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Development A Set Of Mathematics Learning Activities By Collaborative Learning With STAD Technique On The Numeral Factorization Of Primary Education

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Abstract

This research has objectives to1) To study the format of a set mathematics learning activity in collaboration with STAD technique on the numeral factorization for primary education student's grade 6.2) Develop a set of collaborative mathematics learning activity with STAD technique on the numeral factorization for primary education students grade 6 to be effective according to criteria 70/70.3) Compare the learning achievement before and after studying by using a set of the mathematics learning activity that were studied in cooperation with STAD technique on the numeral factorization. 4) To study satisfaction of student on the set a collaborative mathematics learning activity with STAD technique the numeral factorization. The sample group used in this research was 30 students in Primary School, HuaywaWittayakhom School, Ban Fang District, KhonKaen Province for the academic year 2020.

The tools used in this research are 1) A set of mathematics learning activities that are studied collaborative with STAD techniques on the numeral factorization. 2) A test to measure academic achievement with a set of collaborative mathematics learning activities studied by STAD with 30 questions. 3) To study students' satisfaction of a set of collaborative mathematics learning activity that studied by STAD techniques. The statistics used to analyze the data are basic statistics and t-test for dependent samples.

The result of research found that 1) A set of mathematics learning activities that were studied in collaboration with STAD technique. The efficiency value of the media $E_1/E_2$was 74.33 / 70.71, which is higher than the set criteria.2) The academic achievement of students studying with a set of mathematics learning activities that were studied in collaboration with STAD technique. After studying higher than before study statistically significant at 0.5 level. 3) Satisfaction of students with

a set of mathematics learning activities that were studied in collaboration with STAD technique at a very high level (x = 4.47).

1. Introduction

Mathematics is the science of learning and is a knowledge base that will serve as a tool for understanding other sciences, both abstract and concrete. Mathematical knowledge is helping to support to causes in various benefits including explaining natural phenomena, which represents the evolution of human invention nicely as well. (Faculty membersMahachulalongkornrajavidyalaya University, 2010, page 2)Mathematics plays a very important role in the development of human thinking, enabling humans to be creative, think logically, in a systematic manner, able to analyze a problem or situation thoroughly. It helps to anticipate, plan, decide, solve problems and apply them properly in daily life. In addition, mathematics is a tool in the study of science, technology and other sciences. So, Mathematics is useful for life, help to improve the quality of life to be better and able to live happily with others. (Ministry of Education, 2008, page 47)Mathematics is gainful and is part of everyday life. The living with mathematics is inevitable. In life, it needs to use money to spend, or exchanging things requires numbers, work or decision making requires experience or information or quantity to make decisions. Math is also useful in professional work. Because every field of work requires profit or success, and a profitable or successful career depends on decision making and mathematics. It is also an art, which is a beauty in practice human brain to imagine, to be creative, looking for new knowledge that will develop the human brain, to be able to bring technology and to be comfortable for human life. (Narong Ploydanai, 1987, page 5-6)

In the past mathematics teaching, it was found that the results were not achieved as expected. According to the PISA assessment statistics from 2000 to 2003, the assessment of mathematical literacy dropped significantly from 2003 to 2009, the results were relatively stable, or even though the scores were slightly higher, but it didn't look any different. (Institute for the Promotion of Teaching Science and Technology, 2011, page 120), in which 2009 Thailand scored at 419 points, ranked 50 out of 65 countries, below the OECD average of 496 points (Ministry of Education, 2013, page 54). In 2012, the assessment results mean 427 points, which is almost one level lower than the OECD mean and is also ranked 50 (NavaratRamasut, 2013). From statistics scored National Educational Exam (O-NET) in national level. In February, academic year 2012 there were students grade 4 to 6, were taking math exam got a mean of 35.77. In February, academic year 2013, there were students grade 4 to 6, were taking math exam got a mean 41.95. (National Institute of Educational Testing, Public Organization, 2014) On February , academic year 2014 students grade 4 to 6, were taking math exam got a mean of 38.06 (Daily News, 2015). In February, academic year 2015 students grade 4 to 6, were taking a math exam got mean of 43.47 (Daily News, 2016) and on February of the 2016 academic year, students grade 4 to 6, were taking a math exam got a mean of 40.47 (Daily News, 2016) and from statistics score the result National Education Examination (O-NET) School Level. In academic year of 2014,2015 and academic year 2016 have students grade 4 to 6 of Ban San Klang School were taking a math exam got a mean of 42.50, 37.00, and 41.88, respectively.From all levels of assessment scores, every year found that the average of the subjects is less than 50% of all subjects. One of the subjects that should be developed is the number and action as it trains students to conceptualize and solve different problems, about number that it is a real-life use of number and can be applied in real life.

