



ETCOR

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE

Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Creative Problem-Solving (CPS) Model in Enhancing the Problem-Solving Skills Among Grade 10 Students

R-Len E. Jardin*¹, Allen E. Pasia²

¹Alejandro P. Libao National High School, Division of Quezon

²Laguna State Polytechnic University, Faculty of College of Graduate Studies and Applied Research

*Corresponding Author e-mail: rlen.jardin@deped.gov.ph

Received: 09 June 2024

Revised: 18 July 2024

Accepted: 22 July 2024

Available Online: 02 August 2024

Volume III (2024), Issue 3, P-ISSN – 2984-7567; E-ISSN - 2945-3577

Abstract

Aim: This study determined the effectiveness of the Creative Problem-Solving (CPS) learning model in terms of communication, decision-making, analyzing and reasoning to enhance the Grade 10 students' problem-solving skills.

Methodology: This research used experimental research design utilizing a one group pretest-posttest. This study was conducted at one of the public junior high schools in Quezon Province specifically the Tagbacan National High School and selected 33 Grade 10 student as well as 15 teachers selected using the purposive sampling technique. The researchers used validated self-made pretest and posttest based on the Most Essential Learning Competencies in mathematics for the problem-solving skill with the used of rubrics in grading the students on problem-solving with a quantitative approach to determine if there was a significant difference in the students' problem solving-skills before and after the exposure to CPS learning model based strategies. Also, the research survey questionnaire focused on validating the teaching strategies based on the Creative Problem-Solving learning model for the level of effectiveness. The researchers conducted this study within the 4 weeks of the third quarter of School Year 2022-2023.

Results: The result of the study implied that the students positively accepted the creative problem-solving learning model. It was also found out in the study that there is significant difference between the mean score of the students before and after the utilization of Creative Problem-Solving learning model. Furthermore, the Creative Problem-Solving learning model in enhancing the problem-solving skills of the students is commendable for use in terms of communication, decision making, analyzing and reasoning.

Conclusion: There is a significance difference between the Mean Percetange Score before and after the utilization of Creative Problem-Solving model in Problem Solving. Moreover, teachers may use the strategies based on the Creative Problem Solving learning models to help increase the Problem-Solving skills of the students. Also, it can be used not only to improve mathematical problem-solving but also in other subjects to help aid the needs of the struggling learners and it would be beneficial for future researchers to conduct long-term research to examine the sustained effect of utilizing the CPS learning model on the enhancement of the problem-solving skills and to since the study revealed that the decision making obtained the lowest problem-solving skills of the students, it also suggested in the future researchers to focus on the problem-solving skills specifically the decision making.

Keywords: Creative Problem-Solving learning model, Problem-solving skills, Communication, Decision-making, Analyzing, Reasoning.

INTRODUCTION

People find mathematics significant in every day life. Mathematics is used in education and in practically every other areas of life, including time management, budgeting monthly money, and even the infrastructure that build everywhere. Mathematics is one of the top concerns in the Philippines' educational system when determining how many hours each class at all levels is allotted. Under the previous curriculum or the Revised Basic Education Curriculum, the Department of Education regularly allotted a daily time of fifty minutes and one hour for four days for the K to 12



ETCOR Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Curriculum. One's performance in mathematics is also evaluated via national competency assessments such as the National Achievement Test and the National Career Assessment Examination.

Creative Problem Solving is one of the learning strategies that educators must implement to engage students in active learning and enhance their capacity to solve mathematical issues. The Creative Problem-Solving learning model prioritizes learning and problem-solving abilities before building on those same abilities. (Effendi, 2019) The process of discovering unstructured problems, reconstructing a problem using data, and coming up with ideas and solutions for fixing the problem comprise the creative problem-solving learning model (Kim et al., 2019).

In the twenty-first century, education seeks to develop students' critical thinking abilities and capacity for creativity, innovation, problem-solving, communication, and teamwork (Abenojar, 2024; Hobri, 2020). It is aligned with the study of Scherer and Gustafsson (2015) who asserted that pupils must master one skill in the twenty-first century. These skills relate to pupils' capacity to work through challenging problems based on actual situations and call for engagement with an unfamiliar setting. Consequently, it may be said that pupils' capacity for problem-solving is crucial. The problem-solving ability is one of the two main objectives of the mathematics curriculum at the Philippine Basic Education level. (Bahtiar & Sartono, 2020)

Additionally, various schools in the private and public sectors supported the various mathematics enrichment and remedial programs, the country hosts several mathematics training and seminars for students and teachers, such as the mathematics Teachers Association of the Philippines and the mathematics Trainers' Guild to develop mathematical competency in the subject, promoting good camaraderie skills among students and building rapport between teachers and students.

