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EXPLORING RELATIONSHIP OF INSTRUCTIONAL SCAFFOLD IN PROBLEM POSING PERFORMANCE UNDER DIFFERENT SITUATIONS

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Abstract:

This study explored the relationship of the instructional scaffold in problem-posing performance under different situations. The sampling is intentional and purposive. Results revealed an improvement to the student's performance in terms of the quantity of the problems they had posed but not with its quality due to instructional scaffolding. Mostly, they had posed textbook-like problems they commonly encountered in the classrooms, and only a few posed beyond the need for factual information. Students consulted their existing knowledge, a concept of Cognitive Load Theory where the researchers anchored this study. Observation revealed that when students utilized problem posing, there were cognitive load implications. They justified that they choose situations to create problems where they could easily relate and are mainly involved with Statistics and Probability due to its recency for recall since it was offered currently as one of their subjects.

Moreover, Pattern appears to have the least involvement on their posed problems but has perceived the given problems based on given situations as "easy" problems as to their content knowledge. The students judged the structured type of problem-posing as "difficult" as to their posed problems, while they perceived "neutral" with free and semi-structured style, which means they were undecided about its difficulty. However, students confessed they struggled most with their tasks because they lacked previous experiences, which is not present in their early education. Hence, the given recommendation is to infuse it formally in the curriculum with utmost attention and priority.

Keywords: problem posing, instructional scaffold, self-efficacy, encountered difficulties, STEM, data coding

INTRODUCTION

As evident in several existing pieces of literature, scaffolding has been an ideal technique employed in the course of the teaching and learning process. But, it has also been used, more loosely, for any supportive teaching (Gonulal & Loewen, 2018). On the other hand, there is an emphasis on identifying problem-posing as a significant element in mathematics(Ellerton, 2013). However, mathematics teachers are inclined to abandon the inverse of solving a mathematical problem in teaching any mathematics program, which is posing problems (Gonzales, 1994), regardless of its worth in advancing our students' mathematical thinking. Despite research on the influence of posing problems on students' learning, much attention is still given to solving problems. It has to be noted that several types of research revealed that problem-posing boosts the analytical and critical-thinking skills of the students, their viewpoint and behavior, self-esteem, grasping contents, as well as the mathematical and logical skills of learners (Singer, Ellerton, & Cai, 2013). Ponte and Henriques (2013) also emphasized that it reinforces basic mathematical skills, increases motivation, responsibility, and thinking flexibility, and is helpful for teachers to assess students' cognitive processes, identify misconceptions, and modify instruction.Nonetheless, as experienced by the researcher, students were customarily used to being fed up with problems to solve without considering their prior knowledge of it. These problems come either from textbooks, the internet, or the teacher, thus limiting the students' creativity. Fetterly (2010), Silver and Cai (2005), and Yuan and Sriraman (2010) conveyed that posing varied problems is linked with creativity.

The researcher decided to conduct this study to explore the relationship of the instructional scaffold in problem-posing performance under different situations among the students with low prior knowledge, average prior knowledge, and high prior knowledge. This study is essential in crafting the desired model as an intervention like Strategic Intervention in Mathematics (SIM) to enhance teaching and learning.

Students in the problem-posing process sense the necessity of showcasing their reasoning skills, understanding the subject in detail, and making connections with real-life situations (Cunningham, 2004). This process has the probability of giving students an understanding of what it means to "do mathematics" (Lavy & Shriki, 2009). Besides, this process offers students diverse and flexible thoughts and gives them responsibility for learning (Ergün, 2010). In this way, the researcher could help the country's perception of Mathematics' roles in Philippine Education, that is, facilitating contribution in productive life activities, providing a way of making sense of the world, serving as a means of communication, and operating as an opportunity to national progress.

MATERIALS AND METHODS

Research Design

The study made use of descriptive research survey design. The design mentioned unfolded the important relationship of instructional scaffold to the problem posing performance of the students under different situations.

Data Collection Tools

The researcher used the same worksheets for the pre-test and post-test that contain numerous problem-posing activities to cater to the level of learning experiences of the participants and in the different fields of Mathematics which contains problem situations, illustrations, and charts. The participants' tasks include posing three or more problems per category and justifying their choice of problem. They were allowed to pose problems among the problems presented or posed the three questions from only one problem. All the data gathered were used to determine the kind of problems participants posed before and after the instructional scaffold. The categorization of questions includes number sense, geometry, pattern, measurement, and statistics and probability gathered from different pieces of literature of related significance in evaluating the participants posed problems. The researcher must confirm data through diversification, participant, or colleague affirmation (Yildirim & Simsek, 2008) to ensure a holistic representation of the participants. In this context, other than the researcher, the data were subjected to analysis by two other researchers, who were specialists in their fields and trained with problem posing. A colleague confirmation made serves as a test of the validity of this study. The instrument has been used already in the area of problem-posing, as cited in this paper. However, there were some revisions on the problem situations to foster the originality of the examples provided.

Figure I shows the flowchart of the procedure in this study.

