



## PROBLEM-SOLVING PROFICIENCY IN USING EQUATION STRATEGY OF COLLEGE STUDENTS AND SELECTED CORRELATES

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**ABSTRACT:** *Promoting problem solving development is critical in ensuring students' transition successfully into upper-division courses. Innovative approaches to teaching problem-solving skills have the potential of appealing to a broader range of students. The study assessed the problem-solving proficiency of students and its correlates. Specifically, it sought to determine the students' profile; students' English proficiency; their attitude towards problem solving; their problem solving proficiency level in using equation in terms of the specific type of Algebra problems and specific elements of the analytic scoring; and the proposed enrichment activities in teaching College Algebra to be implemented to improve students' problem solving proficiency and to address students' difficulties in using equation in problem solving. The study used the descriptive correlational method with the PSTS test, English proficiency test and attitude towards problem-solving inventory as data gathering instruments. Data were analyzed using the weighted mean, percentage analytic scoring scale, and the Chi Square ( $\chi^2$ ). Most of the respondents were female and graduated from the RBEC curriculum. They have satisfactory performance both in Mathematics and English and have a favorable attitude towards problem-solving. The students have a low level of English proficiency, a very high proficiency level in understanding the problem and in planning the solution, low proficiency level in carrying out the plan and in answering the problem. They have average problem-solving proficiency.*

**KEYWORDS:** *problem-solving proficiency, equation strategy, descriptive correlational method, analytic scoring*

### INTRODUCTION

#### Background of the Study

Mathematics plays an important role in accelerating the social, economic, and technological growth of the nation.

One of the challenges of the new millennium is the proper use of advanced technology in education. Competence in mathematics is essential in order to function in everyday life and to succeed in the increasingly technology-based workplace. Students who



take higher level mathematics courses are required to have strong fundamental skills in Mathematics most particularly on problem solving skills.

Successful problem solving in the 21<sup>st</sup> century requires everyone to work effectively and creatively with computers, with vast amount of information, with ambiguous situations, and with different people.

For the students to enhance their critical thinking, they should be exposed to problem solving activities utilizing higher order thinking skills. Students must be trained to reason out and taught to translate mathematical concepts to actual situations or scenarios.

Research has shown that students become better problem solvers if they are taught with problem solving strategies. Based on the experiences of the researcher in teaching College Algebra for almost 10 years, she noted that students' proficiency in solving problems in College Algebra particularly applying the equation strategy is at poor level. This research is the researcher's initiative to obtain the needed information that will serve as her basis in planning for instructional intervention to enhance students' proficiency level in problem solving.

To enhance the problem solving skills of students, it is necessary to look or to investigate some schemes that students use in employing the equation strategy in solving problem, and to investigate factors affecting their problem solving proficiency. The present study explored on these aforementioned variables. Results of this investigation are considered significant information which would serve as basis for the development of enrichment activities for college level more specifically in teaching College Algebra.

### **Objective of the Study**

This study aimed to determine the level of problem solving proficiency of college students in solving problems involving algebraic concepts using the equation strategy. The study further investigated on the relevant factors that affect students' problem solving proficiency. Results of the study would serve as basis in planning for enrichment activities to enhance students' proficiency in solving problem to address students' problem solving difficulties and to foster in them a more favorable attitude towards Problem Solving.

The study further determined whether students' profile variables, students' English proficiency level, students' attitude towards problem solving, as well as their English proficiency level were significant predictors of students' problem solving proficiency.



## **METHODOLOGY**

### **Study Design**

The study used the descriptive correlational method of research. The descriptive research was used since the study assessed the problem solving proficiency level of students in using equation in solving problems involving concepts in College Algebra. The study further correlated students' problem solving proficiency level with their English and Mathematics grades in high school and college, English proficiency level, and their attitude toward problem solving.

### **Respondents**

The participants of the study were the population of regular freshmen students (n=145) of the Bachelor of Science in Information Technology (BSIT) who were enrolled in College Algebra during the first semester of the school year 2015 – 2016 at Cagayan State University at Lal-lo, Cagayan. Total enumeration was used.

### **Research Instrument**

The different instruments used were the Problem Solving Thinking Skills Test (PSTS) which covered problems involving linear equations, quadratic equations, systems of linear equations and polynomials; the English Proficiency test which was used to measure the students' proficiency level in English; the attitude inventory which was limited to measure students' attitude towards problem-solving.

### **Data Collection**

After obtaining the necessary endorsements, the Attitude questionnaire was administered for an hour outside class hours. Another two days were allotted for the students to answer the problems in the problem solving thinking skill test, with two hours allotment in answering problems on linear equations and polynomials for the first day and another two hours in answering problems on system of linear equation and quadratic equation for the second day.

### **Analysis of Data**

Data were analyzed using the weighted mean, percentage analytic scoring scale, and the Chi Square ( $\chi^2$ ).