One of the subjects that is always present in life, regardless of age or situation, is mathematics. It requires students to possess twenty-first-century abilities, particularly in problem-solving and critical thinking. Nonetheless, many students need to improve in mathematics. (K-12 Mathematics Curriculum Guide, 2016)

One of the twenty-first-century abilities that young people should be able to do is solving problems. However, In PISA 2018, the results for the Philippines were devastating. Of the 79 countries participating, the Philippines ranked dead last (ranked 79) in reading and second to dead last in Mathematics and Science (ranked 78). More importantly, scores were rated at six levels of achievement with Level 1 being the lowest and Level 6 the highest. The Philippines scored 340 in Reading (Level 1a), 350 in Mathematic (Below Level 1), and 357 in Science. (OECD, 2018)

Likewise, the 2022 Programme for International Students Assessment (PISA) results showed that the Philippines ranked third from the bottom in science with an average score of 356 (357 in 2018), sixth from the bottom in mathematics with an average score of 355 (350 in 2018), and sixth from the bottom in reading with an average score of 347 (340 in 2018). (OECD, 2022)

The Philippines also acknowledged its importance and made this ability one of the two main objectives of mathematics education. However, as evidenced by the most recent Program for International Student Assessment results in 2018, Filipino students' level of mathematics competence in international assessments declined in spite of the best intentions of the Philippine Education System. According to the data, the Philippines Scored 353 in mathematics, which is lower than the average of the participating Organization for Economic Cooperation and Development Countries (OECD, 2019). Most of the items in the mathematics test are application problems, indicating that students' performance in solving word problems is inadequate. The restricted exposure to non-routine issues may be one factor contributing to this. (Mogari et al., 2017)

Also, in the Philippines, as well, it has been revealed that forty percent of respondents perform less than satisfactorily when translating stated problems because of the following issues: inattention, poor understanding, value conversion, and unfamiliar vocabulary (Dela Cruz & Lapinid, 2014).

Considering the emphasis on mathematics that the education system of the Philippines places on it, according to Funda (2011), using problem-solving techniques in class can significantly raise students' learning outcomes, especially when it comes to applying and analyzing knowledge.

The researchers as a mathematics teacher at Alejandro P. Libao National High School and an associate professor of Laguna State Polytechnic University, witnessed the struggle of the grade 10 students in mathematics. Over the past 3 consecutive school years, they have consistently scored the lowest in the Mean Percentage Score (MPS). It became evident to us that problem-solving skills are the least learned competencies in the mathematics subject. This realization has fueled my determination to focus on this study and improve our pupils' ability to solve word problems in Grade 10.

This research is not just a theoretical exercise. It addresses a pressing issue that has been exacerbated by the recent pandemic. The disruption to traditional learning methods over the past 2 years has significantly impacted



ETCOR

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE

Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

learners' abilities, particularly their problem-solving skills. Therefore, this study is not only timely but also crucial in examining the Creative Problem-Solving Model Strategies for enhancing the students' problem-solving skills.

Objectives

The main objective of this study is to determine the effectiveness of the Creative Problem Solving (CPS) model to enhance the Grade 10 students' problem-solving skills of Alejandro P. Libao National High School.

Specifically, this study aimed to find answers to the following questions:

1. What is the mean pre-test and post-test scores of the student-respondents before and after using the Creative Problem-Solving model on problem solving in terms of:
 - 1.1 communication;
 - 1.2 decision making;
 - 1.3 analyzing; and
 - 1.4 reasoning?
2. Is there a significant difference between the Mean Percentage Score before and after the utilization of Creative Problem-Solving model in Problem Solving?
3. What is the level of effectiveness of the "Creative Problem-Solving model strategies" in improving the students' problem-solving skills?

Hypothesis

There is no significant difference between the pre-test and post-test results before and after using the Creative Problem-Solving model in problem-solving skills.

METHODS

Research Design

A experimental research method of research was used in this study, specifically a one group pretest-posttest. In one group pretest-posttest pre-experimental design, the research assessed or observed the group before and after the exposure to the strategies based on the CPS learning model. This is to determine the effectiveness of using the strategy based on creative problem-solving learning model in the instruction to improve Grade 10 students' problem-solving skills.

Also, the researchers analyzed the gathered data to determine if there is a significant difference between the pre-test and post-test before and after the exposure in the strategies based on the creative problem-solving learning model of the students.

Furthermore, the researchers administered the pre-test and posttest with a quantitative approach to determine if there was a significant difference in the students' problem solving-skills before and after the exposure on the strategies based on the creative problem-solving learning model.

Population and Sampling

The main sources of data were the Grade 10 students of Alejandro P. Libao National High School (formerly Tagbacan National High School) in Catanauan 1 District in Catanauan, Quezon.

