

Challenges and Prospects of Research Outcomes for Mathematics Classroom Delivery.

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Abstract

This paper centers on the challenges and prospects of research outcomes in mathematics classroom delivery. It was analyzed in the context of mathematics research outcomes and the impact the outcome has on the teacher, learner, content, learning experience and environmental factors in relation to the delivery in the classroom. Challenges range from the ill-preparedness, lack of exposure on the part of the teachers, learners with low commitment and determination level, continuous variation in the content within a short time, an environment that is far from conducive with archaic and outdated instructional materials. The prospects were also itemized to meet the challenges, such that if taken into consideration will contribute to enhancing classroom delivery thereby motivating the teachers and learners alike, creating a cozy environment for effective studying, research and making findings available and accessible.

Introduction

Over the years, the continuous struggles for success have constantly propelled mankind towards inquiring of the past, present and predict the future. This sojourn by mankind has culminated in an endless circle of studies geared towards an improvement in knowledge through its identification, collection, analyses and application.

One of the major areas where this drive for knowledge has been seen is in the study of mathematics. Its search ranges from identification of its branches, understanding its content, its level of applicability and how the subject matter can be transferred to others. In the light of these, mathematicians, mathematics educationist, curriculum experts and other scholars whose works overlap with the findings of mathematics have to work collaboratively and assiduously.

Mathematics is a science of quantity and space. It is the combination of related topics like arithmetic, algebra, geometry, trigonometry and statistics. It can also be regarded as the queen of all sciences and a gateway to technological improvement. It is everywhere in nature, whether in simple things like the activities within the house or complex ones like that found in nuclear experiments and spoken directly or indirectly by all. It offers a vista of boundless opportunities for national and global development, no wonder in Nigeria it is an integral part of the goals as set out in the national policy of education and the curriculum. (Odili, 2006; FME, 2004)

The classroom is any physical building or environment where there is an interaction between the teacher, the learner, the content of the lesson and the methodology adopted whether in virtual or real time. It is an environment that enhances the passage of information between the teacher and the learner through ingenious activities that boost the learner's comprehension, creativity, and adaptability thereby helping the pupils to act right irrespective of the circumstances. For this interaction to be effective, the environment has to be conducive in terms of lightening, space, availability of the right teaching aids, access to technology, and a teacher with the right degree, expertise and attitude.

Mathematics Researches Outcome

Researchers are very keen for continuous improvement in all aspects of human endeavor. According to Creswell (2008) research is the process of steps used in the collection and analysis of information in a bid to increase our understanding of issues and topics, it can also be seen as a diligent inquiry or examination to seek, identify or revise facts, principles, theories, and applications or can be described as the laborious and continuous search for the truth or the systematic investigation into the study of materials and sources in order to establish facts to reach new conclusions. It is also seen as a careful study that is done to find and report new knowledge about something (Hornby, 2010). In the light of these definitions, before one can embark on any form of research the objectives has to be clearly stated as this will serve as the guide in the course of the work and a reference point at the end. For any search to be meaningful it must be seen first as an issue requiring consideration, with relevant data for analyses, and relevant to the society at large.

Studies can be empirical, descriptive, developmental, public opinion, correlation, historical, comparative survey designs, needs assessment and experimental research. The path a research takes is a function of the objectives as conceived by the researcher, the subject matter under consideration and the available materials for analysis. It can include the following or a combination of stages such as: identification of the research problem, review of related literature on the subject matter, purpose of research, specific research questions serving as guides in course of the research, specification of conceptual framework, hypotheses, methodology of administration and collection of data, analyzing and interpreting the data, reporting and evaluating research.

