

Assessing the Challenges of Learning and Teaching of Mathematics in Second Cycle Institutions in Ghana

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ABSTRACT: The importance to incorporate mathematics in education has gain worldwide recognition, as it has a great potential of improving the level and quality of education completely. Mathematics is the bases of creation and is also the bases of learning and any student who is excellent in mathematics has a greater probability in excelling in other subjects as well. Today's era of technology cannot be discussed without making reference to the mathematics. Technology relates it building blocks to mathematics and any nation that wants to develop technologically must pay special attention to the study of mathematics. However, the teaching and learning of mathematics in our education is faced by a lot of hindrances. This study examines the challenges of the teaching and learning of mathematics in second cycle institutions in Ghana at Kumasi Metropolis. The researcher administered 400 total questionnaires, interviews and focus groups discussions, and a sample of three hundred and sixty (360) respondents made up of one hundred (100) teachers and two hundred and sixty (260) students respondent to them. Stratified sampling method was used to group the school population into two (2) main categories: teaching staff, and student. Random sampling was then used to select 360 respondents for data collection. After the study, it came out that, some of the problems are; lack of teaching and learning materials representing 22.22% according to the data gathered from the respondents ,from the respondents another problem was inconsistent syllabus by Ghana Education Service with a percentage of 16.67%, poor attitude towards the study of mathematics by students also had a percentage of 19.44%.

KEYWORDS: Assessing, Second Cycle, Institutions, Challenges, Teaching, Learning, Mathematics.

1 INTRODUCTION

The word mathematics comes from the Greek μάθημα (máthēma), which, in the ancient Greek language, means "what one learns", "what one gets to know", hence it is said Mathematics means "knowledge, study, learning". It is said that Mathematics is the gate and key of the Science (<http://uncyclopedia.wikia.com>).

According to the famous Philosopher Kant, "A Science is exact only in so far as it employs Mathematics". So, all scientific education which does not commence with Mathematics is said to be defective at its foundation. Neglect of mathematics works injury to all knowledge (www.preservearticles.com).

One who is uninformed of mathematics cannot know other stuffs of the World. Again, what is worse, who are thus unfamiliar are unable to perceive their own ignorance and do not seek any remedy. So Kant says, "A natural Science is a Science in so far as it is mathematical". The Mathematics as an academic discipline has played a very significant role in building up modern Civilization by perfecting all Science (www.preservearticles.com).

In this present era of Information Technology, emphasis is given on Science subjects such as Physics, Chemistry, Biology, Medicine and Engineering. Mathematics, which is a Science by any standard, also is an efficient and necessary tool being employed by all these Sciences. As a matter of fact, all these Sciences advance only with the aid of Mathematics. So it is pertinently remarked, "Mathematics is a Science of all Sciences and art of all arts" (<http://en.wikipedia.org>).

In the first instance, are there quality teachers to handle the subject mathematics? What comes into students mind when they hear the subject mathematics? Are these teachers employing the best teaching methods? Is the Government of Ghana committed to the teaching and learning of mathematics? And are there learning materials such as graph board, construction instruments to support the learning of mathematics? What learning style do learners used in studying mathematics?

According to the West African Examination Council, Ghana, 2013 the performance of students in Mathematics in West African Senior Secondary Schools Certificate Examination (WASSSCE) has decline .In 2013, there was a sharp decline in student's performance.47% excelled in Elective Mathematics as against 75.1% in 2012 while 36.8% excelled in core mathematics as against 49.9% in 2012

According to Prakash (2011), in the pedagogical study of mathematics we mainly concern ourselves with two things; the manner in which the subject matter is arranged or the method the way in which it is presented to the pupils or the mode of presentation. Mathematics is intimately connected with everyday life and necessary to successful conduct of affairs. It is an instrument of education found to be in conformity with the needs of human mind.

He also stated that," Teaching of mathematics has its aims and objectives to be incorporated in the school curricula".

If and when Mathematics is removed, the back-bone of our material civilization would collapse. So is the importance of Mathematics and its pedagogic. The Mathematician and the plain man each need one another (icenglish.co.in).

The democratization of Mathematics is a decisive step in the advance of a civil society (Hogben,1937).

According to Munna1 (2012) Mathematics is a fundamental part of human thought and logic, and integral to attempts at understanding the world and ourselves. Mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematical knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art.

