



Mathematics Education: Resourcefulness for Effective Research

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Abstract

This paper examined the importance of mathematics education in predicating effective research while emphasizing the use of statistics in the presentation and analyses of research findings. It held the position that mathematics knowledge is relevant for understanding and application of research findings.

Keywords: Mathematics Education, Resourcefulness, Effective Research, Analyses.

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INTRODUCTION

The world has been changing in almost all spheres and change is still on-going. The speed at which the world is changing presently could be described as supersonic. In time past, news of events that took place in one part of the world may take some days, weeks or even months to get to another part of the world. The results of world class football matches are known even as they are happening, no matter the part of the world the games are played in the present day realities.

To adjust and cope with the 21st century changes, there should be a continuous renewal of the mind through critical thinking and creativity. Mathematics as a subject, builds up critical thinking and creativity in learners. Ekwueme (2013) mentioned that mathematics is a creation of the human mind, concerned primarily with ideas, processes and reasoning. The teaching of mathematics is for the development of power and sound mind because every mathematical problem poses an intellectual challenge which culminates into a unique mental exercise. Sidhu

(2006) asserted that the study of mathematics helps us in the development of many intellectual traits like power of thinking and reasoning, induction, analysis, synthesis, originality, generalization and discovery among others.

Research is the process of arriving at dependable solutions to problems through a well-planned and systematic collection, analysis and interpretation of data. Dependable solutions cannot be achieved if the researcher lacks the intellectual traits developed in us through mathematical concepts. The creative powers of the mind affords a quick and clever way of overcoming difficulties, making valuable reasoning out of difficult or new situations to create a platform for safe landing. Research has to do with discovering new ideas that will ultimately contribute to knowledge and a researcher has to be resourceful, that is, having the ability to overcome problems or to make do with what is available to create a solution and this has to come from a creative mind and a critical thinker which the knowledge of mathematics affords.

MATHEMATICS EDUCATION

Education is concerned with effecting behavioural changes that will synchronize with the social norms for the sake of progress and survival (Odili, 2006). Mathematics education is the teaching and learning processes of mathematics for the purpose of creating behavioural changes in the learner that will make him fit and contribute meaningfully to his immediate society and to the world at large. For teaching and learning to be effective and directional, there has to be the right type of curriculum. The term curriculum has been defined in so many ways because it lends itself to the attainment of educational goals. As a way of introducing one of his works, Ogunyemi (2009) observed that curriculum as a field of study, has continued to attract interest among educators, scholars, researchers and laypersons mainly because of its centrality to the attainment of the educational goals of any nation. However, for the purpose of this paper we shall adopt the definition put forward by Okoro (2009) that curriculum is generally accepted as the preconceived intentions or mapped out plans of all learning activities deliberately chosen and directed by the school which learners follow to reach predetermined goals.

The curriculum of mathematics is more than just the subject matter content. It is the totality of all the activities of the school programmes as it pertains to mathematics for the training of the learner. These activities ensure a good interplay among the teacher, the learner, mathematics content, methods of instruction and of course the learning environment where the schooling is taking place. Issues in mathematics curriculum can be treated at three levels: the intended, implemented and attained curriculum. The intended curriculum is what the highest decision making body in education want the students to learn which should be taught in schools while the implemented curriculum is the activities among the teacher, learner, environment and contents, in the bid to achieve the intended curriculum. The attained curriculum has to do with the contents, behaviours, attitudes and skills which the learner actually learn and ready to use to contribute meaningfully to the society. These attitudes, behaviours, skills and contents, ultimately equip the learner to proffer solution to difficult situations using what is within and around him. When this is achieved, we say, that the learner has attained a state of being resourceful.

RESOURCEFULNESS OF MATHEMATICS EDUCATORS

Problems and new situations we encounter in life do not present themselves with their solutions.

At crossroads, sometimes we have to use what we have and the creative mind that mathematics has afforded us to get through some of the difficulties in life.

It is difficult to have a particular guide that can proffer solution(s) to every possible situation that may present itself. Resourcefulness is the ability to deal skillfully and promptly with new situations, difficulties, and proffer possible solution. Resourcefulness through creativity, innovation, inventions, discovery, enterprising is geared towards solving the problems of mankind in all ramifications.

HOW TO BE RESOURCEFUL

Creativity: Creativity unlocks possibilities. A creative mind always finds inspiration out of some of the possibilities that may have been created.

Preparation: It is commonly said that “prevention is better than cure”. Granted that we cannot anticipate every problem situation, many can be forecasted. A state of preparedness will generate enough confidence and courage to face any new situation or a difficult one.

Innovation: This is the process of translating ideas in to a better way of doing things in order to get better results. A challenging situation could activate innovation whereby critical thinking ability could be displayed to create an idea or imagination to overcome the challenge. This is the base of computerization is mathematics.

Improvisation: This is the act of making or fabricating what is available into what is desirable. In the rural communities where some of the modern equipment are in short supply or none existent, local resources could be harnessed to present a near representation of some modern facilities.

Clever Use of Resources: Resourcefulness is most importantly about creative and clever use of resources at our disposal. How much assess do you have to the resources (human and material) within your reach. Most of the problems encountered in life have been dealt with sometime and somewhere; a resourceful person must ask questions about the situation on ground. Time, money and other material things can be combined and properly harnessed to solve problems.

EFFECTIVE RESEARCH

Basically, research has to do with searching and gathering information to answer a particular question or finding a solution to a problem thereby contributing to knowledge. Dordan and Dawe (2014) opined that the goal of research is to develop an informed opinion on a topic. It means that the researcher should go beyond reviewing literatures and state what he has discovered as his own contribution to knowledge.

