

DEVELOPMENT OF MATHEMATICAL PROBLEM-SOLVING SKILLS ON THE TOPIC OF PRISMS AND CYLINDERS USING SSCS MODEL WITH THINK-PAIR-SHARE TECHNIQUE FOR EIGHTH-GRADE STUDENTS

^[1] NICHAREE SANGSAMAK, ^[2] PINDA VARASUNUN, ^[3] SUNTARAPHON OONWANNADHAM, ^[4] WITTAYA SIMCHAROEN, ^[5] KANITHA CHAOWATTHANAKUN

^{[1],[2],[4],[5]} Kasetsart University Kamphaeng Saen Campus, ^[3] Kanjanapisek Wittayalai Suphanburi School

^[1] Nicharee.san@ku.th, ^[2] Doypinda@hotmail.com, ^[3] Suntaraphon58@gmail.com, ^[4] Wittaya.sim@ku.th, ^[5] Kanitha.ch@ku.th

Abstract

The purposes were to: 1) compare Mathematical problem-solving skills for Eighth-grade students before and after learning on the topic of Prisms and Cylinders using SSCS model with Think-Pair-Share technique and 2) explore the learning satisfaction of Eighth-grade students after learning by using the SSCS model with Think-Pair-Share technique on the topic of Prisms and Cylinders. The sample group consisted of 32 Eighth-grade students in the first semester of the academic year 2022. They selected by cluster sampling. The research instruments included 1) lesson plans in topic of Prisms and Cylinders 2) Mathematical problem-solving skills test and 3) Student learning satisfaction questionnaire. The statistics for data analysis were mean, standard deviation, validity, difficulty index, discrimination index, internal consistency reliability formula KR - 20 and paired sample t - test. Results were as following:

1) Mathematical problem-solving skills of Eighth-grade students after learning on the topic of Prisms and Cylinders using SSCS model with Think-Pair-Share technique higher than before learning at a statistical significance of .01 level and 2) the learning satisfaction of the Eighth-grade students after learning by using SSCS model with Think-Pair-Share technique on the topic of Prisms and Cylinders is at good level which an average score 4.22 of 5.00

Keywords: *SSCS model, Think-Pair-Share technique, Mathematical problem-solving skills*

I. INTRODUCTION

Mathematics is important because it allows people to be creative, rational, organized and structured. Able to analyze problems or situations carefully and thoroughly. It helps forecast, plan, and make decisions to solve problems correctly and appropriately [5]. Mathematical skills and processes are essential to learning

Mathematics in all areas of the curriculum. It includes problem-solving, reasoning, communication, connection, and creativity. The key skill in teaching Mathematics is problem-solving skills because learning come from problem-solving [3].

To reach successful Mathematics Teaching, teachers should reducing the teacher's role from giving lectures to giving advice and allowing students to participate in teaching. Students express their opinions and exchange ideas. It make students happy to learn Mathematics more than lecture style [9]. It's like a student-centered learning. There are many different teaching styles and teaching techniques. The researcher is interested in learning using the SSCS model. This model helps students develop cognitive abilities such as creativity, problem-solving skills and communication skills [17]. That focuses on students to think, make decisions, and find answers on their own. Students use effective problem-solving methods, express ideas and exchange knowledge between students and students or teacher and students. Make students learn how to solve a variety of problems and can adapt to the situation. The SSCS model consists of 4 steps: 1) S: Search, searching for information related to the problem and identifying the problem; 2) S: Solve, planning and solving the problem; and 3) C: Create, create an answer and 4) S: Share, an exchange of opinions and comments. When student can follow all the stage well, They will be able to understand and solve each mathematical problem well [16].

Not only core skills need in 21st, but also want competencies skill such as communication and collaborative, so teachers should help students develop social skills. Reference [15] said learning should focus on students by using cooperative learning by allowing students to learn to work with others. It helps to promote social skills for students, exchange of knowledge and help each other in society. In a cooperative learning model, there are several types of learning techniques, such as Number Head Together, Jigsaw, Make a Match, and Think-Pair-Share [11]. The researcher interested in the Think-Pair-Share technique, which promote student co-activity in the classroom and interaction with others. It is a prerequisite for working together and making the classroom a virtual community [10]. Which learning by using the Think-Pair-Share technique involves 3 steps: 1) Think: Encourage students to think 2) Pair: Students choose their own pair and share their opinions with the pair and 3) Share: Each pair of students share their ideas with their classmates. When student can follow all the stage well, student will be gain knowledge and experience for themselves, be creative, practice thinking skills and problem-solving skills, exchange ideas. As a result, students are confident and assertive [2].

