PROBLEM SOLVING AND PROBLEM STRATEGIES

By

AMEEN S. K. (MRS)
MATHEMATICS DEPARTMENT
KWARA STATE COLLEGE OF EDUCATION, ILORIN.

BEING A PAPER PRESENTED AT THE NATIONAL
MATHEMATICAL CENTRE, ABUJA.

FROM 20TH - 25TH JUNE, 2011.
ABSTRACT

The study examined problem-solving and its strategies on the student’s performances in mathematics. The concept of problem solving is explained. The study reveals various meaning of problems-solving and its uniqueness in the teaching and learning of mathematics. Importance of problem-solving and various steps involved were also enumerated. Suggestion/recommendation on how to improve on the problems-solving are explained/highlighted.

INTRODUCTION

Mathematics is the science of quality and space. In other words; it is a creation of human and which is concerned primarily with ideas, processes and reasoning (Odili, 2006). Based on this, mathematics can be seen as a body of knowledge, a collection of techniques and methods, the product of human activities and even as the activity itself (solving of problem).

Problem-solving therefore is the primary goal of teaching and learning of mathematics in schools. It is expected that mathematics teachers will give a fill attention to the activity, because many students of all ages lack the necessary basic problem-solving skills and higher thinking skills needed by the today’s work place.

Problem-Solving and Problem Strategies

Problem-solving is a process, which begin with the initial contact with the problem and ends when the obtained answer is reviewed, in the light of the given information.

Galadima (2002), defined problem-solving as a complex process to learn and consists of series of tasks and thought process that are closely linked together to form a set of heuristic pattern. He stress further and defined heuristic
as a set of suggestions and questions that a person must follow and ask himself in order to resolve a dilemma. Therefore, students need to learn this process if they are to deal successfully with problems they will in meet schools and indeed real life.

On the other hand, Funkhouser (1992), defined problem-solving as a multiple step process where the problem solver must find relationships between past experienced (schema) and the problem at hand and then act upon a solution.

Problem-solving can also be defined as the process of applying previously acquired knowledge to new and unfamiliar situations (American National Council of Teachers of mathematics, 1997). It is a process that requires the learners to sift through previously acquired knowledge and select an appropriate plan in solving the problem, problem-solving defined basic mathematical skills (reading, computation, knowledge of terms, concepts and theorems) and several cognitive skills such as visualization flexible thinking and forming analogies (Odili, 2006).

**CHARACTERISTICS OF PROBLEM-SOLVING**

Akpan (1986), opined that, in contrast to exercise solving requires the following specific abilities of learners/ students Abilities to read and comprehend what problem is required to find?

(i) Abilities to relate the problem to a previous one that is similar and to recall facts, theorems, formulars or experiences that are relevant to the problem in hand!

(ii) Ability to translate the problem into number sentences or mathematical symbolism.

(iii) Ability to identify the structure of the problem which may include facts, operations and variables to be determined!
(iv) Ability to carry out correct computational procedures to arrive at the desired solution and
(v) Ability to review the solution in order to validate, improve, generalise and consolidate what else might be learned.

Fuhnouser (1992) gave these three characteristics of problem solving based on the cognitive theory.

(i) Problem-solving is cognitive but is inferred from behaviours.
(ii) Problem-solving results in behaviours that lead to a solution.
(iii) Problem-solving is a process that involves manipulation of operation on previous knowledge.

**STEPS INVOLVE IN PROBLEM-SOLVING ARE;**

(i) The problem-solver must first know exactly what the problem is? Here he read and reread the statement? What information is given? What are you trying to find out, state the problem in your own words, and write a similar to you.
(ii) Relates the problems to familiar ideas or a previously solved problem
(iii) Search for strategy by identifying the structure of the problem
(iv) Use search model to find answer to the questions
(v) Analyse the method of solution
(vi) Looking of the problem again
(vii) Problem-solver should interpret the results in the form of generalisation.