On the other hand, to test the level of effectiveness of the strategies based on the Creative Problem-Solving learning model, the respondents of the study are the mathematics secondary teachers in the Catanauan District 1 using the purposive sampling technique.

Also, the respondents selected using the purposive sampling technique. The participants were all selected in the study since there are only 1 section. The total number of respondents are 33 Grade 10 students with 18 males and 15 females in the school year 2022 - 2023.

Lastly, in selecting the teachers in the Catanauan District 1 the respondents choose the basis of their knowledge and information needed or desired, professional license as teacher, permanent in DepEd, and the fact that they teach in Junior High School mathematics students as part of day-to-day instruction or intervention. The total population of the respondents is composed of 15 teachers.



ETCOR Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Instrument

The researchers conducted a pretest and posttest based on the Most Essential Learning Competencies (MELCs) in mathematics problem solving on determine the mean performance of problem-solving skill based on communication, decision-making, analyzing and reasoning before and after exposure in the strategies based on Creative Problem-Solving learning model. The researchers also used rubrics in checking the pretest and posttest of the students. Furthermore, the pretest and posttest are composed of 5 researchers-made questions and was validated by the Master Teachers and School Head-in Charge of mathematics followed by the piloting among 20 respondents from other Section and testing reliability through Cronbach alpha. The test will be finalized before its distribution among the respondents.

On the other hand, the researchers used a 4-point Likert scale survey questionnaire focused on validating the strategies based on the Creative Problem-Solving learning model by assessing its effectiveness in terms of communication, decision-making, analyzing and reasoning (Strongly agree, agree, disagree, strongly agree). Validation of the instruments is done by the Master Teachers in mathematics together with the school head-in-charge of mathematics in Catanauan I also three experts from the field of mathematics tapped to validate the survey questionnaire.

Data Collection

The research followed a systematic procedure in conducting the study. At first, the researchers presented a concept paper of defended the choose topic to the research adviser and sought approval to continue the study. Second, the researchers reviewed the related literature and studies form the different sources and completed the chapter 1 to 3 of the study and it presented to the research panelist for the proposal defense. After that, the researchers seek permission by means of giving a communication letter addressed to the Schools Division Superintendent of Quezon Province, followed by the Public School District Supervisor and School Head of the chosen school in DepEd Quezon.

Before exposing the respondents to the strategies based on Creative Problem Solving, the researchers administered the pretest to determine the mean performance of problem-solving skills of the Grade 10 students. After the pretest, the researchers produced a Lesson Plan with such strategies based on the Creative Problem-Solving learning model in the means of Daily Lesson Logs. The researchers integrated creative problem-solving learning model in every problem-solving lessons. On the first week of using the Creative Problem-Solving method, the researchers discussed the concept of permutation.

The researchers introduced the CPS model by giving them a Problem Solving and asked them one by one to clarified the given problem first by answering what they are trying to figure out about the problem, and disclosure of opinion by asking them what they already know about the problem for the students to thinks the answer creatively after that they played the game called Permutation Millionaire where the students need to answer the given in 10 seconds and every correct answer has a corresponding point, the highest score a student can earned will be an additional point to be a Millionaire. The researchers also gave the students the activity by pair called the "Think-Pair-Share and share their work in front of the class. Before the end of the week the researchers introduced the other way of solving the problem by giving them the formula of permutation.

In the second week of implementing the Creative Problem-Solving learning model, the researchers gave the activity by group and divided the class by 4 with uneven numbers of members. Each group will be asked to arrange themselves in a circle. And discussed their answer in front of the class by following the step of CPS model. After that the researchers discussed a new concept and practicing the new skills of the students and gave them the assessment.

In the third week of implementing the CPS model the researchers introduced the new topic that has a connection with the previous topic which is the Combination and differentiate the Combination and Permutation and giving them a lot of activities to enhance their problem-solving skills using the CPS Model.

By the last week of using the Creative Problem-Solving learning model, the researchers administered the posttest, and the results were analyzed and interpreted.

Treatment of Data

The researchers utilized descriptive and inferential statistic to interpret the raw data collected. The statistical description of the data set is known as descriptive statistics. In descriptive statistics, the researchers used mean, while the researchers utilized inferential statistics to draw conclusions or inferences based on the result of the data collected

In this study, Mean was used by the researchers to determine how the students perceived the strategies based on Creative Problem-Solving learning model in their problem-solving skills as to communication, decision-making,



ETCOR

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE

Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

analyzing and reasoning before and after the exposure to the Creative Problem-Solving learning model and for the effectiveness of the strategies based on the Creative Problem-Solving learning model.

On the other hand, Dependent t-test was used to determine the significant difference in the students' problem-solving skills before and after the exposure to Creative Problem-Solving learning model.