Mathematics research According to Lowell and Levasseur (2015) is the long-term and open-ended exploration of a set of related mathematics questions whose answers connect to and build upon each other. In mathematics research, the focus is on the different aspects of mathematics, its analysis

from the perspective of arts, science, education, or other areas where its relevance is found. The term outcome is the result of processing of information, event, object or the state of it being produced as a result or consequence of a plan, process, accident, effort or other similar action (Hornby, 2010). Mathematics research outcomes, therefore, represent the products gotten a deliberate and purposeful search for new knowledge in any of the aspects of mathematics with a view to solving problems either present or envisaged. Within the classroom, the interplay that occurs between the teacher, environment, pupils and subject matter is of great importance as such requires analysis.

Mathematics Classroom Delivery

The classroom is a meeting point between the teacher, learner, subject matter, the learning experience, and the environment. Conventionally, the classroom is a room in a building or any place of learning that is tailored to meet the needs of the learner and what is to be taught. With the advancement in technology, the classroom has grown beyond just a building but takes the shape of the learner and the subject matter under consideration. Therefore, it is considered to be real or virtual.

A real or traditional classroom is a face to face setting with a teacher teaching a class with educational aids to enhance comprehension while the students listen, write notes, and ask questions. There are personal interactions between the teacher and learner or learners, which eventually leads to transformation and improvement on the part of the teacher and learner. A virtual classroom is an online classroom that allows participants to communicate with one another, view presentations or videos, interact with other participants, and engage with resources in work groups (Bunn, Fischer & Marsh, 2014; Justin, 2013).

A mathematics classroom is a classroom that provides practical experience in mathematical skills and serves as a bridge to the real world of jobs and responsibilities as an adult. It is an environment that goes beyond memorization into a world of reasoning and problem solving. The mathematics classroom is a forum that provides interplay between the mathematics teacher, the learner, the content which hinges on mathematics and the learning experience includes all that is done to facilitate understanding by the learner.

The mathematics teacher/educators is a crucial element in the curriculum delivery because the teacher is at the nucleus of curriculum implementation, as such no matter how fantastic and well planned a curriculum is, it is useless if it is not implemented properly (Ogunkunle, 2006). The teacher can only perform excellently well if there is a strong desire for knowledge and a drive towards helping the learner to comprehend faster, as such serves as the link for the learners between the known and the unknown. For this to be achieved the teacher in the real classroom does not just stand at a position, but goes round in the class in order to keep everyone in check, In the virtual classroom, through the use of prompts students are helped to focus on the lesson. The teacher here serves as a facilitator, guiding the students to achieve the desired objectives at every point in time. The teacher is an individual that strives to provide a forum for collaboration of mathematics

education at varying levels of professional experience with the goal of exchanging ideas locally, nationally and internationally (Chado & Bala, 2014).

The learner is someone (especially a child in the context of the classroom) who learns (as from a teacher) or takes up knowledge or belief. Through the interaction of the learner with others and independently, they are able to see the relationship between what is taught in mathematics and how it is applied to real-life problems. Recall that learning is a process of knowledge acquisition and modification of behaviors, skills, values, or preferences and the synthesis of different of information. With these in mind, learning is thus considered to be a process.

The objectives of the new mathematics curriculum guide the teacher in his formulation of the content objectives. These include;

- Acquire mathematical literacy necessary to function in an information age,
- Cultivate the understanding and application of mathematics skills and concepts necessary to thrive in the ever-changing technological world,
- Develop the essential elements of problem solving, communication, reasoning and connection within their study of mathematics
- Understand the major ideas of mathematics bearing in mind that the world has changed and is still changing, hence, the need to make the curriculum more responsive to the survival and developmental needs of the Nigerian child.(FME,2004)

With these in mind, the content and learning experience has to be so tailored such that the students grow beyond the confines of the classroom, to the society at large. The learning experience encompasses the delivery process and refers to the strategies adopted in passing the content over to the learners. For the delivery to be achieved, the teacher is at liberty to use one or a combination of methods ranging from co-operative learning, exposition, guided discovery, games, laboratory approach, simulations, problem-solving, investigations (math teaching methods, 2015). The effort of researchers in mathematics has led to a lot of findings; let's consider some findings that have resulted from the painstaking efforts of mathematics researchers.