Teaching using the Think-Pair-Share technique can be applied at all levels [1] and it is a technique that teachers prefer to use in conjunction with other teaching methods [12]. The researcher was interested in teaching using SSCS model with Think-Pair-Share technique, which would help develop Mathematical problem-solving skills. Think-Pair-Share technique was inserted into the teaching of the SSCS model in 4 steps: 1) Search: S, this step is consistent with the Think step of the Think-Pair-Share technique. 2) Solve: S, this step is consistent with the Think step and the Pair step of the Think-Pair-Share technique. The teacher encourages

students to think. Then, students choose their own pair and share their opinions with the pair. 3) Create: C, this step is consistent with the Pair step of the Think-Pair-Share technique, and 4) Share: S, this step is consistent with the Share step of the Think-Pair-Share technique.

Based on the explanation above, the researcher is interested in the Development of Mathematical problem-solving skills on the Topic of Prisms and Cylinders using SSCS model with Think-Pair-Share technique for Eighth-grade students. To promote Mathematical problem-solving skills, class participation, exchange of ideas about knowledge and experience solving-problems in a variety of ways and interact more with teachers and classmates.

II. OBJECTIVES

1) Compare the Mathematical Problem-Solving skills of Eighth-grade students before and after learning on the topic of Prisms and Cylinders using SSCS model with Think-Pair-Share technique.

2) Explore the learning satisfaction of Eighth-grade students after learning by using SSCS model with Think-Pair-Share technique on the topic of Prisms and Cylinders.

III. POPULATION AND SAMPLE GROUP

A. Population

Eighth-grade students in the first semester of the academic year 2022 at Kanjanapisek Wittayalai Suphanburi School, Thailand. There are 13 classrooms. Each room has a classroom for different abilities.

B. Sample group

32 Eighth-grade students in the first semester of the academic year 2022 at Kanjanapisek Wittayalai Suphanburi School, Thailand. The sample obtained through cluster sampling.

IV. RESEARCH INSTRUMENT

1) There were 9 lesson plans Mathematics on Prisms and Cylinders, each lasting 50 minutes. The experts examined the validity of the IOC calculations for each item. The consistency was between 0.67 - 1.00

2) Mathematical problem-solving skills test on Prisms and Cylinders, 4 items, 8 points each, totaling 32 points. **The subjective test is a Pre-test and Post-test.** The experts examined the validity of the IOC calculations for each item, which had a consistency between 0.67 - 1.00, a difficulty between 0.20 - 0.80, a discrimination between 0.20 - 0.67 and a confidence value of 0.76.

3) Student satisfaction questionnaire used 10 questions on a rating scale 5 level. The experts examined the validity of each item and calculated the IOC values. The consistency was between 0.67 - 1.00 and some questions were revised according to the advice of the experts.

V. DATA COLLECTION

The researcher had the students take a Pre-test and then taught with lesson plans mathematics on Prisms and Cylinders for Eighth-grade students using SSCS model

with Think-Pair-Share technique. A total of 9 lessons were taught. Finally, the researcher had the students take a post-test and survey the student's learning satisfaction questionnaire. Then take the average score of each topic to interpret as following:

- 1) 4.50 - 5.00 is mean Very good
- 2) 3.50 - 4.49 is mean Good
- 3) 2.50 - 3.49 is mean Average
- 4) 1.50 - 2.49 is mean Below Average
- 5) 0.50 - 1.49 is mean Poor

VI. RESULTS AND DISCUSSION

Table I: Comparison of Mathematical Problem-Solving skills of Eighth-grade students

Score	n	\bar{x}	SD	t	p
Pre-test	32	0.906	2.01	12.3	<0.001**
Post-test	32	15.094	6.82		

Note ** $p < .01$

Table I shows that the average score after the learning by using SSCS model with Think-Pair-Share technique was significantly higher than before learning at the .01 level., which is according to the hypothesis. This may be the result of learning using SSCS model with Think-Pair-Share technique. SSCS model is a model developed to develop students' problem-solving skills by applying the scientific process [3]. Students need to identify issues and information that helps them come up with solutions. The teachers are just guides and help students [7], allowing students to think for answers and make decisions by themselves and Think-Pair-Share technique is a technique in which the teacher raises a question or a problem situation for students to find answers by themselves [4] and encourage interaction with classmates. Because there are discussions and exchanges of ideas with partners and classmates. It makes students think, discuss and solve problems together [13]. As a result, students learn a variety of problem-solving methods from exchanging ideas and experiences with partners and classmates. Reference [8] show she was found that the mathematical problem solving ability of the students, after being taught with the SSCS model and the Think-Pair-Share technique were higher than they were before being taught, at a statistically significant level of .05 and reference [9] show she was found that the student's mathematical problem-solving abilities after learning based on SSCS model with Think-Pair-Share technique was higher than before learning at .01 level of statistical significance.