Ethical Considerations

The researchers diligently adhered to all ethical research protocols to safeguard the well-being and interests of all individuals and organizations involved in the study.

RESULTS AND DISCUSSION

Pre-Test and Post-Test Scores

Table 1. Students' Problem-Solving Skills before and after the utilization of the Creative Problem-Solving Learning Model

| | Pre-test | | | Post-test | | |
|-----------------|-------------|------------|-------------|------------|------------|--------------------|
| | Mean | SD | VI | Mean | SD | VI |
| Communication | 2.99 | .37 | Good | 3.50 | .45 | Outstanding |
| Decision making | 2.90 | .51 | Good | 3.36 | .54 | Good |
| Analyzing | 2.72 | .58 | Good | 3.50 | .59 | Outstanding |
| Reasoning | 2.78 | .53 | Good | 3.62 | .53 | Outstanding |
| Overall | 2.84 | .49 | Good | 3.5 | .53 | Outstanding |

Legend: "Excellent (4.51-5.00)", "Outstanding (3.51-4.50)", "Good (2.51-3.50)", "Acceptable (1.51-2.50)", "Poor (1.00-1.50).

Table 1 shows the result of the students' performance in problem-solving skills before and after the utilization of the Creative Problem-Solving (CPS) Learning Model implied that during pretest, students' problem-solving skills in communication has mean of 2.99 and in the posttest, it increased and it became 3.50 which interpreted as Outstanding.

This is in line with the study of Septian et al. (2020) which revealed that the achievement and improvement of mathematical creative thinking skill of students who use the Creative Problem-solving learning model are better than students who do not get special learning treatment. The Creative Problem-solving learning model improves the ability to solve mathematical problems in class VIII students.

Also, in the study of Wijayanti and Sungkono (2017), it was revealed that the CPS learning approach is said to be more successful since it encourages pupils to think critically, generates ideas for solutions and finds support for the right answer.

Significant difference between the Pre-Test and Post-Test

Table 2. Significant difference between the Mean Percentage Score before and after the utilization of Creative Problem-Solving learning model in Problem Solving

| Creative problem-solving model | Pre-test | | Post-test | | t | df | Sig. (2-tailed) |
|--------------------------------|----------|-----|-----------|-----|------|----|-----------------|
| | Mean | SD | Mean | SD | | | |
| Communication | 2.99 | .38 | 3.50 | .45 | 4.82 | 32 | .000 |
| Decision making | 2.90 | .51 | 3.36 | .54 | 9.67 | 32 | .000 |
| Analyzing | 2.72 | .58 | 3.50 | .59 | 9.06 | 32 | .000 |
| Reasoning | 2.78 | .53 | 3.62 | .53 | 7.20 | 32 | .000 |
| Overall | 2.84 | .50 | 3.50 | .53 | 7.69 | 32 | .000 |

if $p \leq .05$ (significant); if $p > .05$ (not significant)

Table 2 depicts the significant difference between the MPS before and after the utilization of Creative Problem-Solving learning model in Problem-Solving. The t-test was done to see whether there was a statistically significant difference between the tests. Its calculated t-value in terms of communication is 4.82, decision making is 9.67, analyzing is -9.06 and in reasoning is 7.20, which are lower than the table value if 1.99 at the 0.05 p-value level. The



ETCOR Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

null hypothesis that “there is no significant difference between the pre-test and post-test result of Grade 10 students” was rejected since the t-value was smaller than the tabular value. It only proves that the scores obtained in the post-test can be attributed to the utilization of creative problem-solving learning models in enhancing the problem-solving skills of the Grade10 students.

Additionally, when the CPS learning model is used, students have the chance to actively participate in the teaching and learning process. They are taught to manage and effectively express their findings through exploration, inquiry, questioning and investigation of questions and answers. Learning with CPS is therefore more meaningful and can help students become more adept at solving mathematical puzzles.

Aligned with the study of Sundari’s (2016) that found that using CPS learning models, as opposed to expository ones, improves conceptual understanding. Additionally, CPS instruction can enhance students’ learning objectives and activities. (Indayatmi, 2017)

In addition, the success of the Creative Problem-Solving learning model is shown in studying. The practice of employing innovative techniques in CPS instruction aids students in comprehending and resolving a variety of mathematical issues, particularly when it comes to problem-solving. Based on the result, learning using Creative Problem-Solving learning model can increase students’ problem-solving skills. Also, Students are used to comprehending the concept of the subject being taught in classrooms that employ the Creative Problem-Solving learning methodology. Students are expected to have the guts to voice their thoughts and ask questions, and they are used to coming up with original solutions to challenges.

