

Key science for the future

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Mathematics is a compulsory subject at all levels in pre-university education in Ghana. Due to its importance, the government is committed to ensuring the provision of high quality mathematics education. In spite of government efforts to better achievement of mathematics performance, mathematics has not undergone much change that successive governments seek to achieve in terms of students performance.

This manifests contentiously in low achievement levels in mathematics among students at the West African Senior School Certificate Examinations (WASSCE) recently. Student's achievement of mathematics in WASSCE serves as the gateway for senior high school graduates to get admission into tertiary institutions in Ghana.

Without taking the WAEC certification examinations it will be very difficult for one to be able to progress into any tertiary institution in Ghana. The West African Examination Council (WAEC) Chief Examiner's Report for the last five years shows that Ghanaian SHS students have been performing abysmally in mathematics. (Source Ghana News Agency Sunday, 19 February 2017).

Statistics from WASSCE results in 2015, 2016, 2017 and 2018 results points to the fact that students performances especially in the core mathematics were not encouraging. The statistics indicates that 25. 29 % obtained (A1-C6) in 2015, (32. 83%) obtained A1-C6 in 2016, (42. 73%) obtained A1-C6 in 2017 and (38. 33%) obtained A1-C6 in 2018. The grades A1-C6 serve as the basis that many tertiary institutions consider for admission.

Since many tertiary institutions today do not accept D7 for admission, is a clear indication that majority of students were not be able to progress to the

next stage of their academic ladder without having to rewrite to better the grade. It has been a headache to stakeholders and policymakers in the educational sector tracing the causes of these poor performances. It even becomes more difficult to attempt putting the blame on either teachers or students or parents. But it is obvious that the blame be shared among the three when subjected to critical thinking.

Background of the Study

Students' academic performance is affected by several factors. Reddy et al. (2012), is of the view that some of the factors that are likely to affect students' performance in academics are social which include the variables: prevailing school climate, teacher qualifications, classroom resources, learners' home environment and learner attitudes. The study continues to suggest that social vices such as violence, misconduct and all forms of abuse have the potential of impacting negatively on academic performance of students. This suggests that mathematics learning can also be enhanced giving the prevailing climate that exists both in the schools and society at large.

The availability of academic resources appears to play a vital role in student performance. The World Bank (2000) report on higher education attributes the many problems facing universities and students in developing countries to lack of resources due primarily to insufficient financial funding.

The ability of students to monitor, evaluate and make appropriate plans for their learning improves upon their performance. According to Kitsantas (2002) and Zimmerman (2008), Winsler, and Huie (2008) academic self-

regulation is displayed by students who are independent, self-initiated learners with the ability to use a variety of learning strategies, such as organizing, transforming, note taking, to accomplish specific learning goals. Farooq and Shah (2008), in their study found out that learners' success in mathematics depends on their attitudes towards the subject. Learners themselves may lack self-confidence in handling mathematics and such an attitude is likely to affect their achievement in mathematics.

There are many theories of learning that have been proposed and developed by educationists and psychologists, and all of them aim at finding the best approach to the teaching and learning of school mathematics and other subjects.

The constructivist teaching and learning theory is one of the many theories that seek to address the question of learner performance. A constructivist teacher offers his or her students options and choices in their work. Rejecting the common practice of telling students what to do, he or she engages their trust and invites them to participate in a constructivist process that allows them to be involved in decisions about their learning. Students actively involved in their own learning is a vital reality in a constructivist classroom.

Theoretical Framework

The constructivist approach is a popular mathematics teaching method that enhances better understanding. According to this theory knowledge is not transferred from, for instance the educator to the learner, rather knowledge is constructed by the learner himself or herself. The educator functions as a facilitator to the entire students. He or she prompts, coaches and mediates,

in order to allow learners develop and assess their understanding and learning.

Twomey Fosnot (1989) defines constructivism by reference to four principles: learning, in an important way, depends on what we already know; new ideas occur as we adapt and change our old ideas; learning involves inventing ideas rather than mechanically accumulating facts; meaningful learning occurs through rethinking old ideas and coming to new conclusions about new ideas which conflict with our old ideas.