Mathematics Research Findings

At this point, let's consider some aspects of studies that borders on mathematics and especially in the transference of the subject matter in relation to content, educator, learner and the methodology and other physiological dynamics. James, Taiwo, & Ahmed (2015) in a bid to check areas of difficulties in mathematics encountered by students discovered that the ratio of teacher to student was very large, besides the fact that it was filled with unqualified and under-qualified persons. This anomaly makes it difficult for adequate attention to be paid to students individually besides the fact that the students already are negatively biased.

In checking the relationship of mathematics to other fields, Gimba, Hassan, Abdulrahman, & Bashir (2015) shows that a knowledge in mathematics in important and will make students excel better in

entrepreneurship courses like carpentry, welding, tailoring, soap and detergent making. Its applicability can also be seen in art and science courses, thus enabling forecasting and trend analysis, accuracy and precision in measurement, estimation, and approximation and in the long run solve issues of poverty, job creation and eventually lead to economic prosperity (Akissani & Muntari, 2015) . it is also observed that the use of technology can help students and teachers alike in developing competence in any subject area, this is observed as technology can serve as a servant, partners and a master.

The effect of learning trajectories which is based on the fact that new knowledge will further develop what has been taught when analyzed as a consequence on mathematics to both high and low-level learners benefited when exposed to this form of instruction and it is better than the conventional teaching method (Amadi & Charles-Ogan, 2015). In addition to the methodology, is the need for the utilizations of instructional manipulative which is rooted in the works of Jean Piaget cognitive development theory as a way to get learners captivated and involved in the learning process (Iji, Abakpa & Takor, 2015).

Challenges of research outcomes for mathematics classroom delivery

Though laudable, the aspect of findings in mathematics content delivery here championed which are just but a few is not without its obvious challenges. Below are some of these challenges as it affects the teacher, the learner, the learning experience, researched materials and government policies:

- **The Mathematics Teacher:** Owing to the regular interface with the learner, the mathematics teacher is at the heart of the learning experience, thus is the greatest asset. The teacher - student ratio which is supposed to be in the ratio of 1:35 is not being adhered to as found in the policy document. As a result of this, the teacher is unable to give qualitative and individualized attention to the learners, thereby making it difficult to systematically identify the areas of strength and weaknesses (FME, 2004, Ogunkunle, 2006). Another challenge is that of inadequacy on the part of the teachers, who are either being ill-qualified or under qualified because they lack the needed experience and exposure to handle the subject matter. This is manifested in their inability to use manipulative such as mathematical games and other packages in the information and communication technology (ICT), this, therefore, makes the class boring and teacher centered (Odogwu & Mbah, 2015, Ekpo, 2015). These challenges also contribute to the qualified being demotivated.
- **The Learner** is the direct recipient of the information passed on by the teacher. In some cases, the learner is yet to be psychologically ready to grasp the essence of the content. There is also the lack of seriousness that is occasioned by the mad rush for materialism in the society which reduces the determination among learners to rise beyond their comfort zone. Learning difficulties among learners like computational weaknesses, difficulty in transferring knowledge, making connections, and incomplete understanding of mathematical terminologies are some of the things most learners have to grapple with. In the long run, the

results of these learners are not good enough especially when they have to face external examinations (Akinoso, 2014; Ekwueme, 2013).

