

Strategies and Attitude in Problem Solving

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Abstract:

A vital skills of Mathematic Students need to possess is the skill of problem solving. The students' accomplishments and satisfaction of Mathematics depend on how well they have gained the mastery of the use of certain problem solving strategies as well as having developed a positive attitude towards problem solving as a mathematical mental discipline. This study focused to investigate the strategies and attitude problem solving among College Students of Isabela State University. The descriptive research design is used in the study and the attitudinaire towards problem solving together a 20 item problem set were the principal data gathering tools used to elicit the needed information from student participants. The students have difficulty doing problem solving due to their inability and inadequate knowledge to use appropriate strategies and their negative attitude towards problem solving.

Keywords: Frequency and Percentage, Attitude, Research Design, Problem Solving

I. INTRODUCTION

The students' success and enjoyment of Mathematics depend on how well they have gained the mastery of the use of certain problem solving strategies as well as having developed a positive attitude towards problem solving as a mathematical mental discipline.

Word problems are commonly used as practice exercises and illustrations in the teaching and learning of Mathematics. Despite its prevalent use, many students have difficulty in problem solving, based on the complexity and the varied nature of the mathematical problems or exercises. Success in solving word problems is dependent on the students' knowledge of language and structure, their ability to interpret vocabulary in mathematical terms, and their actual mathematical knowledge and ability. The difficulty level of each of these factors can vary greatly between problems and ability levels can vary greatly between students. Based on this complex interaction, traditional teaching strategies for solving math word problems are rarely universally helpful. Instead, several researches suggest that strategies emphasizing the comprehensive understanding of math problems, especially on how individual

problem elements relate to each other and the problem as a whole (e.g. schema-based instruction), are most effective in helping students improve their problem-solving ability.

Students find trouble with problem solving for some reasons related to the fact that there is no single procedure that works all the time. Misunderstanding of the problem and the situations surrounding it may lead to mistakes or wrong assumptions. At times, the wrong use of mathematical approaches to problem solving may also further contribute to students' inability to deal with math problems. The Florida Department of Education, Bureau of Exceptional Education and Student Services cited Polya's four-step approach to problem solving: (1) understanding the problem, (2) devising a plan or strategy to solve the problem, (3) implementing the plan, and (4) reflecting on the problem solution. Some possible strategies to problem solving include: guess and check, make an organized list, eliminate possibilities, use symmetry, consider special cases, use direct reasoning, solve an equation, look for a pattern, draw a picture, solve a simpler problem, use a model, work backward, use a formula, be ingenious, and consider extremes.

The researcher believes that to be a good problem solver, one needs to start with the right attitude. A Mathematics problem that one encounters may sound difficult but with a right positive attitude, the difficulty may be overcome and successfully be dealt with. Furthermore, students normally encounter errors in problem solving not because the problems they sought to solve are difficult but may be attributed to either their math anxiety or their negative attitude towards problem solving. They are believed to be greatly intertwined; thus, motivating the researcher to conduct this study. Furthermore, in the researcher's twenty (20) years of teaching, he has perennially observed that entering freshman college student's weakest link in Mathematics learning lies in problem solving particularly on the use of varied problem solving strategies.

II. Statement of the Problem

This study aimed to investigate the strategies and attitude in problem solving among college students of Isabela State University.

1. What are the problem-solving strategies employed by the participants per program?
2. Is there a significant difference in the problem solving strategies employed by the participants when grouped accordingly?
3. What is the participants' attitude towards problem solving?
4. Is there a significant difference in the students' attitude towards problem solving when they grouped according to program?

III. Methodology

Research Design

The descriptive method of research was used since the study involves a description of the research participants' problem solving strategies and their attitude in problems solving.

Research Participants

The participants of the study consisted of second year students from the different programs of the Isabela State University Cabagan Campus who

finished College Algebra during the School Year 2015-2016. The following table shows the number of participants in each program.

Sampling Technique

There are different degree programs at Isabela State University Cabagan Campus from which the sample of second year students was drawn. Stratified random sampling was employed using proportional allocation from each course, the total sample of which is based on the Slovincs' formula with $N = 85$ and margin of error of 0.10.

IV. Instrumentation

The study used the following data-gathering instruments:

Attitudinaire. This questionnaire consisted of twenty (20) items and was used to elicit the participants' attitude towards problem solving. To determine their degree of agreement or disagreement to each of the items or statements, the participants were made to choose from among four choices: Strongly Agree, Agree, Disagree and Strongly Disagree. The attitude inventory was based from the book of Hopkins and Stanley (1983.).

Problem Solving Test. The test consisted of twenty (20) problems which are solvable by two or more problem solving strategies. The items were chosen and obtained from the websites where solutions to each problem are readily available. This is to ensure that the problem is indeed solvable or that their solutions exist.

Data-Gathering Procedure

The researcher himself personally administered the data-gathering instruments to the participants. To ensure that the participants will seriously answer the problem solving test, they were told by the researcher that the results of their test will be considered as part of their quizzes. After the retrieval of the problem solving test, the problem solving strategies utilized by the participants.

After data collection was done, the needed data were collated and analyzed electronically using statistical

software (Statistical Package and Services Solutions - SPSS Version 17) to ensure the precision of data treatment and analysis.

