The Role of Communication in the Effective Teaching and Learning of Mathematics for Rebranding Citizens

Ihenyen Augustine Okhademevbie
Department of Basic Sciences,
Auchi Polytechnic, Auchi
(07055448998)
ihenyenaugustine998@gmail.com

Zibril Abdulkadri Felix
Department of Basic Sciences,
Auchi Polytechnic, Auchi
(08037043107)
zibikadri@gmail.com

Abstract

This paper examined the role of communication in the effective teaching and learning of mathematics for citizen rebranding for national development and growth. The mathematics teaching and learning was seen as an interaction between the teacher and the learners to acquire desirable mathematical knowledge, ideas and skills necessary for applicability in an everyday life. This paper therefore examined the concept of communication in teaching and learning, effective teaching and learning of mathematics through effective communication, developing effective mathematics communication, mathematic as a tool for everyday living and challenges of mathematics education. At the end recommendation were made, to foster effective mathematic teaching for rebranding citizens. The teachers should apply the gallery walk methods to arose students interests and to improve mathematics communication and government are to employ qualified mathematics teachers.

Keywords: Communication, Effective Teaching and Rebranding Citizens

Introduction

Education is the total process of human learning by which knowledge is impacted, faculties trained and skills developed. Education is seen as the total development of the individual child through acceptable methods and techniques according to his abilities and interests to meet up the needs of the society and for individual to take his rightful place and contribute equally towards the enhancement of the society (Amaele, 2011). Education contributes to the growth of national income and individual earnings. Education is considered as the key instrument for social reformation, transformation and instrument for actualizing national value, peace and security in any nation.

Odili, (2001) defined mathematics as a body of knowledge, a collection of techniques and methods, the product of human activity for solving problem. Teaching as defined by Muok, (2010) is an activity which enables people or learners to learn and acquire the desirable knowledge, skills and disposition necessary for becoming functional members of the society. David (2007) viewed teaching as a series of interaction between the teacher and the learners with the explicit goal of changing one or more of the learners cognitive or affective states. Therefore, mathematics teaching is seen as the interaction(communication) between the teacher and the learner to acquire the described mathematical knowledge, skill, ideas necessary for becoming functional members of the society.

When this is aligned with the proposition outlined by the National Council of Teacher of Mathematics (NCTM, 1995), cited in Amaele (2011), it will enhance effective

communication for teaching and learning of mathematics in secondary schools. These propositions include;

1. Students should experience mathematics as active, engaging and dynamic
2. Students should learn to view mathematics as human discipline to which people of many backgrounds have contributed
3. Class room activities should be organized to build on students' previous experience. Students tends to remember more ideas and information acquired through experience.
4. Mathematics instruction should at all times make appropriate use of technology, especially calculators and computers
5. Applications that motivate theory enable students to recognize that theory contribute to their understanding of mathematics.
6. Mathematics instruction should make extensive use of writing assignment, open end project and corporative learning groups
7. Mathematics instructions should acquaint students with the history of mathematics and its numerous connections to other disciplines
8. Teachers should use variety of teaching strategies and should employ a broad range of examples.
9. Students should be given the opportunity to participate in mathematics discourse to build their confidence about knowing and using mathematics. This can be achieved through active participation in students' mathematical clubs and societies.
10. Students should be encouraged to pursue independent exploration in mathematics.

Obasi and Erondu (2003) view effective communication in teaching and learning as the process that help a learner to easily acquires knowledge, facts, skills, experiences, abilities and attitudes necessary for an active and useful life in society.

It is on this background that this paper examines the concept of communication in teaching and learning, effective teaching and learning of mathematics through effective communication, developing effective mathematics communication, mathematic as a tool for everyday living and challenges of mathematics education. At the end recommendation were made, to foster effective mathematic teaching for rebranding citizens.

The Concept of Communication in Teaching and Learning

Effective communication is vital in education whether as an educator when teaching a student, colleague, parent, or vise-visa, effective communication is required to guarantee the success of the learners. Although it may seem that there is always communication between the learner and the educator, communication does not always occur occasionally, the absence of time, shortage of resources and lack of knowing how to exchange information, can lead to ineffective communication. Once communication amongst the teachers and students is effective, students' enthusiasm would grow and the teacher will be a major influence for the Child's learning. Effective communication helps people learn easier, strengthens the relationship between the teacher and the learner, and create a positive atmosphere in the learning environment.

Communication differs from culture to culture and so does teaching styles. A drastic difference can be seen, in eastern (Soviet Union, Caucasus), and western (North American) styles of teaching. It can be easily noticed that the important of communication is stressed more in western culture and not in eastern culture. Compared to eastern culture, students from western societies do not have as any difficulties expressing their thought or communicating with their teacher. Effective communication can help the level of learning grow in a significant manner since communication and education are interconnected. The standard philosophy in western classrooms is more student centered and gives importance to every form of communication, verbal, non-verbal. Teacher –student, student- student and more.