One of the aims of teaching through problem-solving is to encourage students to refine and build onto their own processes of over a period of time as their experiences allow them to discard source ideas and become aware of further possibilities (Carpentar,1989). As well as developing knowledge, the students are also developing an understanding of when it is appropriate to use particular
strategies. Through using this approach the emphasis is on making the students more responsible for their own learning rather than letting them feel that the algorithms they use are the inventions of some external and unknown expert. There is considerable importance placed on exploratory activities, observation and discovery, and trial and error. Student need to develop their own theories, test them, test the theories of others, discard them if they are not consistent, and try something else (NCTM, 1989).

Students can become more involved in problem-solving by formulating and solving their own problems, or by rewriting problems in their own words in order to facilitate understanding. It is of particular importance to note that they are encouraged to discuss the processes which they are undertaking, in order to improve understanding, gain new insights into the problem and communicate their ideas (Thompson, 1985, stacy and Groves, 1985). Some of the importance of problem-solving approach in mathematics were also highlighted as;

(i) It is a process whereby new ideas or concepts are learnt.
(ii) It is a meaningful way of practising computational skills.
(iii) By solving problems, we learnt to transfer concepts skills to new situations.
(iv) Problems-solving is a means of structuring intellectual curiosity.
(v) New knowledge is discovered through problem-solving.

On the other hand,

Jone (2000) pointed out that there have been more for the integration of technology into the mathematics classroom to bring about improvement in problem-solving skills and the ability to think critically. Teachers believe that success and failure in problem solving depends on students’ ability and effort. In line with this, Lee (1990) found that positive belief can increase problem-solving performance and that beliefs can be improved through training.
However, Aina (1986) gave five main goals for teaching problem-solving in the secondary school mathematics as follows;

(i) To develop students’ awareness of problem-solving strategies.
(ii) To improve students’ ability to select and appropriately use a problem-solving strategies.
(iii) To make students’ aware of the value of approaching a problem in a systematic manner.
(iv) To foster students’/ willingness and perseverance in solving problems.
(v) To improve students

However, teaching problem-solving in secondary school is expected to expose the students to different strategies that are in practice and also to train them on how to make right selection of the strategies and appreciate the systematic way of solving problems. Eventually, their hardworking and endurance as problem solved will lead to self reliant. Fajemidagba (2001), noted that problem-solving is at the apex of the hierarchy of learning types as classified by George. Teachers are therefore verse to be familiar with problem-solving instructional strategies that will be improving students’ performance in mathematics. He further pointed out that teachers need to possess the knowledge of piaget’s theory to enable them choose the instructional strategy pattern relevant to a particular classroom situation. This will enable the students to study mathematics as an exploratory dynamic and evolving discipline not as rigid absolute body of laws to be memorised. (National Research Council, 1987 in schoefield 1993).

In the same vain National Council of Teachers of Mathematics (NCTM, 1980 and 1989) have recommended that the mathematics curriculum should be organised around problem-solving, focusing on:
(i) developing skills and ability to apply these skills to unfamiliar situations

(ii) gathering, organising, interpreting and communicating information.

(iii) formulating key questions, analyzing and conceptualizing problems, defining problems and goals, discovering patterns and similarities, seeking out appropriate data, experimenting, transferring skills and strategies to new situations.

(iv) developing curiosity, confidence and open mindedness (NCTM, 1980 PP2-3).

However, the ultimate goal of any problem-solving program is to improve students’ performance at solving problem correctly. The specific goals of problem-solving in mathematics are to:

(i) improve pupils willingness to try problem and improve their perseverance when solving problems.

(ii) improve pupils on self concepts with respects to the abilities to solve problems.

(iii) make pupils aware of the value of the problem-solving strategies.

(iv) make pupils aware of the value approaching problem in a systematic manner.

(v) make pupils aware that many problems can be solved in more than one way.

(vi) improve pupils abilities to select appropriate solution strategies

(vii) improve pupils’ abilities to implement solutions strategies accurately.

(viii) improve pupils abilities to act more correct answers to problems.

SUGGESTIONS/ RECOMMENDATION

Based on the findings of this study, the teachers of mathematics should be aware of the importance’s of problem-solving and employed appropriate
strategies in teaching mathematics contents. Therefore, conducive classrooms should be created for the teaching of problem-solving in the schools. Also, enough time should be given during problem-solving activities for the students to be able to reflect on what they are doing.
Reference


association with Anachuna educational books.
