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Enhancing mathematical learning of grade 4 students through active learning

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ABSTRACT

The objective of this research aims to develop mathematical learning activities through active learning management. The sample group used in this research consists of 23 students in grade 4. The research tools used include 15 lesson plans, a multiple-choice test with 20 items to measure learning performance, a multiple-choice test with 20 items to measure problem-solving abilities in mathematics, and a questionnaire to measure student satisfaction towards active learning management for mathematics subjects, consisting of 20 items. The statistical analysis used to analyze the data includes percentage, mean, standard deviation, and hypothesis testing. The research findings revealed that the active learning activities had an efficiency of 86.86/80.45. Students had learning score after the implementation is significantly higher than before, with statistical significance at the .05 level. The problem-solving abilities of students was higher than the criterion of 80%. Furthermore, students had level of satisfaction towards active learning management at the highest level.

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1. INTRODUCTION

Education is the most important foundation for development in all sectors. Therefore, it has to develop students to increase knowledge and necessary learning skills (Prachagool & Nuangchalerm, 2021). The idea is to use in helping students to solve various problems, Fisher (2018) stated that thinking skills should be promoted in the primary school level. If students have good thinking, they will use thinking as a tool to learn new things that are happening quickly in today's world. Especially, knowledge and information that is beneficial to one and the public should understand (Prachagool & Nuangchalerm, 2019). Mathematics now plays a vital role in learning success in the 21st century, it is now widely continuous developed in all level of education system (Wrahatnolo, 2018). As it is a tool for education in science, technology, and other sciences, which is the foundation for the development of national human resources to quality and develop the national economy.

Modern world required students to solve the complex problem in various kinds of subjects, the economic, social, scientific, and technological knowledge that progresses rapidly in the era of globalization (Stokols, 2018). Learning management that is in line with changing social conditions, with technology playing a huge role in the lives of students and developing education alongside national development in accordance with government policies (Lakshmi & Paul, 2018). It is very important is that the interaction between teachers and students contributes to successful teaching. Therefore, teachers play a very important role in student learning behavior. That is to say, if teachers and students have a good relationship with each other, the teaching atmosphere will be good and students will have good learning habits (Anagün, 2018).

Teachers should have a deep understanding of the content of each lesson that will be used to manage the study. Learning measurement and evaluation to be appropriate, content, and suitable for students (Suskie, 2018). Students must be initiated learning with clarity of mind. Knowledge creation initiatives, interaction, and hands-on activities are initiated, as well as a learning management atmosphere that is conducive to innovation with challenging activities that incorporate technology into learning activities. It also gives students the opportunity to express their opinions freely and encourages them to take action through practice.

Active learning management is a very popular method in the classroom today. It can encourage students to participate in the classroom activities (Spataro & Bloch, 2018). There is interaction between teachers and students in the classroom (Chaiyama, 2018; Vetter et al., 2020). Students have embarked on activities, collaborating between members within the group. It focuses on allowing students to participate in teaching more, be able to build knowledge, and actively participated in learning process. From the importance of active learning management and learning management issues, it is not enough to meet the ability of students, causing students to not understand the solutions to problems in math. Students' still lack analysis the researchers are therefore interested in developing management activities, learning about mathematics according to concepts. This study aims to develop mathematical learning activities through active learning for grade 4 students. The significance of this study can be applied to broaden classroom.

2. METHOD

Participants

The participants used in the research were 4th grade students in Ban Hua Tone Mittraphab School 165 Suvarnabhumi district, Roi Et province, Thailand. They were 23 students enrolled the second semester, academic year 2022. They were obtained from randomized groups by using the school as a random unit.

Variables

The variables used in the research consisted of independent variables, namely mathematical learning activities through active learning and the dependent variable is learning achievement, mathematical problem-solving, and learning satisfaction.

Research tools

1. Lesson plan through active learning management, 15 lesson plans with an overall expert opinion score of 4.75, the most appropriate level.

