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# Students Mathematical Creative Problem-Solving Ability, Perception and Performance in General Mathematics

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**Abstract—** The study aims to determine the level mathematical creative problem-solving ability, perceptions and performance of the students in General Mathematics. The researchers used descriptive research design and purposive sampling in accordance to the objectives of the study. The respondents of the study were 133 grade 11 students in Nueva Ecija, Philippines. In data gathering, the researchers personally developed survey instruments in accordance to satisfy the objectives of the study Based on the findings of the study, the level of creative mathematical problem-solving ability of the students had the overall weighted mean of 2.47 and verbally interpreted as "High". Students were performed satisfactorily and obtained mean grade of 89.87. But their perception to solving problems are more complex, challenging, requires collaboration, time consuming and requires good mathematical skills to successfully answers all the problems in more creative ways. Flexibility had found moderate positive correlation with the students' performance in General Mathematics.

**Keywords—** Creative Problem-Solving Ability, General Mathematics, Perceptions, Performance.

## I. INTRODUCTION

Mathematics is a pattern of thinking and organizing as well as logical proof about shape, structure, number, and concept related to everyday life. In accordance with one educational goal to actualize the individual ability, then one of the existing abilities in mathematics education is a mathematical problem-solving ability. Mathematics education should focus on the development of creative thinking and problem -solving skills where the students are free to express and think their own original possible solutions.

Creative problem -solving ability is the high-dimensional human ability or skills to think up something new and drawn much attention in every field of education.

Mathematical creative problem-solving ability is one of abilities needs by the students, to formulate and solve problems according to the appropriateness and evolved concepts of mathematical problems in more flexible, fluent and original creative responses to see the relevance of math with other subjects as well as in real life.

Students are said to be able to solve mathematical problems if they can understand, choose the right strategy, and then implement them in problem solving.

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Teachers become the main focus, because they directly affect, assess and develop student ability to be a smart, skillful and moral human. Therefore, the efforts to improve student learning outcome cannot be separated from efforts of teacher ability to teach and use the models in the mathematics learning. Various learning models have been applied by the math teachers in schools for communicating the concept of the subject material, but the use of learning models are not necessarily creating a good learning outcome.

Measuring the mathematics performance of students is challenging since students' performance is a product of socio-economic and environmental factors. Performance in mathematics involves a complex interaction of factors on school outcome. Studies on mathematical performance have been found to improve the levels of mathematics achievement and delivering high quality education in school organization.

It cannot be denied that student's performance in mathematics is greatly influenced not only by student and teacher but also the mathematical creative problem-solving ability towards mathematics. That's why the researcher desires to find out the level of mathematical creative problem-solving ability and students' perception towards mathematics.

## II. OBJECTIVES OF THE STUDY

The main objectives of the study were to determine the creative mathematical problem-solving skills, perceptions and performance of the students in General Mathematics.

Specifically, the study aims to:

1. To assess the level of creative mathematical problem-solving ability of the students in General Mathematics in terms of flexibility, fluency and originality
2. To determine the performance of the students in General Mathematics.
3. To identify the perceptions of the students in solving problems.
4. To determine the significant relationship between level of creative mathematical problem-solving ability and performance of the students in General Mathematics.

## III. RESEARCH METHOD

The researchers used descriptive research design to determine the creative mathematical problem-solving skills, perceptions and performance of the students in General Mathematics. The respondents were composed of 133 grade 11 students were selected using purposive sampling method.

In data gathering, the researchers personally developed survey instruments in accordance to satisfy the objectives of the study. Upon development, several researches and references were used. And the research

instrument was subjected to pilot testing before conducting study. To the validity and reliability, CronBach Alpha was used and the results of the test analysis was 0.92 and interpreted as "valid and reliable".

Before conducting the survey, the researchers forwarded a formal request letter addressed to the School Principal to seek permission to conduct the study among the Grade 11 students. Upon approval, they coordinated with the class advisers for proper endorsement.

Prior to the solicitation of data, the researcher discussed with the participants the provisions of the study, so that they could better understand the points included in the questionnaire.

`For the responses of the respondents, the researchers utilized 4-Likert scale based on the degree of acceptance as shown below:

Legend: 4 – Very High 2- Moderately High
3- High 1- Need Improvement

Finally, all data and information obtained, were statistically treated, organized and analyze using SPSS tool kit.