In classroom situation everywhere, teachers take a strong leadership role in motivating and ensuring the use of pedagogical grounded teaching practices that make sure all students feel involved. This provides new understandings and methods on effective communication in classrooms, concentrating on communication among the teacher and students. And this shows how communication can affect the student's level of enthusiasm for school leaning. Understanding the cultural aspects of effective communication helps understand which communication specifies and tactics students and which of these techniques benefit the student's level of enthusiasm. In our society today, so much silence tears are shared by students due to improper commutation and lack of proper methods and they cannot express themselves because of fear. So, the of communication and teacher's method remains vital in teaching and learning (Ndirangu, 2007).

Effective Teaching and Learning of Mathematics Through Effectives Communication

Communication has always been one of the main components of education. In order to achieve success in communication requires a rational space which guides and hold the meaning and significance of information and generate reciprocity within human relation. For effective teaching and learning of mathematics, good communication skills is needed on the part of the teacher and the learner, because of the importance of mathematics. Mathematics is quite rich in concepts which directly translate to proper life skills. The importance of mathematics to everyday living cannot be over emphasized. To aid the effective communication in mathematics teaching, the mathematics curriculum in Nigerian secondary school must be developed and structured around four major concepts and maturation and everyday statistics (Kolawele & Ohiwatoiyo, 2004). These concepts have direct bearing on people's way of life. Taking the concept of commercial arithmetic under number and numeration for instance several life skills that can be taught ranges from how to prepare 'ready reckoners' for some groceries at shops, how to budget wisely and be able to live within one's means ,it helps to describe the population of a country, a state , a local government area, a town or a family.

Mathematics teaching therefore, can be seen as the interaction between the teacher and the learner to acquire the described mathematical knowledge, skills, ideas necessary for becoming functional members of the society. Kolawale and Oluwatayo (2004) states that communication requires greater attentions in teaching and learning of mathematics especially in written and oral communication during mathematics teaching. He further states that students at all levels consolidate their mathematical thinking through communication; communicating their mathematical thought coherently and clearly to peers, teachers and others: analyze and evaluate the mathematical thinking and strategies of others, and use mathematical language to express mathematical ideas appropriately. Communication is an integral part of the classroom and school processes and the quality of communication affect quality of teaching and learning of mathematics (Ontario, 2015). Ontario ministry of education (2005\) states that there are three categories of mathematical communication.

1. Expression and organization of ideas and mathematical thinking (e.g. clarity of expression logical organization) using oral, visual and written forms (e.g. pictorial, graphic, dynamic, numeric, algebraic forms, can create materials)
2. Communication for different audiences (e.g. peers, teachers) and purposes (e.g. to present data, justify a solution, express mathematical argument in oral, visual and written form)
3. Use of conventions, vocabulary and terminology of the discipline (e.g. terms, symbols) in oral, visual and written form.

Developing Effective Mathematical communication

Effective mathematical communication can be developed in the following ways:

1. **Use of the underlying teaching characteristics**: The development of student mathematical communication shifts in precision and sophistication throughout the primary and junior intermediate levels yet the underlying characteristics remain applicable across all level. During whole class discussion, teachers can use these characteristics as a guide both for interpreting and accessing students' presentations of their mathematical thinking and communication and for determining discussion points.

The characteristics, listed below, are relevant across levels when teaching mathematics.

- Precision about problem detail, relevant choice of method or strategy to solve the problem, accurate calculations
- Assumptions and generalizations that show how the details of the mathematical task / problem are addressed in the solution
- Clarity in terms of logical organization for the reader's ease of comprehension, requiring little or no reader inference
- A cohesive argument that consists of an interplay or explanations, diagrams, graphs, tables and mathematical examples
- Elaboration that explains and justify mathematical ideas and strategies with sufficient and significant mathematical detail.
- Appropriate and accurate use of mathematical terminology, symbolic notation and standard forms of labeling graphs and diagrams

2. **Updating the three-parts-problem solving lesson:** The three approaches for coordinating students' discussion and analysis of solutions are illustrated within the frame work of the three-parts-problem solving lesson.
    - Before getting started. Revisiting mathematical ideas and strategies from a previous lesson that relates to the learning goal of the lesson
    - During – teaching /learning. Solving the lesson problems in pairs, small groups are individually
    - After-
        a. Consolidation continuation of whole – class discussion and analysis of student solutions
        b. Highlight/summary - recounting key mathematical ideas and strategies related to the learning goal of the lesson.
        c. Practice- solving the problem that is simulation of the lesson problem in order to practice applying new ideas and strategies
3. **Use of gallery walk:** Gallery work is an interactive discussion technique that gets students out of the chairs and into a mode of focused and active engagement with other students' mathematics ideas (Fosnot & Dolk, 2002). The purpose of the gallery work is to have students and teachers mathematically engage with a range of solutions through analysis and response. It is after carried out after students have generated solutions to a mathematics lesson problem. Solutions could be recorded on computers, piece of paper on tables or posted chart paper. A gallery work is often deluded for about 10- 20 minutes depending on the instrumental purpose and depth of mathematical analysis expected.