A productive, constructivist classroom, then, consists of learner-centered, active instruction. In such a classroom, the teacher provides students with experiences that allow them to hypothesize, predict, manipulate objects, pose questions, research, investigate, imagine, and invent. The teacher's role is to facilitate this process.

According to Midelton and Geopfert (1996), no two people have the same interpretations of same things because of their different backgrounds and experiences.

The teaching for understanding was derived from Jean Piaget's theory of socio-moral and cognitive development (Blythe, 1994). Freire (1998) indicated that learner centered education should be built on reflective teaching and understanding in order to facilitate learners making connections between classroom activities and real life situations.

Constructivist strategies of teaching focuses on active learning, a method of teaching that places the learner, instead of the teacher or the curriculum, as the centre of the learning process (Woolfolk 2010, Alemu 2010).

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According to Gates (2001: 126) the educator serves as a guide and a teaching aid. He or she would scaffold the learner through various aspects learning and the learner must construct meaning for himself or herself.

Brooks and Brooks (1993) also indicated that the teacher's role in constructivist teaching and learning strategies is that of a mediator rather than the transmitter.

Teachers' role as facilitator of students learning is to assist them construct their own meaning and understanding by creating conducive learning environment. Teachers continually encourage positive relationship among students and serve as a role models as reflective practitioner of teaching learning process.

To carry out effective constructive teaching of mathematics, Canfrey (Souviney, 1994: 37) suggested the following:

- Promote intellectual autonomy and commitment in students. Ensure that students views are respected.
- Develop students' reflective processes by using learning logs.
- The educator should use portfolios or informalobservationlogs in order to develop a case history on the learner.
- The different ways to solve problems should be discussed with learners.
- After learners have arrived at solutions, revisit their solution path by discussing the various solution to find similarities and differences in the way learners have answered.

- Make a deliberate effort to prevent outside interruptions and ensure that learners stay focused on the lesson.

Kinchloe ; Steinberger (1993) found out from their research that the vital role the educator plays in teaching for understanding is stimulating student learning. This study points out to the fact that for learners to be able to complete given tasks on their own, they should be given the opportunity to develop new knowledge through a process of active construction.

In order to go beyond rote memorisation and achieve true understanding, students need to develop and integrate a network of associations linking new knowledge pre-existing experience deeply rooted in concrete experience. It was against this background that this study was carried out.

The research is therefore seek to find out challenges that hinder effective teaching of mathematics for understanding in senior high schools in Ghana.

Statements of the Study

Mathematics is a key science for the future, through both its fundamental development and its enabling role for science, engineering and technology. This is illustrated by dramatic advances in communications, bioinformatics, the understanding of uncertainty and dealing with large data sets" (Lemaire, 2003, p. 21). This perspective on Mathematics has gained more attention with the rapid advances of information and communication. Mathematics is not just calculation but a tool for understanding structures, relationships and patterns to produce solutions for complex real life situations. Mathematics is an essential for people at all levels to be successful in life.

It reveals some patterns that have been hid and therefore enable us to understand the world around us. Mathematical modes of thought builds mathematical power, a capacity of mind of increasing value of this technological age that enables one to read critically, to identify fallacies, to detect bias, to assess risk, and to suggest alternatives. Having a solid background in mathematics helps students develop sophisticated perspectives and offers morecareeroptions. The importance of mathematical learning has repeatedly been emphasized by educators and politicians (Wilkins ; Ma, 2002).

Despite the wide applicability and importance of Mathematics, SHS students in Ghana consistently perform poorly in the subject, which makes the country lose economic advantage over other countries, because its students lag behind their counterparts in mathematics. Hence, mathematics achievement has been a great concern for policymakers, educators, teachers, researchers, parents and students as well. But, the desired level of mathematics achievement seems to require a dynamic interplay between individual factors, instructional factors, classroom management as well as evaluation factors.