V. Data Analysis

To describe the data of the study, frequency, percentage, and the weighted mean were used.

Frequency and Percentage. These were used to describe the profile of the participants based on their degree program as well as in describing the problem solving strategies utilized by the participants and the error patterns obtained from their test.

Weighted Mean. This was utilized to describe the participants' attitude towards problem solving. The attitude of the students towards problem solving was described using the following arbitrary intervals and descriptions:

Mean Range	Qualitative Description	
3.25 – 4.00	Very Favorable	Positive Attitude
2.50 – 3.24	Favorable	
1.75 – 2.49	Unfavorable	Negative Attitude
1.00 – 1.74	Very Unfavorable	

The attitude ratings of the participants were based on the scale from 4 to 1, for positive statements and 1 to 4 for negative statements presented as:

Response	Positive Statement	Negative Statement
Strongly Agree	4	1
Agree	3	2
Disagree	2	3
Strongly Disagree	1	4

Chi-Square Test. The Chi-Square Test was utilized to test for significant differences in the problem solving strategies and attitude of the participants when they are grouped according to program.

VI. Summary of Findings

Based on the data obtained and analyzed, the following summarizes the salient findings of this study:

a. Student-Participants Problem Solving Strategies When Grouped According to Program

The student participants utilized the following strategies in answering the 20 item problem set:

- 1) The *Guess and Check* strategy was utilized by the BS Biology student participants in solving Problem Numbers 2, 3 and 17, *Make an Organized List* was utilized for Problems 3 and 20, *Draw a Diagram* for Problems 8, 15 and 19, *Work Backwards* for Problem 4, *Make a Table* for problem 10, *Find a Pattern* for problems 12 and 14 and *Use of Equation or Formula* for Problems 1 and 17.
- 2) The BS Criminology student participants utilized the *Guess and Check* strategy in solving Problems 1, 3, 4, 14, 17 and 20, *Make an Organized List* was utilized for Problem 6, *Draw a Diagram* for Problems 8, 15 and 19, *Make a Table* for Problem 4, and *Find a Pattern* for Problems 12 and 14.
- 3) The BS Computer Engineering student participants utilized the *Guess and Check* strategy in solving Problems 1, 3, 4, 7, 14 and 20, *Make an Organized List* was utilized for Problems 6, 18 and 20, *Draw a Diagram* for Problems 2, 8 and 19, *Work Backwards* for Problems 3 and 5, *Make a Table* for Problems 1, 4, 10 and 12, Use of Logical Reasoning for Problems 15 and 19, *Find a Pattern* for Problems 14 and 16 and *Use of Equation or Formula* for Problems 1, 6, 10, 17 and 18.
- 4) The student participants enrolled in the BS Computer Science program utilized the *Guess and Check* strategy in solving Problems 1, 3, 4, 5, 7, 8, 14, 16 and 17, *Make an Organized List* was utilized for Problems 6, 18 and 20, *Draw a Diagram* for Problems 2, 8, 13, 15 and 19, *Work Backwards* for Problems 3, 5 and 11, *Make a Table* for Problems 1, 4, 9, 10 and 12, Use of Logical Reasoning for Problems 2, 15 and 19, *Find a Pattern* for Problems 11, 14 and 16 and *Use of Equation or Formula* for Problems 1, 6, 7, 10 and 18.
- 5) The *Guess and Check* strategy was utilized by the participants enrolled in the BS Information Technology program in solving Problems 1, 3, 7, 11, 14 and 17, *Make an Organized List* was utilized for Problems 18 and 20, *Draw a Diagram* for Problems 2, 8, 13, 15 and 19, *Work Backwards* for Problems 3, 5 and 11, *Make a*

Table for Problems 1, 4 and 9, Use of Logical Reasoning for Problem 2, *Find a Pattern* for Problems 12 and 16 and *Use of Equation or Formula* for Problem 6.

b. Test for Significant Difference in the Problem Solving Strategies Utilized by the Student Participants when Grouped According to Academic Program

There is no significant difference in the problem solving strategies utilized by the student participants in 17 out of 20 problems when they are grouped according to academic program. However, there is a significant difference in the problem solving strategies utilized by the student participants in problem number 17 when they are grouped according to academic program. The BS Biology students are more likely to use the *Guess and Check* strategy while the BS Computer Engineering students utilized the *Use of Formulas or Equations* to solve the said problem.

c. Attitude of Student Participants in Problem Solving

Majority of the participants have negative attitude towards problem solving. This kind of attitude is generally the same across the five (5) academic programs that include the BS Biology, BS Criminology, BS in Computer Engineering, BS Computer Science and BS Information Technology. Among the participants who possess positive attitude toward problem solving, most of them come from the BS Computer Science program.

d. Test for Significant Difference in the Attitude of the Student Participants in Problem Solving when Grouped According to Academic Program

There is no significant difference in the attitude of the participants towards problem solving when they are grouped according to their academic program. Generally, participants manifest a negative attitude towards problem solving regardless of their course or program.

VII. Conclusion

The students may not be faulted for being poor in problem solving as they might not have had adequate exposure and training in problem solving in their lower years of their education, thus the responsibility to train students to become problem solvers must be viewed as a collaborative and concerted effort of all mathematics teachers regardless of level.

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