2. Learning achievement test is a multiple-choice test, 20 items have a conformity index between 0.60-1.00. The difficulty value is between 0.50-0.80. The power value is classified between 0.20-0.50 and the confidence value is 0.63.

3. Test for measuring the ability to solve mathematical problems, geometry and measurement, 4 multiple-choice test, the consistency index is between 0.60-1.00. The difficulty value between 0.50-0.80, the classification power value between 0.20-0.50, and the confidence value is 0.69.

4. Satisfaction questionnaire towards active learning with a confidence value of 0.64.

Data collection

Before teaching and learning management the researcher conducted the test before studying. Then researchers conducted a mathematical learning activity through active learning for 23 of grade 4 students. They spent time to learn 15 hours. After that, the teaching and learning management students were test after implementation.

3. RESULT AND DISCUSSION

1. The efficiency of mathematical learning activities through active learning found that it got 81.13/80.45 (Table 1). The process and product efficiencies of the mathematical learning activities through active learning for effective grade 4 students relevant to the criteria setting.

Table 1 Efficiency of mathematical learning activities through active learning

Efficiency	Full score	$\bar{X}$	Total	Percentage
Process efficiency (E_1)	603	596.34	13716	81.13
Product efficiency (E_2)	20	16.09	370	80.45

The efficiency may be due to the organization of mathematical learning activities through active learning management, which is based on the assumptions created by the researcher. The learning process focuses on students to practice and learned from self-practice. Students have acted on their own participation. Students have knowledge and understanding.

Active learning will focus on the learning process rather than the subject content. It helps students connect knowledge or create knowledge by themselves (Bean & Melzer, 2021).

Students have mathematical skills and processes to think and fun with lesson plan. According to the concept of active learning management for grade 4 students through expert evaluation to find the average and suitability of the learning management plan. At this stage, it provides an experience for the students, which must be organized in accordance with the spirit of the course (Astin et al., 2010; Bravmann, 2011).

2. Analysis of learning achievement before and after school by organizing math learning activities through active learning for grade 4 students using paired t-test statistics can be shown in Table 2.

Table 2 Comparison of academic achievement before and after organizing

Test	N	$\bar{X}$	S.D.	Total	P
Pre-test	23	8.87	2.13	19.145	.000*
Post-test	23	16.09	0.99		

From Table 2, it was found that 4 grade students had score of learning achievement higher than before school with statistical significance at level .05. According to the concept of active learning management, this may be due to students learning by active learning management. It helps students speak and express concepts freely in the classroom. Active learning allowed all students to construct own thoughts. If the teacher arranges the learning space that the students feel safe. The integrity of all students will be released in naturally (Bryk & Schneider, 2002; Woolner, 2010).

3. Mathematical problem-solving score after students learned through active learning was higher than 80% at .05 level of statistics (Table 3). It found that the mathematical problem-solving has been structured for mathematical learning tasks. The notion of management states that fourth graders' levels of active learning are over 80% and statistically significant at the. 05 level, with an average score of 16.43 (or 82.15%).

Table 3 Mathematical problem-solving score

N	k	$\bar{X}$	Percentage	df	p
23	20	16.43	82.15	22	.023*

According to active learning, students can gain their thinking and problem-solving based on the finding it revealed that they had problem-solving score higher than the threshold of 80%. These may be concerns students had answer the question in which problem relevance. Students understood the problem, plan to solve the problem, implement the plan, and solve with their prior experiences. The learning satisfaction of grade 4 students, the analysis results show that students were most satisfied with the learning management, which the teaching and

learning activities are appropriate for the content study. Because active learning activities are appropriate for the content they study. Teachers have methods of teaching and learning in line with problem solving (Bean & Melzer, 2021; Lombardi et al., 2021). Students use the strategy to solve the problem in line with the plan. They have a plan to solve the problem, determine the solution, and students have understanding the problem is correctly identified.

4. CONCLUSION

Mathematical learning activities through active learning management were found to be efficient at 86.86/80.45. Student learning scores increased considerably after adoption, with statistical significance at.05. Students solved problems better than 80% and they are satisfied with active learning management.

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