1st Day: Test for Prior Knowledge (3 hours)

1) Pre-test of Problem Posing Skills (2.5 hours)
2) Measuring Self-Efficacy (0.17hour)
3) Measuring Perceived Level of Difficulty on the Given Problems Posed Based on the Given Situations as to their Content Knowledge (0.33hour)

2nd Day: Instructional Scaffold (8 hours)

1) Orientation on Problem Posing (Definition, Importance, Application in Teaching and Learning(1hour)
2) Presentation of Data Coding Scheme (Criteria and Examples) (1hour)
3) Developing Problem Posing Skills Workshop (1.5 hours)
4) Post-test of Problem Posing Skills (2.5 hours)
5) Identification of Encountered Difficulties/ Focus Group Interview (1hour)
6) Judgment of the Problems they Posed (1hour)

Figure I

Data Gathering Procedure

Participants

The participants of this study were the 18 students of Grade 11 Science, Technology, Engineering, and Mathematics of Loreto Senior High School, Loreto, Dinagat Islands, for School Year 2018-2019. There were 16 of them whose age is 17 years old and two students who are 16 years old; 14 were females while there were four males. This study used purposive sampling. They are chosen as participants of this study since they are taking more mathematics subjects as their specialization than Technical-Vocational students. The researcher took their exposure to

Math subjects into account to have some knowledge to avoid the novelty of the problem-posing task being an issue. Therefore, the sample is intentional.

Data Analysis

This study used the following statistical tools in analyzing and interpreting the gathered data.

Frequency Count and Percentage. This was used to determine the profile of the participants and to classify the responses in each category. This study determined the frequency in each level of criteria on good problem posing.

Mean and Standard Deviation. This was used to determine the participants' perceived level of self-efficacy and difficulty of the problems posed based on their content knowledge.

Data Coding

Figure II shows a summary of the data coding scheme being developed and used in this study. Each step in the data coding process is explained more fully in this section. Specifically, the data coding scheme described how the participants posed the problems before and after the activity.

The flow of the problem posed can be gleaned in Figure II.

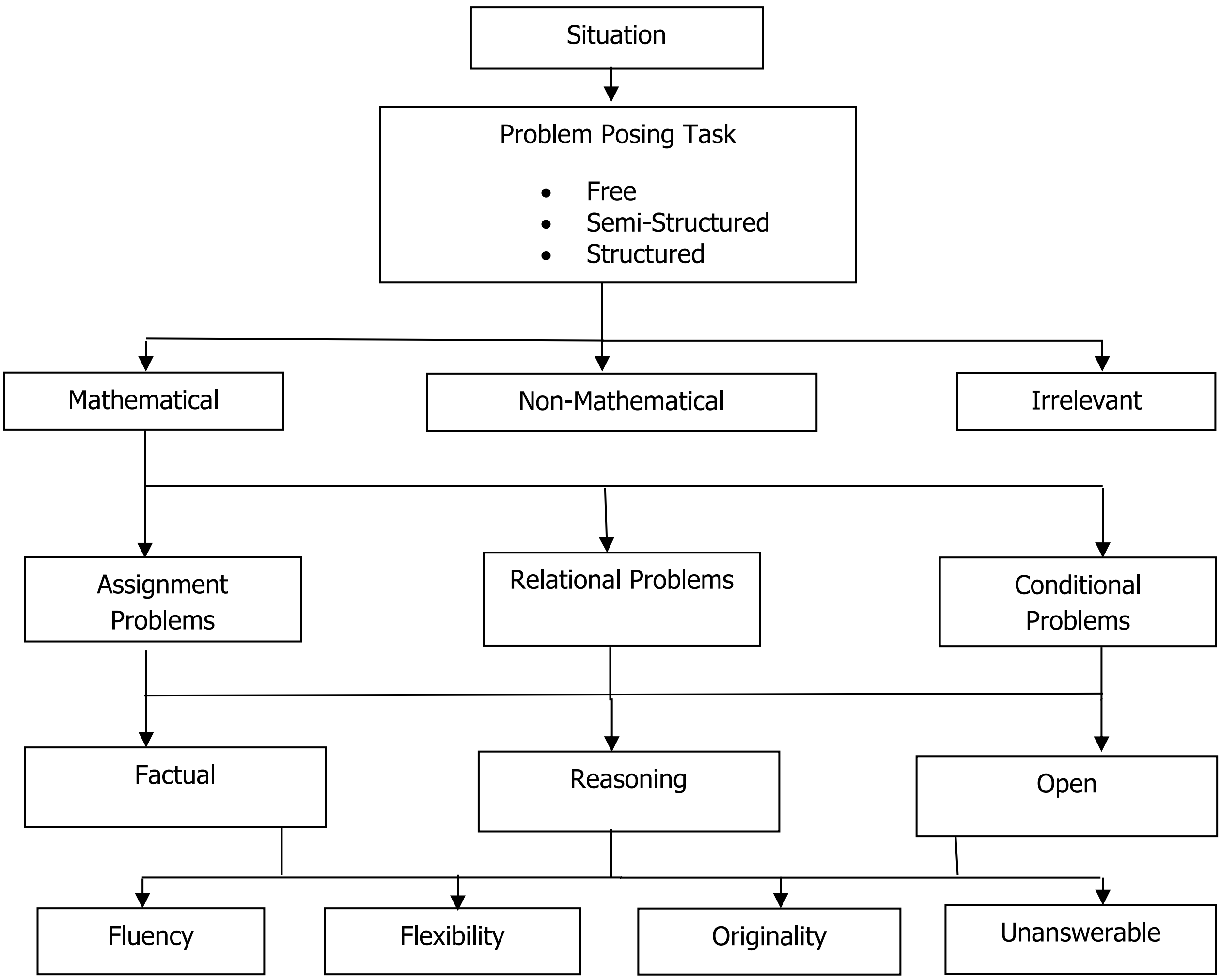


Figure II

Data Coding Scheme for Participants' Problem-Posing Activity

The first categorization of students' problem-posing responses is from criteria set by Stoyanova and Ellerton (1996) as free, semi-structured, and structured as to the type of situations. Those responses were given in freestyle when they posed a problem based on a realistic situation. Just like in this case, "In a candy jar, there are 15 lemons, 12 chocolates, and three strawberries. Give their possible chances to be picked up". It is semi-structured when students explore it using knowledge, skills, concepts, and relationships from their prior mathematical experiences. For example, "Which of the following shapes is not a polygon?" Responses were classified as structured when they modify the known and pose a new problem, or keep the data and have changed the required. For instance, "What four circles should be added to represent -2 in the given array? "