Acceptability Level of the Creative Problem-Solving Learning Model According to the Expert

Table 3. Level of Acceptability of Creative Problem-Solving in improving the students problem-solving skills in terms of Communication

| Communication | Mean | Verbal Interpretation |
|--|-------------|-----------------------|
| 1 The strategies employed utilize appropriate mathematical vocabulary and terminology. | 3.87 | Highly Acceptable |
| 2 The strategies were clearly articulated, well-organized, and straightforward to comprehend | 3.93 | Highly Acceptable |
| 3 The strategies provided justification and reasoning for each step in the problem-solving process. | 3.93 | Highly Acceptable |
| 4 The lessons incorporated visual aids, such as diagrams or charts, to enhance and bolster the explanations provided within the lessons. | 3.13 | Acceptable |
| 5 The lessons consistently demonstrated high-level communication skills in problem-solving | 3.67 | Highly Acceptable |
| 6 The lessons Implement peer-review activities where students can provide feedback on others problem-solving. | 4.00 | Highly Acceptable |
| 7 The lessons feature a clear and detailed rubric that outlines specific criteria for assessing problem-solving abilities, with a particular emphasis on communication skills. | 3.73 | Highly Acceptable |
| 8 The strategies facilitate the application of students' critical and creative thinking skills in problem-solving. | 4.00 | Highly Acceptable |
| GRAND MEAN: | 3.78 | Highly Acceptable |

Legend: "Highly Acceptable (3.50-4.00)", "Acceptable (2.50-3.49)", "Moderately Acceptable (1.50-2.49)", Not Acceptable (1.00-1.49)

Table 3 illustrates the level of effectiveness of creative problem-solving in improving the students’ problems-solving skills in terms of Communication. Based on the findings, the respondents revealed that in terms of communication the lessons in Creative Problem-Solving implement peer-review activities where students can provide feedback on other problem-solving, and the strategies facilitate the application of students’ critical and creative thinking skills in problem solving with a mean of 4.00 and interpreted as Highly Acceptable. On the other hand, the Creative Problem-Solving lessons incorporated visual aids, such as diagrams or charts, to enhance and bolster the explanations



ETCOR

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE

Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

provided within the lesson obtained the lowest mean of 3.13 and interpreted that the respondents agree on this indicator.

This implies that as to communication in the Problem-Solving skills, the Creative Problem-solving learning model in teaching-learning process encourages peer-review activities that students can provide feedback on other problem-solving, and it can improve the students' critical and creative thinking skills in problem solving. It also implies that the respondents felt lack on the visual aids such as diagrams or charts in the teaching-learning process.

Table 4. Level of effectiveness of creative problem-solving in improving the student's problem-solving skills in terms of decision-making.

| | Decision Making | Mean | Verbal Interpretation |
|--------------------|---|-------------|------------------------------|
| 1 | The lessons have identified the key components and requirements essential for understanding and tackling the problems effectively | 3.67 | Highly Acceptable |
| 2 | The strategies have selected an appropriate problem-solving strategy that aligns seamlessly with the nature of the problem at hand with the nature of the problem | 3.73 | Highly Acceptable |
| 3 | The lessons effectively apply the chosen problem-solving strategy with accuracy and precision | 3.80 | Highly Acceptable |
| 4 | The lessons guided students to provide clear and logically justified explanations for the decisions made throughout the problem-solving process | 3.93 | Highly Acceptable |
| 5 | The strategies exhibit advanced decision-making skills in mathematical problem-solving. | 3.93 | Highly Acceptable |
| 6 | The application of the strategy lead to a logical and coherent problem-solving process. | 4.00 | Highly Acceptable |
| 7 | The strategies are well-suited to address the specific mathematical challenge. | 3.87 | Highly Acceptable |
| 8 | The strategies assessed the students' capacity to provide clear and logical justification for the decision made during the math problem-solving process. | 3.60 | Highly Acceptable |
| GRAND MEAN: | | 3.81 | Highly Acceptable |

Legend: "Highly Acceptable (3.50-4.00)", "Acceptable (2.50-3.49)", "Moderately Acceptable (1.50-2.49)", Not Acceptable (1.00-1.49)

Table 4 present teachers' responses with regards to the effectiveness level of creative problem-solving in improving the students' problem-solving skills in terms of Decision Making. It can be gleaned from the data that the grand mean of the teacher-respondents along the effectiveness level in decision making of response is 3.81 which is "Highly Acceptable" by teacher-respondents. All eight indicators were rated to "Strongly Agree" having weighted mean that range from 3.60-4.00.