For student, gallery walk is a chance to read different solution and provide oral and written feedback to improve the clarity and precision of a solution. On the other hand, for teachers, it is a chance to determine the range of mathematics evident in the

different solutions and to hear student's responses to their classmate's mathematical thinking. Such assessment for learning data helps the teachers to determine points of reference, elaborate and clarification for the ensuring whole class discussion (Fosnot & Dolk, 2002). Although there is different variation of a gallery walk, common approach is outline below:

a. Small – group problem solving students in small groups developed one solution to the lesson problem on chart paper
b. Small –group discussion – small group take turns reading and analyzing one another's solution and recording comments, questions and / or suggestion for improvement ,,,,, uses stick on notes (for letter sorting) or writing directly on the chart paper. After three to five minutes, the groups relate to the next solution. The rotation continues until all solutions are analyze and responded to by all groups. As comment accumulate for each solution, the groups also review what previous groups have written and not only new comments questions and or suggestions for improvement
c. Teacher observation as student are discussing their classmates' solution, the teachers circulate around the class room, gauging student understanding and noting students use of mathematics and vocabulary and symbolic notation as well as their mismatched conceptions
d. Whole class discussion when the group returned their own solution, they synthesized the comments, questions and suggestions for improvement into oral report that will be presented to the whole class. Small group oral report provides specific details that the teachers can use to highlight and summaries key mathematical idea and strategies related to the lesson learning goal as well as including discussion about mathematical misconceptions and errors also, the group can apply their classmates' responses to receives their solution

Mathematics as a tool for Everyday Living

Mathematics is quite rich in concepts which directly translate to proper life skills, the importance of mathematics to everyday living cannot be over emphasized. The mathematics curriculum in Nigerian secondary schools is developed and structure around four major concepts, number and Numeration, Algebraic process, Geometry and Mensuration and everyday statistic (Kolawole & Oluwatayo, 2004). These concepts have direct bearing on people's way of life. The concept of time can be understood by the use of clock. The time to wake up is indicated by the use of the clock. It is the clock that indicates the time to wake up in the morning, prepare for school, have recess, and have specific lessons, time to complete studies, get married retire from the public or private service etc. These helps to plan and make life worth living. The concept of ratio and proportion has wide range of application in chemistry, especially in the balancing of chemical equations and mass-volume relationship. Furthermore, the application of ratio and proportion had been recognized in taxation, income tax computations, import and export duties, exercise and local duties and insurance. The use of chemical for either weed or pest control require sound knowledge of ratio in mixing the chemical. Similarly, a mason requires the knowledge of ratio and proportion for mixing of concrete.

The application of probability in rebranding the Nigeria citizenry for self-reliance is very important, ability to predict the outcome of an election or the possibility of winning a war of football match. It is use for forecasting weather base in precious events. The application of mathematics for everyday living are numerous and cannot be exhausted. When these applications are used in the process of teaching and learning, it will help to make the students better and hence a better citizen in the society.

In conclusion Odilli (2006) sees mathematics as a subject that help student to form habit of clarity, brevity, accuracy, precision and certainty in expression and this will go a long way in giving us the much-needed unity which is much need in our society today in line with the rebranding agenda.

Challenges of Mathematics Teaching

Despite the effort of the government on the development of mathematics teaching and provision of opportunities for improvement of teaching, there are still problems of which hinder mathematics effective communication learning

- Lack of curriculum integration
- Shortage of mathematics teachers
- Poor government policy
- Poor classroom organization by teachers
- Lack of equipped mathematics laboratory for practical.
- Over population of students which may impedes effective demonstration during practical like graphs and construction of loci
- Teacher's impatience and unpreparedness.
- Poor remuneration of teachers.

Conclusion and Recommendations

Effective communication which enhances teaching and learning of mathematic is for life skills and self-reliance implies making the learners see mathematics beyond the classroom boundaries. It means that learners must be brought to real world of issues and relate the mathematics they learned to the realities of life. The essence of teaching and learning mathematics for self-reliance is to promote responsible citizens as based on the research work, the following recommendations are made:

1. Through effective communication mathematics teachers should endeavor to relate mathematics concept to real life situation
2. Government should employ qualified mathematics teacher and supply adequate instructional materials for teachers and learners of mathematics in Nigeria secondary schools to improve on mathematics communication
3. Mathematics curriculum planners should ensure that there is proper integration of the curriculum in all secondary school in Nigeria for effective communication
4. There should be monitoring of teachers by the ministry of education, principals and so on.5. Teachers should learn from the paper how to improve mathematics communication. 6. Gallery walk in this should be implemented by teachers to arose students interests and performance in mathematics.

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