The second level was evaluating the kind of questions whether the problems posed were deemed mathematical, non-mathematical, or irrelevant (Silver & Cai, 1997). When taken together with the information provided in the task, those responses given in the form of mathematical questions can be considered to organize a mathematical problem. On the other hand, it was deemed non-mathematical if these do not include, propose, or entail any logical mathematics or lack sufficient information for the statement to be considered mathematical. Responses were classified as irrelevant when questions had nothing to do with the given situation at all, out of context and crazy or stupid, neither mathematical nor non-mathematical, confusing, and lacking details.

The third level judged the classification of mathematical questions posed as to the criteria set by Silver and Cai (1996) as to assignment, relational and conditional problems. Responses were classified as assignment problems when the problems are perceived to be primarily minor complex or easy problems that simple calculations could answer. It is relational problems when the problems are more complex than assignment problems and conditional problems when problems are neither assignment nor relational and is a most complex one.

According to Vacc (1993), the fourth level classification was as factual, reasoning, and open questions as nature of questions. Factual questions are mathematical questions with the essential elements of the statement known in the Mathematics discipline. The classification of responses is reasoning questions when they are not immediately apparent and require figuring things out and explaining why something is not. Otherwise, they were classified as open questions when it is a hybrid of factual and reasoning questions. They elicit information already known but provide a wide range of acceptable answers.

Lastly, the fifth level was on whether the problems have shown fluency, flexibility, originality according to Torrance, 1966; 1974 and unanswerable question. Fluency refers to the total number of interpretable, meaningful, and relevant ideas generated from the given situation or problem. Flexibility pertains to the different ways of problem-solving. Originality refers to a uniquely generated problem from the given situation or problem, while unanswerable indicates questions and concerns where solutions and answers are impossible to grasp.

FINDINGS

The researcher treated all the necessary data of the study and revealed the salient findings of the study as follows:

1. Majority of the participants are female whose age is 17 years old, belonging to average prior knowledge.
2. As to the problem-posing skill of the participants, for the type of situations, before scaffold, "free type of problem-posing" appears to be the most frequent but seems to be the opposite right after scaffold. It became "least frequent" as to their posed problems since most of the problems they have made after the scaffolding that happened dwell under the "semi-structured category." For the kind of questions, the majority of the posed problems are "mathematical" problems. Regarding the classification of mathematical problems, "assignment" problems are the most frequent while "relational and conditional" appear to be the least before and after scaffold. For the nature of questions analysis, the majority are "factual" problems while "reasoning" got the least in number. As to the creativity level analysis test, most of the problems they posed for the fluency category involved "Statistics and Probability." This could be because all of them are currently enrolled in this subject. At the same time, Pattern appears to have the least involvement in their posed problems. Statistics and Probability also ranked first in the flexibility category. At the same time, for originality, this was improved right after the instructional scaffold happened, same with the last category, which is "unanswerable."
3. The participants generally reflected somewhat true of them with the statements measuring their perceived level of self-efficacy.
4. Generally, the findings also revealed that students judged the given problems based on given situations as "easy" problems based on their content knowledge even before the instructional scaffold happened.
5. The encountered difficulties of the students in problem-posing using the instructional scaffold include low prior knowledge or weak foundation with basic math, consciousness on language or sentence structure, making connections with the real-life setting, translating verbal representation to symbolic representation and vice versa, no previous experience, and used to solving." Among all of these, "no previous experience with problem-posing" was the most frequent difficulty they cited.
6. Students judged the difficulty of the problems they posed as "neutral," which means they were undecided about whether they were very difficult, difficult, easy, or easy. However, the participants perceived the structured type of problem-posing as "difficult" based on problems they had posed in this category.

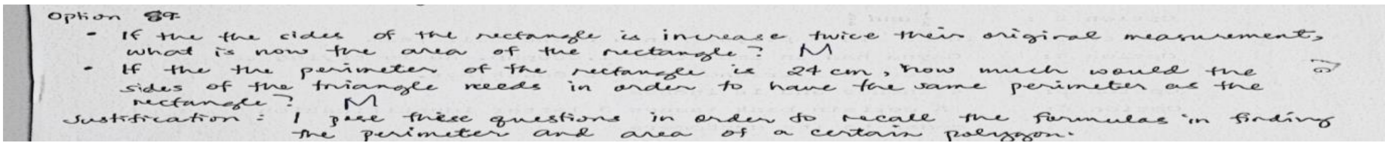
RESULTS AND DISCUSSION

Table 1

Profile of the Participants

Profile		f(n=18)	Percent
Prior Knowledge	Low	4	22.2
	Average	12	66.7
	High	2	11.1
	Total	18	100

As shown in table 1, majority of the participants have average prior knowledge. Students' prior knowledge was rated based on the frequency and quality of their posed problems after the tallying, recording, and categorization were made. The hierarchy scores ranged from one to three. This categorization and scaling process and idea are somewhat parallel to the hierarchy scoring of students' prior knowledge from the study of Guthrie and Taboada (2006), wherein they investigated the relationship of student-generated questions and prior knowledge.