It is not all the discoveries of researchers that are valid and genuine. A researcher may carry out a rigorous research exercise and sincerely come up with his findings but if the data used in his work are faulty such exercise may not meet up its expectation. An effective research is one that generates some understanding about the topic of study (Krishna, 2009). For research to be effective, accurate data must be obtained and such data could be verified, dependable and certified using statistical methods that allow for coherence and inferences can be deducted from it. The result of an effective research should be such that other researchers can find it easy to understand and undertake further research work in related areas. Most importantly, the research

methods used, the result obtained, the conclusion and the recommendation should be stated clearly and not in vague terms.

RESOURCEFULNESS AND EFFECTIVE RESEARCH

As mentioned earlier, research is a careful study of a given subject, problem or field, undertaken to discover facts and principles. A researcher must utilize enough resources (knowledge, time, money, etc.) to come up with a discovery that will add to knowledge. Skill and creativity is needed to harness the resources which most times are scarce, to produce an acceptable result.

For a research to be effective, the researcher must prepare for the task ahead of him. Without preparation some researchers often abandon their work when they are faced with some challenging situations. Preparation and definition of the component parts of the subject under consideration makes a good start for an effective research.

An effective research is characterized by a procedural approach. In the procedural linkage, research begins with the identification of a research problem. Educational problems are vast and with no permanent solution, hence it requires several attempts and exploration. The problem must be stated concisely and in a manner that renders it solvable. Mathematical problems are also vast – it borders on instruction, concepts, attitudes of learners and achievement. Recent challenge has been the application of mathematics concepts in tackling problems of social interest such as meeting the need of the society. Some of the contemporary problems have relationship with the past research and is needful through adequate literatures, to find out what has been said and done about the problem.

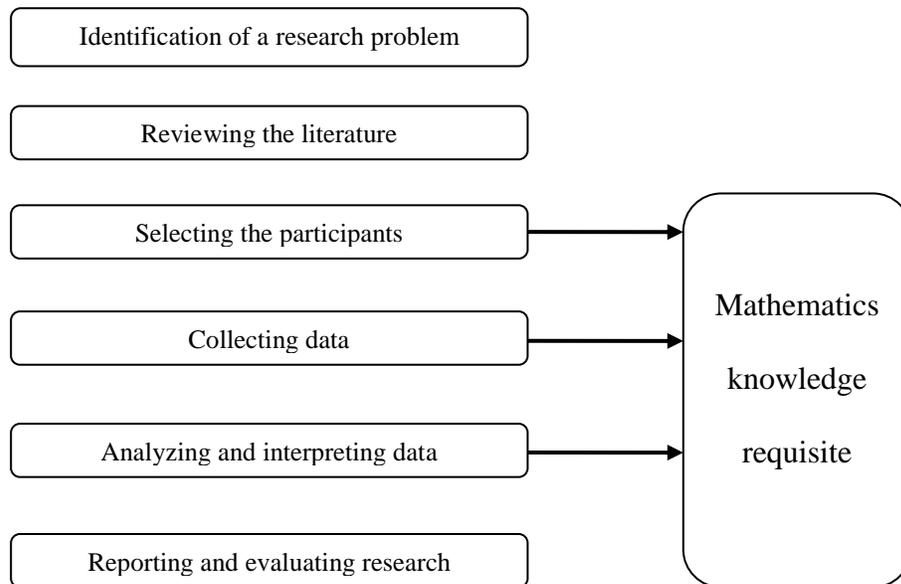


Figure 1: Characteristics of an effective research procedure. Source: Gay and Airasian (2009)

Stage IV in the loop is concerned with collecting data. Data is usually arranged by following a mathematical method – discrete, class or interval, ordinal and nominal. Individual scores and group scores are arranged using tables. The mathematics needed in the research procedure begins with sampling and population. The other stages are analyzing of the data and its interpretation,

therefore, the position occupied by the mathematics requirement in research has rendered it indispensable in the process of effective research.

A resourceful researcher permute and combine the resources available to him in the best possible way in order to avoid resource wastage and to cleverly achieve his aim by utilizing the available materials. Creativity and improvisation has to be put on display for an effective research to be achieved. In a nutshell, without resourcefulness, a researcher cannot conduct an effective research.

MATHEMATICS EDUCATION AND EFFECTIVE RESEARCH RESOURCEFULNESS

Mathematical tools are utilized consciously or unconsciously during some of the processes of an effective research. For example, the research data gathered must be analyzed and presented in a concise manner in order for the readers to easily understand the results. Ezelonwu (2012) agreed that data in its raw form do not make much sense to the readers until they are arranged in an organized form.

The arrangement of research involves the use of descriptive and inferential statistics while the data is presented in figures and tables, inferential are made using inferential statistical tools such as t-test, analysis of variance (ANOVA), analysis of covariance (ANCOVA), chi-square, among others.

Ukwuije (2003) emphasized that for clarity and easy understanding, results can be presented using tables, figures, graphs (Histogram, Bar chart, pie chart, and pictograms). Of course these are mathematical tools in which a researcher who has little or no knowledge of them could not communicate the results of his findings to the public.

In analyzing and presenting data, frequencies of variables, differences between or among variables and statistical tests must be calculated in order to establish an acceptable result of a research endeavour.

CONCLUSION

The use of mathematical tools in research must continue to be very relevant and even the more in this technological and computer era. It is needful for learners to have basic mathematical knowledge in order to acquire the skills needed for interpretation of scientific cum research based results. The importance of mathematics to research cannot be overemphasized, therefore, all researchers and potential researchers should be made to have a good knowledge of mathematical tools especially those required for data analysis and presentation in order to ease communicating research findings accurately.

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