Table II: Results of the learning satisfaction study of Eighth-grade students

Assessment	\bar{x}	S.D.	level of learning satisfaction
1. Students learn to research, plan and solve problems on their own.	4.50	0.62	Very Good
2. Students exchange ideas with friends, resulting in a variety of ideas and methods.	4.56	0.62	Very Good
3. Students can exchange knowledge and acceptance of others' opinions better.	4.38	0.70	Good
4. Promote the development of better interaction with classmates.	4.47	0.67	Good
5. Promote confidence and assertiveness in group discussions.	3.91	0.78	Good
6. Encourage students to understand the concepts and methods of solving Prisms and Cylinders.	4.06	0.88	Good
7. Encourage more Mathematical problem-solving skills.	4.16	0.72	Good
8. Encourage students to apply their knowledge to other matters.	3.84	0.85	Good
9. Encourage students to apply their knowledge to solve mathematical problems in everyday life.	4.09	0.89	Good
10. Encourage students to have a positive attitude towards mathematics.	4.22	0.80	Good
Score	4.22	0.75	Good

Table II shows that, overall, students were satisfied using the SSCS model with Think-Pair-Share technique at good level. The mean (\bar{x}) was 4.22 and the standard deviation (S.D.) was 0.75, which is according to the hypothesis. When considering each item, it was found that the students learning satisfaction was at very good level in item 1 and item 2. In item 2, students exchange ideas with friends, resulting in a variety of ideas and methods with the highest average score ($\bar{x} = 4.56$). The next order is item 1, Students learn to research, plan and solve problems on their own with an average score ($\bar{x} = 4.50$). As for other item, there is an good level of satisfaction. It also helps students to understand the concepts and methods of solving Prisms and Cylinders, apply knowledge to other subjects. Students also develop Mathematical problem-solving skills, apply knowledge to solve mathematical problems in everyday life, interaction with classmates, exchange knowledge, acceptance of others' opinions, have confidence, assertiveness in group discussions and a positive attitude towards Mathematics. Reference [14] said Think-Pair-Share can make students more creative in writing, gives the students a chance to discuss their individual solutions with other students and increases their confidence before presenting their idea to the classroom and reference [13] show

he was found that the students who learned by using collaborative learning and think-pair-share technique for interest and the value of money revealed higher Mathematical problem-solving skills 4 items, 8 points each, totaling 32 points. Those who learned using the conventional approach at the .01 level of significance. In addition, reference [9] show she was found that almost students opinions about the learning based on SSCS model with Think-Pair-Share were at good level.

VII. RECOMMENDATION

A. *For applying the research results*

1) The key to teaching problem-solving is to give students confidence. You should start by giving an example of a simple problem-solving, not complicated. Then teach the more difficult problems in order.

2) Teachers should design the duration of using the SSCS model with Think-Pair-Share technique in 2 lessons or 2 hours for the most efficient learning process.

3) Matching students of Think-Pair-Share technique. Teachers should pair students with each other to create a good atmosphere for learning. But teachers need to pay attention to pairs of students who have a fair and fair knowledge base, or extra soft and very soft.

4) Creation of a problem-solving skills test. Teachers should clearly explain the details of writing the test answers and create a common understanding with the students before the test. In order for learners to understand the process of answering the examination clearly and reduce discrepancy in scoring.

B. *For future research*

1) There should be a study of other dependent variables that are likely to be beneficial to learning, such as communication skills, Mathematical communication skills, etc.

2) There should be additional study on Mathematics problem-solving skills in each step using the SSCS model with Think-Pair-Share technique.

3) Pairing in the Think-Pair-Share technique. It may be a student who has a basic knowledge of fair to fair or weak to weak. Puzzles may also be incorporated into learning techniques to promote effective learning and students understand the lesson better.

CONCLUSION

Teaching using the SSCS model with Think-Pair-Share technique on the topic of Prisms and Cylinders can improve students' problem-solving skills and students have a good level of satisfaction with this teaching model. Teaching this method allows students to participate in teaching, research, plan and solve problems on their own. Students understand the concepts and methods of problem-solving in the lesson and apply it to other lessons. In addition, the researcher found that students thought that exchanging ideas with friends. It gives a variety of ideas and methods and also helps develop interactions, communication skills and social skills with classmates.

If you are interested in using this technique in your classroom. You should pay attention to pairing in the Think-Pair-Share technique, pairs of students has a basic

knowledge of fair to fair or weak to weak may not get the variety of ideas and methods as well as students has a basic knowledge of fair and good.

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