Option 8?
• If the the sides of the rectangle is increase twice their original measurement, what is now the area of the rectangle? M
• If the the perimeter of the rectangle is 24 cm, how much would the sides of the triangle needs in order to have the same perimeter as the rectangle? M
Justification: I pose these questions in order to recall the formulas in finding the perimeter and area of a certain polygon.

Participant 13: If the sides of the rectangle are increased twice their original measurement, what is now the area of the rectangle? If the perimeter of the rectangle is 24cm, how much would the sides of the triangle needs in order to have the same perimeter as the rectangle?

Justification: I posed these questions in order to recall the formulas in finding the perimeter and area of a certain polygon.

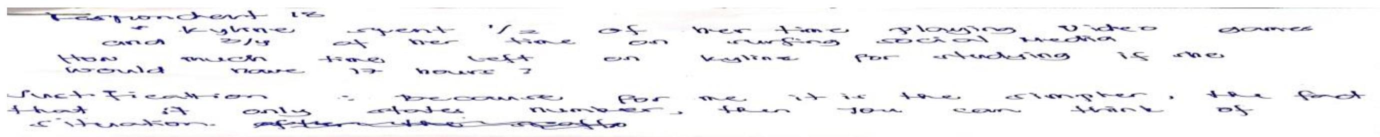
Figure III: ***Example problem posed by a participant with high prior knowledge***

Table 2

Type of Situations

1st Level of Analysis Areas	Free		Semi-Structured		Structured		Total	
	Before	After	Before	After	Before	After	Before	After
Number Sense	6	3	8	11	3	14	**17**	**28**
Geometry	2	15	9	31	1	2	**12**	**48**
Pattern	1	1	3	5	1	14	**5**	**20**
Measurement	6	15	4	10	10	10	**20**	**35**
Statistics and Probability	17	25	6	20	4	25	**27**	**70**
Total	**32**	**59**	**30**	**77**	**19**	**65**	**81**	**201**

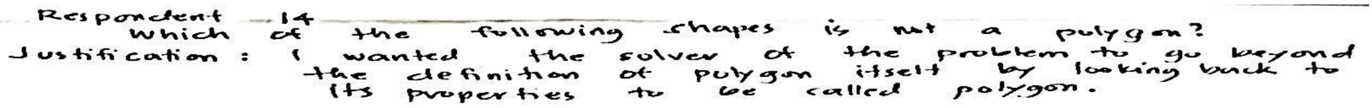
As to the type of situations, before scaffold, the free type of problem-posing appears to be the most frequent. However, it seems to be the opposite after scaffolding was given since it became least frequent as most of the problems they've made fall under the semi-structured category. Free problem posing is effective in the development of mathematical thinking of students (Akay, 2006). As also stated by Ngah, Ismail, Tasir, Said, and Haruzuan (2016), within the three types, the free kind of problem-posing is the most demanding for secondary students. However, Akay (2006) emphasized that in a semi-structured problem-posing strategy, students are given an open-ended situation and are requested to pose problems related to this situation, utilizing their knowledge, skills, and mathematical experience. As observed, the students posed problems from Statistics and Probability, with only a few problems posed before scaffold was given. For instance,


Respondent 18
• Kyline spent 1/2 of her time playing video games and 3/4 of her time on surfing social media. How much time left on Kyline for studying if she would have 17 hours?
Justification: because for me it is the simpler, the fact that it only states number, then you can think of situation. ~~after the scaffo~~

Participant 18: Kyline spent ½ of her time playing video games and ¾ of her time on surfing social media, how much time left on Kyline for studying if she would have 17 hours?

Justification: Because for me it is the simpler, the fact that it only states number, then you can think of situations.

Figure IV: ***Example of a problem posed on a free type of problem posing before scaffold***



Participant 14: Which of the following shapes is not a polygon?-

Justification: I wanted the solver of the problem to go beyond the definition of polygon itself by looking back to its properties to be called polygon.

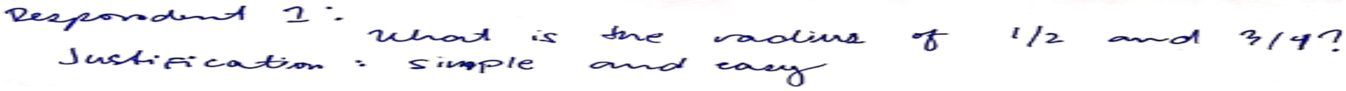
Figure V: ***Example of a problem posed on a semi – structured type after scaffold***

Table 3

Kind of Questions

2nd Level of Analysis Areas	Mathematical		Non-Mathematical		Irrelevant		Total	
	Before	After	Before	After	Before	After	Before	After
Number Sense	17	28	1	0	17	9	**35**	**37**
Geometry	12	48	5	0	8	6	**25**	**54**
Pattern	5	20	3	0	7	4	**15**	**24**
Measurement	20	35	1	2	11	4	**32**	**41**
Statistics and Probability	27	70	1	3	16	9	**44**	**82**
Total	**81**	**201**	**11**	**5**	**59**	**32**	**151**	**238**

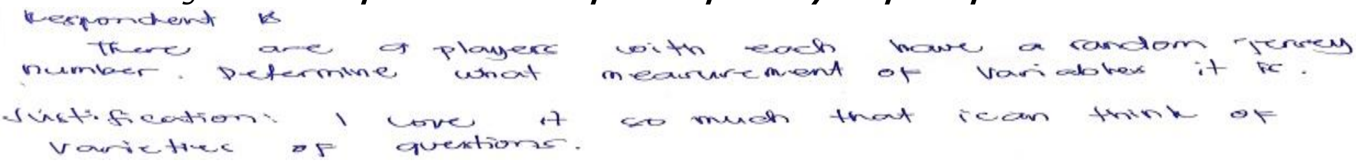
For the kind of questions, most of them posed mathematical problems before and even after the scaffold. The classification of problems is mathematical after a precise examination of an essential concept, theorems, formulas, and application of solutions in mathematics. It is considered mathematical when taken together; it will form a mathematical statement. This lends empirical support to the theoretical argument of Kilpatrick (1987) that the quality of the questions students pose might serve as an index of how well they can solve problems.