The findings imply that as to the decision-making, the application of the CPS learning model strategy can lead to a logical and coherent problem-solving process. Also, it also implies that the teacher-respondents felt lack of the visual aids such as diagrams or charts in the teaching-learning process. In support of the study, Tambunan (2018) revealed that educators play a critical influence in shaping students' interest in and performance in mathematics. Teachers must make learning enjoyable for pupils in order to foster their interest, as enjoyment is crucial to learning. Students' dominance at a high level of interest is demonstrated by the creative problem-solving learning model, indicating that it positively affects their interest in learning. In the CPS, learning curiosity will motivate students to never give up on finding solutions by making every effort to generate original ideas based on the knowledge they already possess. (Partayasa et al., 2020)



ETCOR Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

Table 5. Level of effectiveness of creative problem-solving in improving the student's problem-solving skills in terms of analyzing

| | Analyzing | Mean | Verbal Interpretation |
|--------------------|---|-------------|-----------------------|
| 1 | The strategies revealed that student's ability to introduce original and innovative approaches in solving mathematical problems. | 3.80 | Highly Acceptable |
| 2 | The strategies encourage the students to think outside conventional methods and explore unique problem-solving approaches. | 3.87 | Highly Acceptable |
| 3 | The strategies determined whether the students demonstrate flexible and adaptive thinking when approaching mathematical problems. | 3.20 | Acceptable |
| 4 | The lessons encourage the students to explore alternative problem-solving strategies and demonstrate openness to unconventional approaches. | 3.27 | Acceptable |
| 5 | The strategies evaluate the student's capacity to integrate multiple mathematical concepts and approaches to create innovative problem-solving solutions. | 4.00 | Highly Acceptable |
| 6 | The lessons encourage students to explore connections between different mathematical concepts to develop creative solutions | 3.67 | Highly Acceptable |
| 7 | The lessons assess the students' ability to effectively communicate and present creative problem-solving solutions with clarity and coherence. | 3.80 | Highly Acceptable |
| 8 | The strategies encourage the students to articulate their creative thought processes and solutions in a clear and organized manner. | 4.00 | Highly Acceptable |
| GRAND MEAN: | | 3.70 | Strongly Agree |

Legend: "Highly Acceptable (3.50-4.00)", "Acceptable (2.50-3.49)", "Moderately Acceptable (1.50-2.49)", "Not Acceptable (1.00-1.49)"

Presented in table 5 are the teachers' responses in relation to the effectiveness of the CPS learning model in improving the students' problem-solving skills as to analyzing. The average weighted mean in terms of analyzing is 3.70 which is strongly agreed. In terms of "the strategies evaluate the students' capacity to integrate multiple mathematical concepts and approaches to create innovative problem-solving solutions" and "The strategies encourage the students to articulate their creative thought processes and solutions in a clear and organized manner" it has a weighted mean of 4.00. It can be interpreted that the Creative Problem-Solving learning model is well-organized since it can improve the students in analyzing the mathematical problem and improve the students' problem-solving skills.

It is similar with the study of Heliawati (2022) which revealed that the by breaking students into small groups and having them collaborate to find solutions to mathematical problems, the creative problem-solving learning model fosters creativity in mathematics education. The learning steps include problem clarification, opinion expression, evaluation, and implementation. With this approach, students' curiosity will grow since the problems presented have the potential to put them in challenging circumstances and inspire them to participate fully in their education. (Eladl & Polpol, 2020)

Table 6. Level of effectiveness of creative problem-solving in improving the student's problem-solving skills in terms of reasoning

| | Reasoning | Mean | Verbal Interpretation |
|---|---|------|-----------------------|
| 1 | The strategies assess the students' ability to apply logical reasoning to analyze and solve mathematical problems. | 3.53 | Highly Acceptable |
| 2 | The strategies encourage students to demonstrate a strong grasp of logical processes in their problem-solving | 3.67 | Highly Acceptable |
| 3 | The strategies determine if the student supports problem-solving decision with strong evidence and coherent arguments based on mathematical principles. | 3.87 | Highly Acceptable |



ETCOR Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

| | | | |
|--------------------|--|-------------|-------------------|
| 4 | The strategies encourage students to provide solid evidence and reasoning to support their problem-solving process. | 3.67 | Highly Acceptable |
| 5 | The strategies evaluate the students' demonstration of strategic thinking in analyzing and approaching mathematical problems. | 3.87 | Highly Acceptable |
| 6 | The strategies motivate the students to showcase adept understanding of strategic decision-making in their problem-solving strategies. | 3.93 | Highly Acceptable |
| 7 | The strategies assess the students' ability to integrate mathematical concepts and principles to develop coherent problem-solving. | 3.67 | Highly Acceptable |
| 8 | The strategies encourage students to demonstrate a comprehensive understanding of how various mathematical concepts can be integrated into their problem-solving approach. | 3.73 | Highly Acceptable |
| GRAND MEAN: | | 3.74 | Highly Acceptable |

Legend: "Highly Acceptable (3.50-4.00)", "Acceptable (2.50-3.49)", "Moderately Acceptable (1.50-2.49)", Not Acceptable (1.00-1.49)

Table 6 displayed the teacher's responses in relation to the effectiveness level of the creative problem-solving learning model in improving the students problem-solving skills in terms of Reasoning. It can be gleaned from the analyzed data having the grand mean of 3.74 which interpreted as "Strongly Agree". This means that the CPS learning model strategies motivate the students to showcase adept understanding of strategic decision-making in their problem-solving strategies with a mean of 3.93 interpreted as Highly Acceptable.