1.1 COMPARISON BETWEEN 2012 AND 2013 CORE MATHEMATICS PERFORMANCE

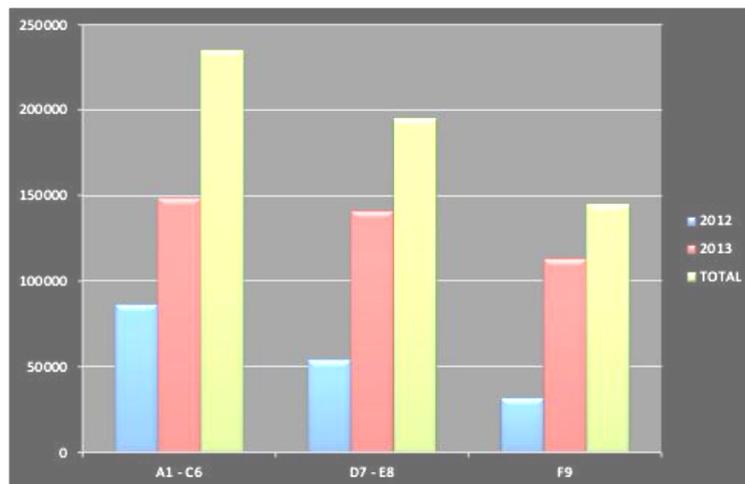


Figure. 1 Comparison between 2012 and 2013 Core Mathematics Performance Source (West Africa Examination Council, Ghana)

The performance of students in the 2012 WASSSCE core Mathematics examination was poor since the total number of students who passed was fewer than those who failed. 2013 May/June WASSSCE Core Mathematics examination also witnessed an abysmal performance similar to that of the 2012 examination. Performance of female students was very poor as compared to that of their male counterparts. The turnout for the 2013 (402,794) was more than double that of 2012 (173,499).

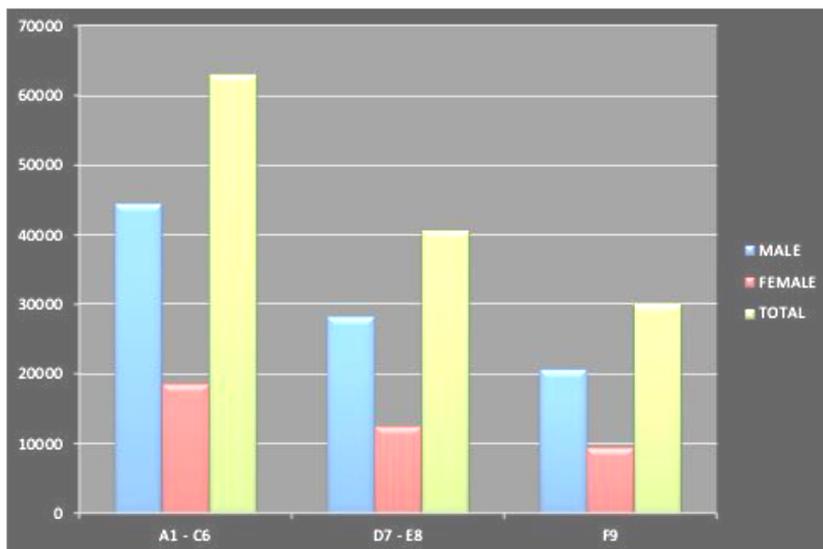


Figure. 2 Comparisons between 2012 and 2013 Elective Mathematics Performance Source (West Africa Examination Council, Ghana)

1.2 COMPARISON BETWEEN 2012 AND 2013 ELECTIVE MATHEMATICS PERFORMANCE

Results from the 2012 WASSSCE was fairly good with majority of the students passing examination with just a few failing. Many students sat for the 2013 Elective Mathematics examination, none the less, the performance was poor as compared to the 2012 results. Students who failed in the 2013 elective mathematics were greater than those who passed.

1.3 PROBLEMS AFFECTING THE LEARNING AND TEACHING OF MATHEMATICS

Studies has shown that even teachers who have an in depth knowledge in mathematics cannot integrate them in their teaching. They have attributed this to a high number of teachers who teach mathematics is not professional teachers and

lack basic skills in teaching. Some students also do not have mathematics anxiety and all that they say is “I fear mathematics”.

Not only have higher education systems expanded worldwide, the nature of the institution within these systems has also been shifting, through a process of differentiation (World Bank, 2000 as cited by Ololube, Ubogu & Ossai, 2007).

Mathematics, particularly in application, is of economic origin. But, they admit that an aware of Mathematics, is essential for civilized living (Bell, 1940).

According to Kolawole and Usman (2007), the challenges of Mathematics education in the 21st century were highlighted to include: incorporating new developments in Science and Technology into Mathematics, Acceleration of programs for the continued professional development of teachers; and Need for Mathematics educators to find new assessment instruments that reflect the new expectation of mathematics education.