Participant 1: What is the radius of 1/2 and 3/4?

Justification: simple and easy

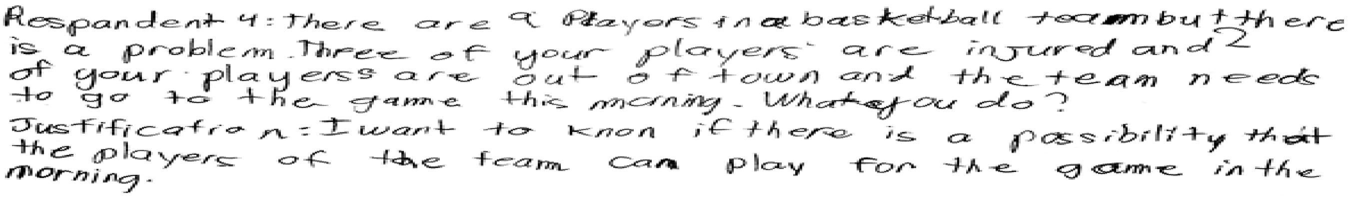
Figure VI: ***Example of irrelevant question posed by the participant after scaffold***



Participant 18: There are 9 players with each have a random jersey number. Determine what measurement of variables it is.

Justification: I love it so much that I can think of varieties of questions.

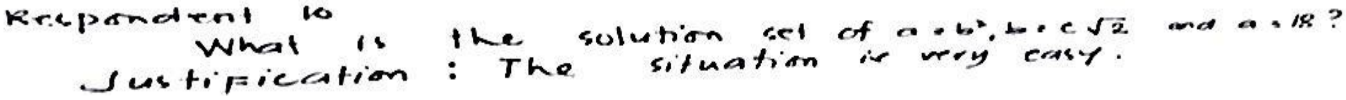
Figure VII: ***Example of posed problem in Statistics and Probability after the scaffold***



Participant 4: There are 9 players in a basketball team, but there is a problem. Three of your players are injured and 2 of your players are out of town and the team needs to go to the game this morning. What would you do?

Justification: I want to know if there is a possibility that the players of the team can play for the game in the morning.

Figure VIII: ***Example of a posed non-mathematical problem after scaffold***



Participant 10: What is the solution set of a= b2, b= c√2 and a=18?

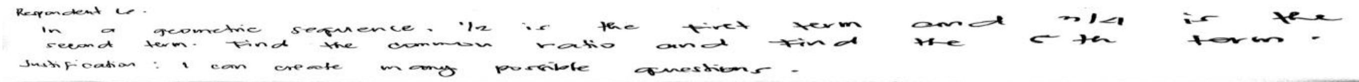
Justification: The situation is very easy.

Figure IX: ***Example of a posed mathematical problem before scaffold***

Table 4
Classification of Mathematical Questions

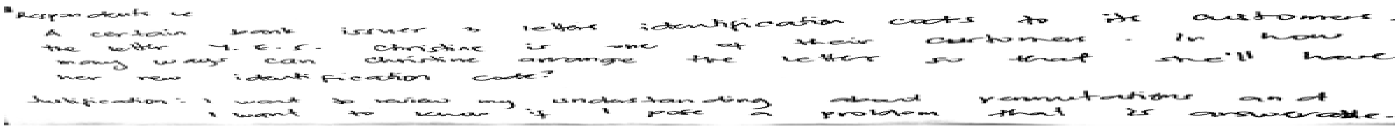
3rd Level of Analysis	Assignment		Relational		Conditional		Total	
Areas	Before	After	Before	After	Before	After	Before	After
Number Sense	12	19	2	5	3	3	**17**	**27**
Geometry	9	36	1	5	2	8	**12**	**49**
Pattern	4	5	1	6	0	7	**5**	**18**
Measurement	15	25	3	8	2	2	**20**	**35**
Statistics and Probability	24	50	1	15	2	7	**27**	**72**
Total	**64**	**135**	**8**	**39**	**9**	**27**	**81**	**201**

As to the classification of mathematical problems, assignment problems are the most frequent, while relational and conditional appear to be the least before and even after scaffold. This could be because problem-solving difficulty seemed to be related to linguistic complexity. Problems with conditional and relational propositions tend to be more difficult for students to solve than those containing only assignment propositions (Mayer, R., Lewis, A., & Hegarty, M., 1992). This influenced their ways of posing problems. For example,


Respondent 6:
In a geometric sequence. 1/2 is the first term and 3/4 is the second term. Find the common ratio and find the 5th term.
Justification: I can create many possible questions.

Participant 6: In a geometric sequence, ½ is the first term and ¾ is the second term. Find the common ratio and find the 5th term.
Justification: I can create many possible questions.

Figure X: ***Example of assignment problem in the area of Pattern posed before scaffold***


Respondent 6
A certain bank issues 3 letter identification codes to its customers. The letter Y.E.S. Christine is one of their customers. In how many ways can Christine arrange the letter so that she'll have her new identification code?
Justification: I want to review my understanding about permutations and I want to know if I pose a problem that is answerable.