The study implies that Creative Problem-Solving strategies motivate the students to showcase adept understanding strategic decision-making in their problem-solving strategies and evaluate the students' demonstration of strategic thinking in analyzing and approaching mathematical problems.

In line with that, the study of Nopitasari (2016) revealed that The students' arithmetic adaptive reasoning abilities were greater for those taught using the creative problem-solving model than for those taught using the conventional paradigm.

Likewise, Faro et al. (2022) revealed that the four steps of the creative issue-solving model—problem classification, opinion expression, evaluation and selection, and implementation—have been shown to be effective in enhancing creative thinking, problem solving, and adaptive reasoning. Creating a supportive environment is essential for the CPS model learning process.

Table 7. Summary table of level of effectiveness of creative problem-solving in improving the student's problem-solving skills.

| Problem Solving Skills | Mean | Verbal Interpretation |
|------------------------|------|-----------------------|
| Communication | 3.78 | Highly Acceptable |
| Decision Making | 3.81 | Highly Acceptable |
| Analyzing | 3.70 | Highly Acceptable |
| Reasoning | 3.74 | Highly Acceptable |

Legend: "Highly Acceptable (3.50-4.00)", "Acceptable (2.50-3.49)", "Moderately Acceptable (1.50-2.49)", Not Acceptable (1.00-1.49)

The table 7 showed the summary for the Level of Acceptability of creative problem-solving in improving the students problem-solving skills. Based on the findings the Problem-solving skills of the students in terms of Communication, Decision Making, Analyzing and Reasoning are all Highly Acceptable.

It implies that the strategies with Creative Problem-solving learning model evaluate the students' capacity to integrate multiple mathematical concepts and approaches to creative innovate problem-solving solutions and it encourages students to articulate their creative thought processes and solutions in a clear and organized manner.

Conclusions

Based on the findings of the study, the Creative Problem-Solving learning model improves the Problem-Solving skills of the Grade 10 students. Moreover, the Creative Problem-Solving learning model in problem solving skills in terms of Communication, Decision making, Analyzing and Reasoning in is effectiveness for use since the base on parameters, communication, decision-making, analyzing and reasoning were observed by the respondents. This only



ETCOR

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE

Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

manifests the effectiveness of the strategies based on the creative problem-solving learning model in enhancing the problem-solving skills of the Grade 10 students. On the other hand, Teacher-respondents' overall satisfaction with the strategies based on Creative Problem-solving was considered. It shows that the teachers' respondents were pleased with the strategies. The survey results indicated that the Creative Problem-Solving was well received by its target audience. The overall is Communication, Decision Making, Analyzing and Reasoning, which "Highly Acceptable" generate a broad conclusion that can trust based on these numbers.

Recommendations

It is recommended that teachers use the strategies based on the Creative Problem-Solving learning model to help increase the problem-solving skills of the students. This can be used not only to improve mathematical problem-solving but also in other subjects to help aid the needs of the struggling learners. While the current findings suggested the use of Creative Problem-Solving learning model can be effective in improving the problem-solving skills of the students, it would be beneficial for future researchers to conduct long-term research to examine the sustained effect of utilizing the Creative Problem-Solving learning model on the enhancement of problem-solving skills. Furthermore, since the study revealed that the decision making obtained the lowest problem-solving skills of the students, it suggested in the future researchers to focus on the problem-solving skills specifically the decision making.

