.

RESULTS

Are there identifiable factors amongst students in Colleges that may affect their academic performance in mathematics?

Students' Attitude towards mathematics

Students selected for the study were asked of their opinions towards learning and performance of mathematics on an 11 item likert scale. This helped in detecting the kind of attitudes they had formed towards the subject. Their responses are presented in table 1. The table shows that majority of students 66% with a mean of 2.3 indicated that they strongly disagree (36%) or disagree (30%) to the statement that they are always under terrible strain in mathematics class. It is also therefore not surprising that 70% of respondent strongly disagree (38%) or disagree (32%) that they do not like mathematics. Majority of respondents (70%) with mean 4.1 see that mathematics is useful in life. More than half of the students prefer doing mathematics to other subjects. They indicated that they strongly agree (20%) or agree (50%) to the statement. The mean responses also indicate that students had positive attitude towards mathematics. The result therefore disagree with Benson (1999) who found that majority of the sampled students had negative attitudes towards mathematics. Mwamwender (1995) also noted that the achievement of a student in a subject is determined by their attitudes rather than inability to study.

Table 1: Students' Attitude towards Mathematics

Statement	SD F (%)	D F(%)	U F(%)	A F(%)	SA F(%)
I am always under a terrible Strain in mathematics class	18(36%)	15(30%)	1(2%)	11(22%)	5(10%)
I do not like mathematics and it scares me to have to take it	19(38%)	16(32%)	2(4%)	9(18%)	4(8%)
Maths is very interesting to me and i enjoy maths course	6(12%)	6(12%)	2(4%)	24(48%)	12(24%)
My mind goes blank and I am unable to think when working maths	22(44%)	17(34%)	2(4%)	7(14%)	2(4%)
I never liked maths and it is my most dreaded subjects	26(52%)	13(26%)	-	7(14%)	4(8%)
I feel a sense of insecurity when attempting mathematics	17(34%)	15(30%)	4(8%)	13(26%)	1(2%)
Maths makes me feel uncomfortable restless, irritable and impatient	21(42%)	16(32%)	6(12%)	4(8%)	3(6%)
Maths is something which I enjoy a great deal	6(12%)	8(16%)	6(12%)	23(46%)	7(14%)
I feel ease in maths and I like it very much	4(8%)	11(22%)	3(6%)	24(48%)	8(16%)
I am happier in maths class than in any other class	5(10%)	17(34%)	2(4%)	19(38%)	7(14%)
I feel a definite positive reaction to maths its enjoyable	5(10%)	7(14%)	3(6%)	25(50%)	10(20%)

Students were also given options to indicate who they thought motivate them to learn mathematics. Table 2 reports on the distribution of students responses on people who motivate them to study mathematics. This was to determine the extent to which their coping strategies in studying mathematics are influenced by people.

Table 2: Percentage distribution of students' responses on people who encourage them to study mathematic

Responses	Frequency	Percentage
Teacher	23	48%
Myself	17	34%
Friends	7	14%
Parent	3	4%

The result from table 2 show that a very high proportion (48%) of the respondents were encouraged by their teachers, followed by self-encouragement (34%), friends (14%) but rarely by parents (4%). Hill and Rowe (1998) affirmed that teachers have major effect on student's achievement.

Entry grades of students'

Table 3: Frequency distribution of entry qualification of students' in Mathematics

Entry Grade	Frequency	Percentage (%)
A ₁	3	6%
B ₂ /B ₃	14	28%
C ₄ /C ₅ /C ₆	33	66%

Table 3 indicate that 66% of the students' sampled for this study, were admitted into the College with a credit pass in mathematics. However 6% and 28% of the students sampled also indicated that they had A and B respectively upon which they obtained admission into the college. "Learning is a cumulative process, thus a student admitted with higher entry requirement will be well prepared for the course material compared to a student admitted based on the bare minimum qualification" Mlambo (2011). This result also suggests that several of our pre-service teachers who are being trained to handle the basic level already had fragile foundation in mathematics.