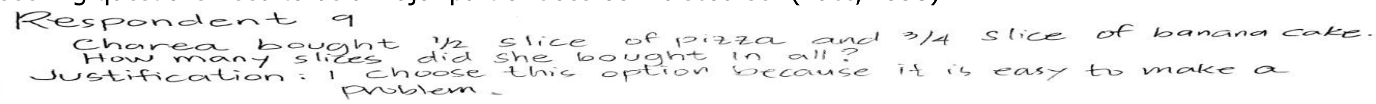
Participant 6: A certain bank issues 3 letters identification codes to its customers. The letters are Y.E.S. Christine is one of their customers. In how many ways can Christine arrange the letters so that she'll have her new identification code?
Justification: I want to review my understanding about permutations and I want to know if I pose a problem that is answerable.

Figure XI: ***Example of conditional problem in Statistics and Probability posed after scaffold***

Table 5
Nature of Questions

4th Level of Analysis	Factual		Reasoning		Open		Total	
Areas	Before	After	Before	After	Before	After	Before	After
Number Sense	12	23	3	0	2	4	**17**	**27**
Geometry	10	40	0	1	2	7	**12**	**48**
Pattern	4	12	1	2	1	4	**6**	**18**
Measurement	17	34	1	0	2	1	**20**	**35**
Statistics and Probability	24	65	0	1	2	7	**26**	**73**
Total	**67**	**174**	**5**	**4**	**9**	**23**	**81**	**201**

For the nature of questions analysis, the majority are factual problems while reasoning got the least in number. Vacc'sVacc's categories, parallel to the NCTM'sNCTM's (1991) guidelines, pull attention to the pedagogical qualities of the questions or problems teachers practice in their classrooms, arguing that factual questions give teachers petite information about whether their students comprehend the given concept. She suggests that "non-fact-seeking questions need to be a major part of classroom discourse" (Vacc, 1993).


Respondent 9
Charea bought 1/2 slice of pizza and 3/4 slice of banana cake. How many slices did she bought in all?
Justification: I choose this option because it is easy to make a problem.

Participant 9: Charea bought ½ slice of pizza and ¾ slice of banana cake. How many slice did she bought all in all?

Justification: I choose this option because it easy to make a problem.

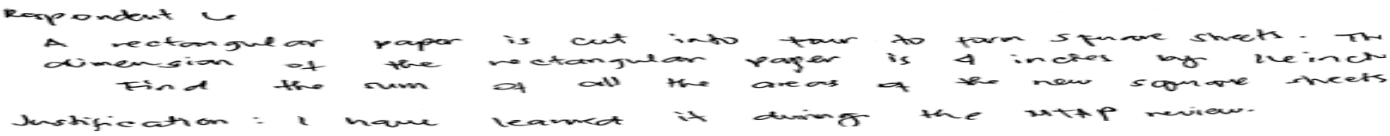
Figure XII: ***Example of a factual problem in Number Sense posed before scaffold***


Respondent 13
In the illustration above, find the area of rectangle whose length is 4 cm and 8 cm wide and area of the equilateral triangle whose side is 3 cm. Then compare the area of the two shapes. Which shape has a bigger area? Why? Find the sum/total areas of the two shapes.
Justification: I choose option 8 because I want to apply the formulas in finding the perimeter and area of a certain polygon.

Participant 13: In the illustration above, find the area of rectangle whose length is 4 cm and 8cm wide and area of the equilateral triangle whose side is 3cm. Then compare the area of the two shapes. Which shape has a bigger area? Why? Find the sum/total areas of the two shapes.

Justification: I choose option 8 because I want to apply the formulas in finding the perimeter and area of a certain polygon.

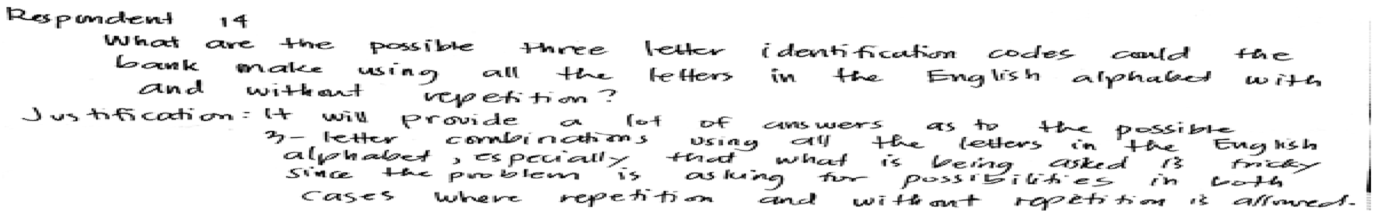
Figure XIII: ***Example of a reasoning problem in Geometry posed before scaffold***


Respondent 6
A rectangular paper is cut into four to form square sheets. The dimension of the rectangular paper is 4 inches by 16 inches. Find the sum of all the areas of the new square sheets.
Justification: I have learned it during the MTAP review.

Participant 6: A rectangular paper is cut into four to form four square sheets. The dimension of the rectangular paper is 4 inches by 16 inches. Find the sum of all the areas of the new square sheets.

Justification: I have learned it during the MTAP review.

Figure XIV: ***Example of an open problem in Geometry posed before scaffold***


Respondent 14
What are the possible three letter identification codes could the bank make using all the letters in the English alphabet with and without repetition?
Justification: It will provide a lot of answers as to the possible 3-letter combinations using all the letters in the English alphabet, especially that what is being asked is tricky since the problem is asking for possibilities in both cases where repetition and without repetition is allowed.