REFERENCES

- Abenojar, M. B. (2024). Effectiveness of Directed Reading Thinking Activity (DRTA) in Improving the Reading Comprehension of Grade Three Pupils. *International Journal of Open-access, Interdisciplinary and New Educational Discoveries of ETCOR Educational Research Center (iJOINED ETCOR)*, 3(2), 435-446. [https://etcor.org/storage/iJOINED/Vol.%20III\(2\),%20435-446.pdf](https://etcor.org/storage/iJOINED/Vol.%20III(2),%20435-446.pdf)
- Bahtiar, R., S., & Sartono, E., K., E. (2020). The Role of Sociology in Development Primary School Education in Indonesia. *Journal of Human University Natural Sciences*.
- Dela Cruz, J. K. B., & Lapinid, M. R. C. (2014) *Students' Difficulties in Translating Worded Problems into Mathematical Symbols*. DLSU Research Congress 2014.
- Effendi, A. (2017). *Implementation of Creative Problem-Solving Model to Improve the High School Student Metacognitive*. IOP Conference Series: Journal of Physics.
- ElAdl, A., M., & Polpol, Y., S. (2020) The effect of self-regulated learning strategies on developing creative problem-solving and academic self-efficacy among intellectually superior high school students. *International Journal of Psycho-Educational Sciences*.
- Faroh, A., Asikin, M., & Sugiman, S. (2022) *Literature Review: Kemampuan Berpikir Kreatif Matematis dengan Pembelajaran Creative Problem Solving*. JKPM (Jurnal Kajian Pendidikan Matematika)
- Funda, K. (2011). *Using songs as audio materials in teaching Turkish as a foreign language*. Turkish Online Journal of Educational Technology.
- Heliawati, L. (2021) *Creative problem-solving learning through open-ended experiment for students' understanding and scientific work using online learning*. International Journal of Instruction.
- Hobri, Unmah, I., K., Yuliati, N., & Dafik. (2020) *The Effect of Jumping Task Based on Creative Problem Solving on Students' Problem-Solving Ability*. International Journal of Instruction ISSN vol. 13 no. 1 <https://doi.org/10.29333/iji.2020.13126a>
- Indayatmi (2017) *Peningkatan Hasil Belajar Analisa Titrimetri melalui Model Creative Problem Solving pada Peserta Didik SMK*. Jurnal Pendidikan Sains.



ETCOR

INTERNATIONAL
MULTIDISCIPLINARY
RESEARCH CONFERENCE

Educational Research Center Inc.
SEC Reg. No. 2024020137294-00

Sta. Ana, Pampanga, Philippines



Website: <https://etcor.org>



iJOINED ETCOR
P - ISSN 2984-7567
E - ISSN 2945-3577



The Exigency
P - ISSN 2984-7842
E - ISSN 1908-3181

- Kim, S., Choe, I., & Kaufman, J. C. (2019). *The Development and Evaluation of The Effect of Creative Problem-Solving Program on Young Children's Creativity and Character*. Thinking Skills and Creativity. <https://doi.org/10.1016/j.tsc.2019.100590>.
- Kim, D., Lee, Y., Leite, W. L., & Huggins-Manley, A. C. (2020). *Exploring student and teacher usage patterns associated with student attrition in an open educational resource-supported online learning platform*. Computers & Education. <https://doi.org/10.1016/j.compedu.2020.103961>.
- Mogari, D., & Chirove, M. (2017). Comparing grades 10-12 mathematics learners' non-routine problem solving. *Eurasia Journal of Mathematics, Science and Technology and Education*. <https://doi.10.12973/eurasia.2017.00956a>
- Nopitasari, D. (2016) Pengaruh model Pembelajaran Creative Problem Solving (CPS) terhadap kemampuan penalaran adaptif matematis siswa. *Mathline J Mat dan Pendidik*.
- Organization for Economic Co-operation and Development OECD (2018) The Future of Education and Skills: Education 2030 The Future We Want
- Organization for Economic Co-operation and Development OECD (2019) Education at a Glance.
- Organization for Economic Co-operation and Development OECD (2022) PISA 2022 Results. Volume I and II
- Partayasa, W., Suharta, I., G., P., & Supara, I., N. (2020). *Pengaruh Model Creative Problem Solving (CPS) Berbantuan Video Pembelajaran Terhadap Kemampuan*
- Scherer, R., & Gustafsson, J. (2015) Student assessment of teaching as a source of information about aspects of teaching quality in multiple subject domains: an application of multilevel bifactor structural equation modeling. *Quantitative Psychology and Measurement. Volume 6*. <https://doi.org/10.3389/fpsyg.2015.01550>
- Sundari, (2016) Eksperimen Pembelajaran Matematika dengan Strategi Creative Problem Solving (CPS): terhadap Pemahaman KOnsep Ditinjau dari Kemampuan Komunikasi Matematis pada SISwa Kelas.
- Tambunan, H. (2018). Impact of heuristic strategy on students' mathematics ability in high order thinking. *International electronic journal of Mathematics Education*. <https://doi.org/10.12973/iejme/3928>.
- Wijayanti, S., & Sungkono, J. (2017) Pengembangan Perangkat Pembelajaran mengacu Model Creative Problem Solving berbasis Somantic, Auditory, Visualization, Intellectually. *Al-Jabar: Jurnal Pendidikan Matematika*