- **The Learning Experience:** these include the methodologies adopted by the teacher /educator in the course of knowledge transfer. This is the direct point of overlap between the learner and the teacher and vice versa, as such if not properly managed can lead to information stillbirth. For this session to be effective, the environment has to be conducive for information transfer, this currently is a challenge because of the over population of classrooms, the pattern of instruction by the teacher which may not be effective considering the classroom setting. When the content of the lesson is not clearly understood and the methodology adopted is not suitable in view of the context, it, therefore, leads to conflict in the mind of the learners. These in effects affect classroom delivery, and the understanding of the mathematical concepts leading to low retention level (Anyor & Iji, 2014; Justin, 2013).
- **Availability of Researched Materials / Infrastructures:** the inability for mathematics researchers to have available the latest findings in the field of mathematics in it poses a challenge. Owing to this many researchers are still using obsolete information which eventually leads to underachievement among their learners. As observed by Ekpo (2015), additional challenges are inadequate access to funds, a laboratory for mathematical experimentations, libraries without latest materials, and the absence of linkage systems to another mathematical centre within and around the world. (Ogunkunle, & Mbelede,2008).
- **Government Policies:** policies guide the framework of how things happen, therefore when there is summersault due to inconsistencies it becomes a challenge for the objectives of such a policy to be met. Most times also those at the helm of affairs in the educational sector are in most cases not aware of what education entails, which thus affects the level of researches done in the field. Another aspect is the fact that the implementers or formulators are ill qualified to man such ministries, parastatals, government agencies and non-governmental organizations (NGO). They have no idea what the policy document on education entails and how these can be interpreted for optimal good. Most policy makers are change resistant and this in itself poses a major challenge to the subject matter (Ozuzu, 2000; Ekwueme, 2013; Abayomi, 2012; John Templeton Foundation , 2009).

Prospects of Research Outcome for Mathematics Classroom Delivery

Irrespective of the aforementioned challenges that bedevil research outcome deliveries in Nigeria, the future is not bleak as the opportunities, on the other hand, are boundless. Mathematics is the language of science, therefore for Nigeria to attain its much talked about vision 20:20, and become a hub in science and technology then mathematics research outcome is keen as is helps the teacher, learner and the society at large. Here are some of the prospects for research outcome in relation to classroom delivery;

- ✓ In-depth studies are hard to come by most times, and when done are not available for the public to consume. It is thus imperative for a reward to be given for painstaking research works and making them for the general mathematical public and others alike.

- ✓ The learning environment is a major determinant in students understanding of concepts, Therefore the environment should be stimulating to the teaching-learning process and this can be accomplished through the availability of state of the art teaching and research facilities.
- ✓ The world of mathematics should be made lucrative, so as to encourage more to participants and therefore reduce the present teacher-student ratio that is a far cry from that which is expected.
- ✓ Enhance student inclusion of information and communication technology to enhance learning through interaction with different medias.
- ✓ Build blocks of collaboration with other practitioners within and outside the country.
- ✓ Increase government and private sector funding.
- ✓ Put square pegs in square holes, in terms of those at the helm of affairs in government educational parastatals.
- ✓ Creating a research database, where areas already worked upon can be identified to avoid repetition.

Conclusion

This paper has looked at the mathematics education studies in relation to how it impacts on classroom delivery. The challenges confronted by the teacher, the learner, the subject matter mathematics, the process of it being taught and its acquisition within the classroom and on mathematical studies. If we want long-term results in the field of mathematics and especially as it relates to its success in external examinations, then how the subject is taught will be of utmost concern to we all through the adoption of current teaching techniques and aids to help in concretizing learning. If the enabling environment is created, mathematics education researchers will do better, in addition to motivation through rewards for hard work and application of the research findings. If these are put into consideration it will be easy for Nigeria to develop rapidly to enviable heights.

Recommendations

The following recommendations were made

- ❖ A state of emergency should be declared by the federal government on the study of mathematics irrespective of the area of specialty.
- ❖ Mathematics education studies should be implemented to enhance growth in the field
- ❖ Mathematics educators should be encouraged to attend conferences and workshop and this will help them know the latest trends and how these can be applied.
- ❖ Only those with the right educational qualification should be allowed to head ministries and other agencies linked to education.
- ❖ The environment of learning should be made conducive with latest information and communication tools to boost research.

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