Participant 14: What are the possible three letter identification codes could the bank make using all the letters in the English alphabet with and without repetition?

Justification: It will provide a lot of answers as to the possible 3-letter combinations using all the letters in the English alphabet, especially that what is being asked is tricky since the problem is asking for possibilities in both cases where repetition and without repetition is allowed.

Figure XV: ***Example of an open problem in Statistics and Probability posed after scaffold***

Table 6
Test for Creativity Level

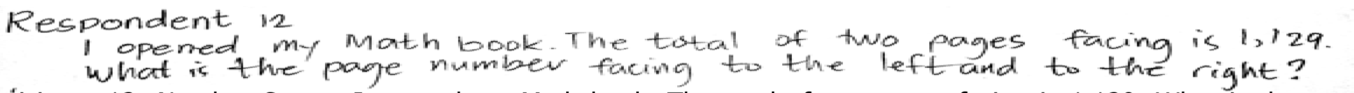
5th Level of Analysis Areas	Fluency		Flexibility		Originality		Unanswerable	
	Before	After	Before	After	Before	After	Before	After
Number Sense	12	23	1	2	1	2	0	1
Geometry	10	40	2	2	1	1	2	0
Pattern	4	12	2	2	2	3	0	0
Measurement	17	34	1	2	1	1	0	0
Statistics and Probability	24	65	3	3	1	2	0	0
Total	**67**	**174**	**9**	**11**	**6**	**9**	**2**	**1**

It could be gleaned from Table 6; most of the problems they posed involved Statistics and Probability for the fluency category. The reason might be because all of them currently enroll in this subject, while Pattern appears to have the least involvement in their posed problems. This idea is close enough to that of Zan and Martino (2008), as they said that students like mathematics depending on their performance. Statistics and Probability also ranked first in the flexibility category. At the same time, for originality, an improvement is noticeable right after the instructional scaffold happened, like the last category, which is unanswerable. This embraces the idea that for any intervention to be effective, the programs designed should be based on clearly defined objectives, and there must be a monitoring and evaluation (Kaggwa, 2003). Jensen (1973) said that for students to be creative in mathematics, they should pose mathematical questions that permit exploration of the original problem and solve the problems in numerous ways.

Although mathematics is undoubtedly closely linked to creativity, students have made less attention to it. Through schooling, it has also lessened the opportunity for students to experience this aspect of mathematics (Silver, 1997). However, it may be that general measures of creativity do not measure factors that are related explicitly to mathematical proficiency, as has been argued by Haylock (1987) in his review of studies involving the relationship between creativity and mathematical ability.

Problems posed in an unanswerable category like,

Participant 13: In cube ABCDEFGH, the length of the diagonal AG is 9 and BG is 3, what is the length of the diagonal ABCDEFGH?



Participant 12: Number Sense: I opened my Math book. The total of two pages facing is 1,129. What is the page number facing to the left and to the right?

Figure XVI: ***Examples of problems posed in an unanswerable category***

Table 7

Perceived Level of Self Efficacy of the Participants

Statements	Mean	SD	Description
1. In a class like this, I prefer course material that really challenges me so I can learn new things.	5.82	1.42	True of Me
2. I believe I will receive an excellent grade in a class like this.	3.99	1.63	Neutral
3. I'm certain I can understand the most difficult material presented in the readings for this course.	4.05	1.79	Neutral
4. I'm confident I can learn the basic concepts taught in this course.	5.66	1.6	True of Me
5. I'm confident I can understand the most complex material presented by the instructor in this course.	4.99	1.49	Somewhat true of Me
6. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	5.72	1.6	True of Me
7. I'm confident I can do an excellent job on the assignments and tests in this course.	4.93	1.57	Somewhat True of Me
8. I expect to do well in this class.	5.38	1.61	Somewhat True of Me
9. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	5.99	1.57	True of Me
10. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	4.88	1.7	Somewhat True of Me
11. I'm certain I can master the skills being taught in this class.	5.05	5.28	Somewhat True of Me
12. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	5.28	1.81	Somewhat True of Me
Average	**5.15**	**1.25**	**Somewhat True of Me**

The participants generally reflected somewhat true of them with the statements measuring their perceived level of self-efficacy. This reflected the idea of Siebert (2006) & Pajares (1992) when they said that researches have shown that whenever individuals have low self-efficacy attitudes, they become very pessimistic toward their capabilities and demonstrate fragile performance in the educational systems.

It can also be said as the students reacted as Somewhat True of Me on every statement except on statements 2 and 3, where they responded as neutral, that they don't take sides or are undecided on this regard and statements 1, 4, 6, and 9 where they reacted as True of Me. This is quite alarming since the feeling of academic self-efficacy, as a motivational factor, plays a substantial role in developing critical thinking skills (Artino and Stephens, 2009).
As Woolfolk and Hoy (1998) stressed out, critical thinking is one factor that has a significant relationship with self-efficacy belief as a motivational belief.

Table 8
Perceived Level of Difficulty of the Posed Given Problems Based on a Given Situation

Situation: Three teachers have groups practicing different presentations for Variety Show. Mrs. Reyes has four groups containing 2, 3, 4, and 5 students. Mrs. Cruz has groups of 4, 5, 6, and 7. Mrs. Pena has groups of 6, 7, 8, and 9.	**Mean**	**SD**	**Description**
1. How many students did Mrs. Reyes has?	1.58	1.11	easy
2. How many students did Mrs. Cruz has?	1.66	1.13	easy
3. How many students did Mrs. Pena has?	1.63	0.94	easy
4. How many students they have altogether?	1.74	1.35	easy
5. How many more students Mrs. Pena has than Mrs. Reyes?	1.93	1.24	easy
6. Who has the most number of students?	1.79	1.21	easy
7. How many students did each teacher have?	1.74	1.35	easy
8. Who has the least number of students?	1.41	0.85	very easy
9. If each teacher wants to have the same number of students to supervise, then which group should be moved to another classroom?	1.81	1.14	easy
Average	**1.7**	**0.17**	easy

Generally, this study found that students judged the given problems based on given situations as easy problems based on their content knowledge even before the instructional scaffold happened. Our analysis of these problems was very similar to Silver and Cai's study (1996). The problems given above were too close to the generated result that appeared in their research.