Gender

The opinions of the participants vary on the issue related to the relationship between gender and mathematics achievement. 60% of the students believe boys are better than girls while 40% believe previously boys used to perform better than girls but nowadays there is no significant difference. Therefore in trying to find out if there is any significant difference in mathematics achievement of boys and girls; mock examination scores of 20 students made up of 9 boys and 11 girls selected randomly was analyzed using SPSS. The result is shown in table 4.

Table 4: Independent sample t-test of Mock scores of males and females

Sex	N	mean	t-value	df	p-value
Male	9	8.18	1.402	18	0.493
Female	11	7.72			

Table 4 shows no significant difference between males ($M = 8.18$, $SD = 1.98$) and female ($M = 7.72$, $SD = 2.40$); $t(18) = 1.402$, $p = 0.493$. Since $0.493 > 0.05$, there was no evidence to suggest that significant difference existed between males and females.

School Based factors that Influence Mathematics Performance

Teachers Attitude towards Mathematics

Most of the teachers had positive attitude towards mathematics. They believe mathematics is not difficult by nature.

Method of Teaching Mathematics

Expository approach of teaching mathematics which limits students' classroom activities to just listening to teacher's words and copying notes from the board was the major method of instruction by most tutors. The results indicates that 88% of mathematics teachers uses lecturer method of instruction, 10% also uses questioning and answering method of instruction while heuristic methods of teaching which are strongly believed to enhance students' performance in mathematics such as small group discussion was the least method used by tutors representing 2%. Fletcher (2003) noted that indeed, irrespective of the level at which mathematics is taught; the task of the Ghanaian mathematics educator has almost always been that of a lecturer and interpreter, communicating the structure of mathematics methodically.

Teaching and Learning Materials

Result obtained from the data on availability of TLM in teaching mathematics in the Colleges of Education in Ghana showed that text book lead with 78%. However, most of the teaching resources that enhance students' understanding of mathematics concepts like geometrical set and mathematics models were minimal representing 2% and 20% respectively. Others like projectors and computers were never used. According to Akkoyunlu (2002), instructional materials motivate students, and encourage them to study lesson providing them with opportunity to have an access to information and to evaluate it.

CONCLUSION

The study was carried out to explore the factors influencing College of Education students' performance in mathematics. It was concluded based on the findings that; factors such as , lecture method of instruction which turns the learner into passive participants in the learning process as while as inadequate teaching and learning material affect students' performance in mathematics.

REFERENCES

- Akey, T. M. (2006). *School Context, Student Attitudes and Behaviour, and Academic Achievement: An Exploratory Analysis*.
- Akkoyunlu, B. (2002). Educational Technology in Turkey: past, Present and Future. *Educational Media International* , 2 (39), 165-174.
- Ankomah, Y.A.(2002). The Success of Private basic Schools in Ghana. The case Of three Schools in Cape Coast. *Journal of Educational Management* (4), 14
- Benson, O.D. (1999). A study of relationship between attitudes and achievement in Mathematics among form-4 students in Ukwala Division of Siaya District, Kenya Unpublished M.Ed thesis. Kenyatta University.

- Considine, G. & Zappala, G. (2002). Influence of social and economic disadvantage in the academic performance of school students in Australia. *Journal of Sociology*, (38) 129-148.
- Crosnoe, R., Johnson, M.K., & Elder, G.H. (2004). School size and the interpersonal side of Education: An examination of race/ ethnicity and organization context. *Social Science Quality*, 85(5), 1259-1274.
- Eraikhuemen, L. (2003). The influence of Gender and School location on Students' academic Achievement in Senior Secondary School Mathematics. *ife Journal of Theory and Research in Education*. 7(2), 99-112.
- Etsey, K., (2005) *Causes of low academic performance of primary school pupils in the Shama Sub-Metro of Shama Ahanta East Metropolitan Assembly (SAEMA) in Ghana*. Cape Coast. Paper presented at a Regional Conference on Education in West Africa, Senegal, Dakar.
- Fletcher, J. (2003). Constructivism and mathematics education in Ghana. *Journal of the mathematics Association of Ghana* , (5), 29-38.
- Geiser, S. & Santelices, V.M.(2007). Validity of high school grades in predicting student success Beyond the freshman year.