## **RESULTS AND DISCUSSION**

### **Students' Profile**

The respondents were predominantly female (65.52%). Majority were graduates of the RBEC curriculum. Mathematics and English performances of the students were satisfactory.

### **Attitude towards problem-solving**

The students' favorable attitude towards problem solving is an indicator of their positive attitude and proper disposition towards problem solving tasks. As such, when they are exposed to any problem solving tasks, they always have the feeling of willingness and confidence to work on the task.

### **Significant Difference of Students Attitude towards Problem Solving When Grouped According to Profile Variables**

The result of the analysis shows that there is no significant difference on the students' attitude in problem solving when they are grouped according to sex, high school curriculum and English performances. However, when they are grouped according to Mathematics performance, a significant variation exists.

### **English Proficiency Level**

The general English proficiency level of the students was low. This indicates that the students do not have adequate skill in grammar and correct usage, in noting important details, in summarizing information, and in analyzing and interpreting the selection read. Thus they lack the desired proficiency level in language that is necessary and helpful in problem-solving.

### **Problem-solving Proficiency Level**

The students had an average level of proficiency in problem solving. This implies that the students' ability to tackle problems is just within the average level. This means that they have not fully acquired the desired level of problem-solving proficiency.

### **Comparative Analysis on Students' Problem Solving Proficiency Level when Grouped According To Profile Variables**

Correlational analysis revealed that there is no significant difference in students' problem solving proficiency level when they are grouped according to sex and high school



curriculum. The results imply that regardless of their sex and high school curriculum profile, students' problem solving proficiency level does not significantly differ.

More specifically, the problem solving proficiency of the students does not vary across sex groups. This finding indicates that male and/or female have the same problem solving proficiency level.

In addition, results show that there is no significant relationship between students' problem solving proficiency level and students' high school mathematics performance. This result is supported by the computed  $\chi^2$  value of 14.77 with its corresponding probability value of 0.25. On the contrary a significant relationship exists between students' problem solving proficiency and students' college mathematics performance as shown in the probability value of 0.00. This result implies that students' mathematics preparation in high school does not affect their ability to solve problems. On the contrary, the student's mathematics performances in college significantly affect their problem solving skill.

Furthermore, results show that there is no significant relationship between students' problem solving proficiency level and the students' high school performance in English; however, a significant relationship exists between students' problem solving proficiency level and the students' college English performance. These findings imply that the problem solving proficiency of the students relates with their English performances in High School but not with their English performance in college.

The  $\chi^2$  test on the significant relationship between English proficiency level and problem solving proficiency level of students reveal that students' problem solving proficiency is significantly related to their proficiency in grammar, reading comprehension and vocabulary and overall English proficiency level of the students. These findings point out that English proficiency level has something to do with solving problems. Students need to have the basic skills in English to solve problems. Students' English proficiency helps them in understanding the problem and in translating the word problems to appropriate equations.

#### **Difficulties Encountered by the Students in Problem-solving**

The common difficulties encountered by the students in solving problems. Results indicate that nearly half (62 or 42.76 percent) of the participants found difficulty in



translating mathematical statements to symbols. Some of the students had difficulty in completing the translation process because they thought that there was incomplete information in the problem. Based on their solutions, most of them misinterpreted or used incorrect operations.

There are 40 or 27.58 percent of the participants who do not know how to substitute the given data. This led them not to come up with the correct process in obtaining the correct solution to the problem. Moreover, there were 26 or 17.93 percent of the participants who had an incorrect and incomplete answer due to incomplete enumeration of the given. Some were not familiar with the words used in the problem because they just wrote the given values in the order as they appeared in the problem and just guessed the fundamental operation and formula in solving the problem. Some did not comprehend fully because they were not able to visualize and did not interpret the problem at all. Finally, few of them got an incorrect answer due to incorrect labeling of answers as supported by the frequency of 17 or 11.72 percent. Some students got the correct answer but mislabeled it. They used the correct arithmetic operation, but missed out the given.

## **Conclusion**

The student's skill in performing each phase of the problem solving process is essential for his/her success in the problem solving task.

The students' favorable attitude towards problem solving is an indicator of their willingness to work with problem solving tasks and to explore appropriate strategies in arriving at the most reasonable solution to the problem.

Students' problem solving proficiency level is a function of interplay of students' Mathematics and English performance in college and their attitude towards problem solving tasks.

The students' ability to solve worded problems depends on how they translate phrases into mathematical symbols. Problem solving is a difficult task as it involves a lot of steps. Students have to hurdle the challenges in going from one step to another although the steps may not necessarily have to be taken in sequential manner. Some of the processes in solving word problems involve reading comprehension and how students make a plan. Many students encounter difficulties in problem solving because they



misinterpret some words that have multiple meanings and overlook its context. This difficulty usually happens when problems are presented in written form.

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