Table 9
Common Encountered Difficulties of the Participants in Problem Posing Using Instructional Scaffold

Encountered Difficulties	**f(n=18)**	**Percent**
1. Low Prior Knowledge or Weak Foundation with Basic Math	7	38.90%
2. Language/ Sentence Structure Conscious	4	22.20%
3. Difficulty in Making Connections with Real Life Setting	2	11.10%
4. Difficulty in translating verbal representation to symbolic representation and vice versa	3	16.70%
5. No previous experience with problem posing	12	66.70%
6. Not used to posing problems, but used to solving	7	38.90%

The encountered difficulties of the students in problem posing using the instructional scaffold are *low prior knowledge or weak foundation with basic math and not used to posing problems, but used to solving* as supported by Mohd and Rosaznisham (2004) and Berch and Mazzocco (2007), when they said that many students failed to learn the basic skills they need in Mathematics and even the result of Silver and Cai (1993) revealed a strong positive relationship between problem posing and solving performance; *language or sentence structure conscious* which contradicts the idea of English (1998) and Silver and Cai (1996) when they supposed that comprehending requires understanding the meaning of the operations and algorithmic process, a focus on operational and not on the semantic structure of the problems; *difficulty in making connections with real life setting* as according to Garnett (1998) and Nathan, Lauren, and Adam (2002) difficulty to make meaningful connection, inability to easily connect and transfer conceptual aspects of Math to the knowledge and incomplete mastery of number fact might lead to varied kind of Mathematics skills difficulties; *difficulty in translating verbal representation to symbolic representation and vice versa* which was stressed out by Rosnick (1981) that transition from verbal expressions into symbolic/algebraic expressions is difficult for students of every age; and *no previous experience with problem posing.*

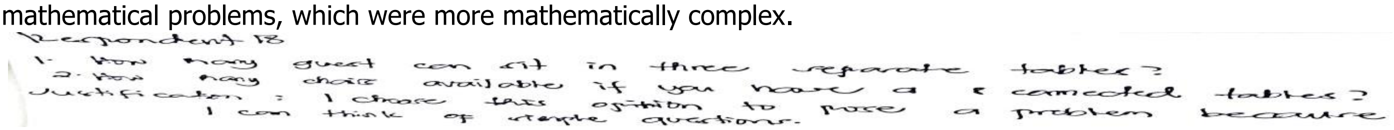
Among all of these, no previous experience with problem-posing is the most frequent difficulty they cited. English (1998), Mestre (2002), Silver (1994), Winograd (1991) support this idea when they conveyed that students' experience with problem-posing enhances not only their perception of the subject but also produces excitement and motivation.

Sample responses to the difficulties they have encountered related to the abovementioned categories are:
"This (problem-posing) was not the usual mathematics we do; that is why I perceived it to be difficult at first." (Participant 14)
(On encountered difficulty due to no previous experience with problem-posing)

Table 10
Perceived Level of Difficulty of the Problems Posed by Participants

Problems' Classification as to Structure	**Mean**	**SD**	**DESCRIPTION**
Free Type	3.33	0.16	neutral
Semi-Structure Type	3.07	0.26	neutral
Structured Type	3.85	0.16	difficult
AVERAGE	**3.42**	**0.19**	neutral

Students generally judged the problems they posed as neutral, which means they were undecided about whether they were very difficult, difficult, very easy, or easy. However, the participants perceived the structured type of problem-posing as difficult regarding the problems they had posed in this category. This contradicts the idea of Silver and Cai (1996) when they found a high correlation between the problem-posing performance and students' problem-solving performance. Compared to less successful problem solvers, good problem solvers generated more mathematical problems, which were more mathematically complex.



Participant 18: 1) How many guests can sit in three separate tables? 2) How many chairs available if you have 8 connected tables?
Justification: I choose this option to pose a problem because I can think of simple questions.

Figure XVII: ***Example of a problem posed in a structured type***

CONCLUSIONS

The conclusions based on the findings above are as follows. Even after the given instructional scaffold, the students' problem-posing performance improved in the quantity of the problems they had posed but not with its quality. On confronting problem-posing tasks, students refer to their schema of related mathematical concepts and procedures. This is directly related to the Cognitive Load Theory, where this study is being anchored. When problem posing is utilized to deliver mathematical instruction, the order in which students learn to employ the problem-posing and understand the relevant subject matter has cognitive load implications as its network with their prior knowledge levels.

Moreover, students have a nearly high self-efficacy attitude, which means they have roughly high self-motivation that significantly impacts their problem-posing performances. Even before the instructional scaffold happened, the students' content knowledge was high as they perceived the given problems based on given situations as easy problems. Students admit that they struggle most with the problem-posing tasks because they don't have any previous experiences with problem-posing as this process was not introduced to them in their early education. The structured type of problem-posing was judged as difficult by the students as to their posed problems. At the same time, they perceived neutral with free and semi-structured type, which means they were undecided about whether they were very difficult, difficult, very easy, or easy.

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