They also stated that, to learn the essential mathematics needed for the 21st century, students need a non-threatening environment in which they are encouraged to ask questions and take risks. The learning climate should incorporate high expectations for all students, regardless of sex, race, handicapping condition, or socioeconomic status. Students need to explore mathematics using manipulative, measuring devices, models calculators and computers. They need to have opportunities to talk to each other about Mathematics. Students need modes of instruction that are suitable for the increased emphasis on problem solving, applications and higher order thinking skills. For example, cooperative learning allows students to work together in problem-solving situations to pose questions, analyze situations, try alternative strategies and check for reasonableness of results.

This paper measures the various challenges that confront the learning and teaching of mathematics in educational development in Second cycle institutions in Ghana. The paper measures the challenges by administration of questionnaires and interviews as well as focus groups discussions on a randomly sampled population made up of students and teachers relating to the various obstacles encountered by teachers and students.

2 METHODOLOGY

If the population size is around 1,500 samples size should be 20%, and if it is above a certain population size (approx $N > 5000$) a sample size of about 400 is adequate, Leedy and Ormond (2005).

The population is 1800 which is less than 5000 and thus 20% of the 1800 which is 400 of the population were considered as the suitable samples size and were used for the study. The researchers administered 400 total questionnaires, interviews and focus groups discussions, of which (360) respondents made up of one hundred (100) teachers and two hundred and sixty (260) students respondent to them giving a response rate of 90%. Stratified sampling method was used to group the school population into two (2) main categories: teaching staff, and student. Random sampling was then used to select 360 respondents for data collection. Stratified sampling technique was adopted as it embraced the distinct categories and organized them into separate strata. This technique was more efficient because it improves accuracy of estimates.

Purposive sampling was also used as a technique in data gathering. A study started with a survey, and then finally, purposive sampling was done based on the survey of the population of students and teachers.

The data (primary/secondary sources) collections were done with data collection instruments such as questionnaire, interview and focus group discussions, and the collected data was analyzed using Statistical software called general statistical package (GENSTAT), and the results interpreted and discussed.

3 RESULTS

The analyses of the data collected from survey in order to find out from teacher respondents what problem(s) they faced with in the teaching of mathematics in schools are shown below in Table 1.

Table 1 Challenges in teaching and learning of mathematics

PROBLEMS IN TEACHING AND LEARNING OF MATHEMATICS	FREQUENCY	PERCENTAGE
LACK OF TEACHING /LEARNING MATERIALS	80	22.22
INCONSISTENT SYLLABUS BY GHANA EDUCATION SERVICE (GES)	60	16.67
UNSERIOUSNESS ON THE PART OF STUDENTS	50	13.89
POOR ATTITUDE TOWARDS MATHEMATICS BY STUDENTS	70	19.44
POOR SUPERVISION	40	11.11
POOR TEACHING ENVIRONMENT	60	16.67
TOTAL	360	100

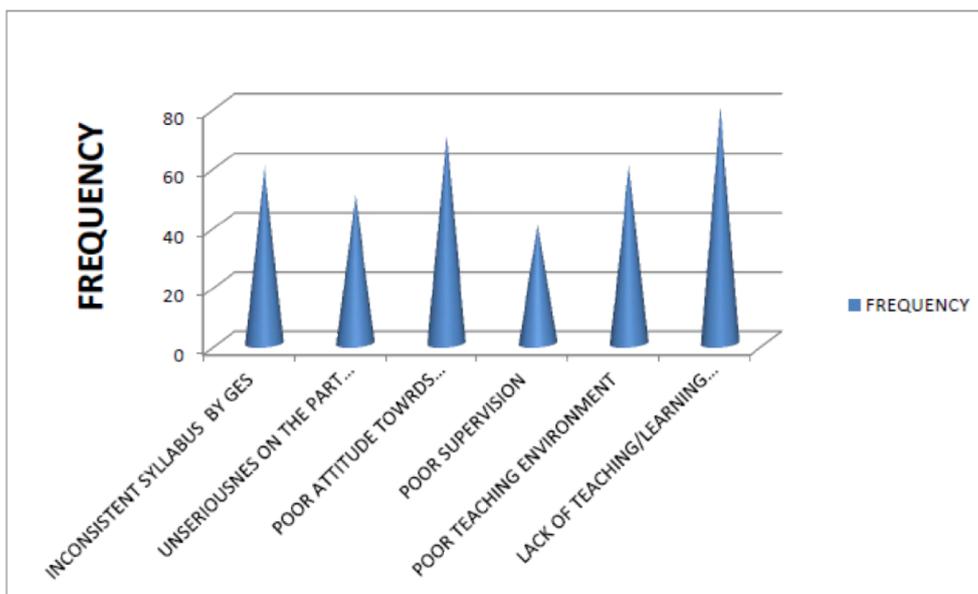


Figure 3 Problems with the teaching and learning of mathematics

From Table 1, it is clear that all 360 respondents showed that they face problems with the teaching and learning of Mathematics in their various schools. Some of the respondents showed that 80(22.22%) of schools lack of teaching /learning materials, 60(16.67%) of the respondents indicated that because of inconsistent syllabus by Ghana education service (GES).when it was 4 years the syllabus was different and when it came back to 3 years too ,the syllabus was also different. 50(13.89%) of them indicated that most students are not serious about the subject in their various schools, while poor supervision, poor attitude towards mathematics by students, and poor teaching environment provided by their various school all sum up to a percentage of 47.22 .