## IV. RESULTS AND DISCUSSION

***1. Level of Creative Mathematical Problem-Solving Ability of the students in General Mathematic***

**Table 1. Creative Mathematical Problem-Solving Ability**

| Creative Mathematical Problem-Solving Ability | Weighted Mean | Verbal Interpretation |
|---|---|---|
| **1. Flexibility** | 2.70 | High |
| **2. Fluency** | 2.50 | High |
| **3. Originality** | 2.20 | Moderately High |
| **Overall** | 2.47 | High |

Table 1 presents the overall mean of 2.47 and verbally interpreted as "High". This meant that grade 11 students had performed high level in creative mathematical problem-solving ability in General Mathematics. The students can solve problems because they are more flexible and creative to solve mathematical problems.

They can easily understand and analyze the problems. Students are more creative to find answers and used varied techniques and ways to solve problems completely and correctly. The students can solve and answer problems in a creative way with problem solving, critical and analytical thinking skills. They made multiple or many correct answers in any given categories.

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***2. Performance of the Students in General Mathematics***

**Table 2. Students' Performance in General Mathematics**

| Grade | Frequency | Percentage | Verbal Interpretation |
|---|---|---|---|
| **97-100** | 11 | 8.27 | Outstanding |
| **95-96** | 20 | 15.04 | Very Satisfactory |
| **87-94** | 56 | 42.11 | Satisfactory |
| **80-86** | 27 | 20.30 | Fairly Satisfactory |
| **75-79** | 11 | 8.27 | Need Improvement |
| **Below 75** | 8 | 6.02 | Did not meet Expectations |
| **Total** | 133 | 100 | |
| **Mean Grade** | 89.87 | | Satisfactory |

Table 2 presents the data on the performance of grade 11 students in General Mathematics. As shown, less than half of the student 56 or 42.11 got academic grades of 87-94 with mean grade of 89.87 and verbally interpreted as "Satisfactory".

The findings meant that grade 11 students performed satisfactory in General Mathematics. Students had high level of creative mathematical problem-solving ability.

***3. Perceptions of the Students in Solving Problems***

**Table 3. Students' Perceptions in Problem Solving**

| Students' Perception | Rank |
|---|---|
| **1. Complex** | 1 |
| **2. Work Challenges** | 2 |
| **3. Require Collaboration** | 3 |
| **4. Time Consuming** | 4 |
| **5. Requires good mathematical skills** | 5 |

As shown in the table, students' perceptions in problem solving in General Mathematics is complex and work challenges based on the top 2 responses. These were followed by require collaboration, time consuming and requires good mathematical skills.

Most of the students reported more challenging and have learning difficulties in problem solving. They believed that solving problem in General Mathematics requires collaboration and good mathematical ability to achieve successful results.

***4. Relationship between Level of Creative Mathematical Problem-Solving Ability and Performance of the Students in General Mathematics***

**Table 4. Correlation between Level of Creative Mathematical Problem-Solving Ability and Performance of the Students in General Mathematics.**

| Creative Mathematical Problem-Solving Ability | Students' Academic Performance | |
|---|---|---|
| | R | p |
| **Flexibility** | .591* | .030* |
| **Fluency** | .020 | .949 |
| **Originality** | .126 | .681 |

*significant

As shown in the table above, flexibility had found moderate positive correlation with the students' performance in General Mathematics. The result indicates that when there is high level of flexibility in solving problems, the performance of the students in also increases. Because high level of creative mathematical problem-solving ability helps the students to be more creative, have the ability to think critically and analytically to answer problems towards better academic performance.

## V. CONCLUSIONS AND RECOMMENDATIONS

***Conclusions***

Based on the results, the following conclusions were drawn: Grade 11 students had high level of creative mathematical problem-solving ability. They were satisfactory performed in General Mathematics. Students' perceptions in General Mathematics were challenging and difficult to learn that needs more time and need collaboration to achieve a successful outcome. Flexibility in solving problem had found moderate positive correlation on students' performance.

***Recommendations***

The researchers recommended to develop enhancement plan to help students improve their creative mathematical problem-solving ability towards the improvement of students' academic performance in General Mathematics.

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