Table 2 challenges in teaching and learning of mathematics

CHALLENGES IN TEACHING AND LEARNING OF MATHEMATICS	FREQUENCY	PERCENTAGE
LACK OF GOOD LEARNING MATERIALS	40	11.11
USE OF ABSTRACT CONCEPTS IN TEACHING	45	12.50
FEAR FOR THE SUBJECT	60	16.67
POOR ATTITUDE TOWARDS TEACHING BY TEACHERS	20	5.56
INCOMPETENT TEACHERS	25	6.94
THREATING ENVIRONMENT	40	11.11
LIMITED MATHEMATICS PERIODS	45	12.50
LAZINESS ON THE PART OF TEACHERS	30	8.33
BAD TEACHING METHODS	55	15.28
TOTAL	360	100

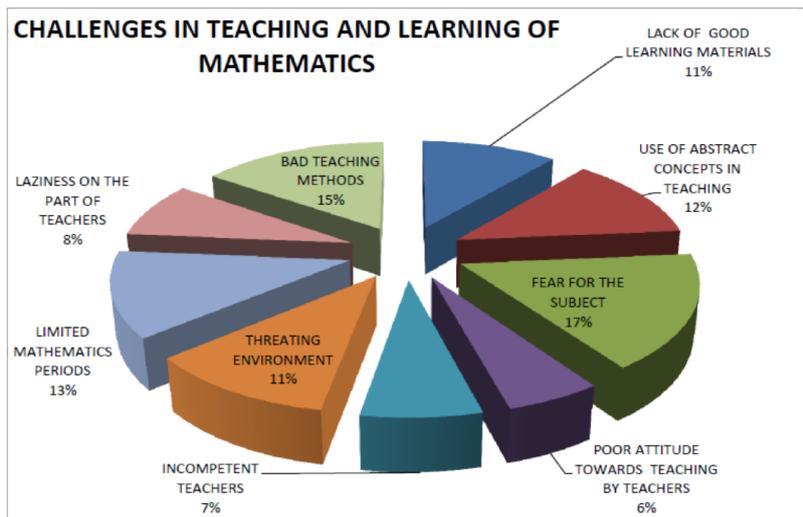


Figure 4 Challenges with the teaching and learning of mathematics

The analysis of the factors reveals some of the challenges that respondents are faced with, teaching and learning of mathematics in educational development in schools. This result is shown in Table 2 and Figure 4.

The Majority of the respondents 60 (16.67%) said that most students have fear for the subject mathematics. Others also had other challenges which have been captured in table 2 and figure 4

4 DISCUSSION

The research seeks to find out the problems with the teaching and learning of mathematics in various second cycle institutions in the Kumasi Metropolis. After the research, it came out that , some of the problems are; lack of teaching and learning materials representing 22.22% according to the data gathered from the respondents ,from the respondents another problem was inconsistent syllabus by Ghana Education Service with a percentage of 16.67%, poor attitude towards the study of mathematics by students also had a percentage of 19.44% ,lack of competent Teachers in the Metropolis was also a major problem with percentage of 6.94 , another problem meet by the study is the limited mathematics periods during schools hours in the Metropolis, the data gathered shows that majority of students has fear for the subject as it has a whopping percentage of 16.67% and one of the other challenges confronting the teaching and learning of mathematics in the Metropolis was bad teaching methods used by teachers. Per the analysis of the data gathered from the respondents, it shows that at least there is a problem or challenge hindering the teaching and learning of mathematics in almost all the second cycle institutions used for the study.

5 CONCLUSIONS

In conclusion, the problems and challenges confronting the teaching and learning of mathematics by various second cycle institutions in the Metropolis drawn from the analysis are that most institutions lack competent teachers, some also lack good teaching and learning materials and on the part of the students most of them has poor attitude towards the study of mathematics and they also have fear for the subject as they say mathematics is too abstract. Also poor supervision by Educational heads and bad teaching methods used by teachers in the Metropolis are some of the few challenges confronting the Metropolis.

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