A collaborative learning model is a method of teaching and learning that focuses on students working together in small groups, typically with four members. Group members have different learning abilities, member will be responsible for what they have been taught and help fellow members

to learn by helping each other and having a goal of working together is the goal of the group (ChaiwatSuthirat, 2009, page 182). The form that promotes collaborative learning, there are many forms, including JIGSAW, S.T.A.D format, T.A.I format, T.G.T. format, L.T. format and GI form, each of which has its main method of operation, which is the study grouping content, testing, scoring and reward systems that different for a specific purpose.But whatever ways will use the same principles and objectives in one direction, is to help students learn in the most studied subjects. It helps students to gain broader and deeper learning through collaborative learning, mutual assistance and exchanging knowledge among groups of students. The differences in each form in educational techniques content, and the method of reinforcement and reward is important. (Thane Khaemmanee, 2009, page 265-266), including the use of teaching materials to be used as an intermediary to transfer knowledge to help students understand have an idea, attitudes and skills in students.

Therefore, the set of learning activity is an innovation that teachers use to make learning easier and faster. It can remember for a long time, which made the abstraction that is difficult to understand can be made into concrete that is easy to understand, helping to create a good learning management environment, leading to successful learning management. Such as a sets of learning activities organized using traditional learning collaborative, as can be seen from the research of ArpornRatsarnphol (2010) that developed of the set of mathematics learning using a collaborative learning model on multiplication of student grade 5. It found a set of math learning that using a collaborative learning model, the efficiency was 79.14 / 78.57, higher than the set benchmark of 75/75. In addition, students had a statistically significant higher post-learning achievement at 0.1 levels, had a high level of collaborative behavior, and students were satisfied with learning with a set of mathematics collaborative learning model is at high level.And SupanneeApichaianek (2013) studied the development of collaborative learning activities promoting reasoning on probability mathematical for junior high school students. The results were found a set of collaborative learning activities that promote reasoning on probability mathematics for junior high school students. The efficiency was 76.74 / 75.28 which was higher than the set criteria 70/70, and the students' post-learning achievement was statistically significantly higher at the 0.05 level and the post-student achievement was significantly higher. The students were statistically important at the 0.05 level and the students' satisfaction with the learning activities was at a high level.

For this reason, the researcher is interested in developing a set of mathematics learning activities using a collaborative learning model with the STAD technique on number factorization. To promote learning outcomes and desirable math traits, for primary school grade 6 students. To make mathematics teaching activities effective and able to work with others, help each other and develop themselves to their full potential. It promotes students' learning persistence, higher mathematics learning outcomes, and more math-dependent attributes needed in their education.

2. Research objectives

1. To develop a set of collaborative mathematics learning activity with the STAD technique on the numerical factorization of primary school students grade 6.

2. To study the learning outcomes of the numerical factorization that using a set of collaborative learning model with STAD techniques, of primary school students grade 6.

3. To study the desirable attributes in mathematics of students from learning about numerical factorization that using a set of collaborative learning model with STAD techniques of primary school students grade 6.

3. Research hypothesis

Students have learning results post-learning about numerical factorization that using a set of collaborative learning model with STAD techniques of primary school students grade 6 higher than pre-learning.

4. Research conceptual framework

In this research, the researcher studied the development of a set of mathematics learning activity that using a collaborative learning model. Along with games to promote learning outcomes and desirable math traits for primary school students grade 6. It was summarized as a conceptual framework as follows.

Independent variable **Dependent variable**

Teaching and learning context

1. Basic Education Core Curriculum, B.E. 2551
2. Education Courses
3. Teacher Condition
4. Classroom Conditions
5. Student Condition
6. Evaluation Measurement
7. Instructional Media
8. Organization of Teaching and Learning Activities

A set of mathematical learning activity that using a collaborative learning model with the STAD technique.

The elements of a set of mathematics learning activities are activity title, introduction, table of contents, teacher instructions, student instructions, learning purpose, learning activities, knowledge worksheet, activity worksheet, knowledge check worksheet. Appendix contains quiz answers, activity answers, skills training solutions, score table and the test record form pre-study and post-study.

Development results Performance of a set of learning outcomes activity on numerical factorization are:

1. Comprehension and analysis
2. Process skills including computation and problem solving.The desirable attributes of mathematics for students are:
1. Collaboration
2. Prudence
3. Responsibility
4. Realization and Good attitude towardsmathematics.

Figure 1: Conceptual Framework

5. Benefits expected from the research

1. Have got a set of mathematics learning activity that using a collaborative learning model with STAD technique on the numerical factorization. For primary school students grade 6.
2. Students gain higher math learning results using a set of collaborative learning model with STAD techniques.
3. Students have responsibilities, have good human relations, able to work well with others and help each other in the work.
4. Teachers can apply a learning management plan by using a set of collaborative learning model with STAD techniques. With further learning of mathematics in other subjects and classes.
5. Students have desirable attributes in mathematics and a good attitude towards learning mathematics by using a set of collaborative learning model with STAD techniques.

6. Research method

The development a set of mathematics learning activity that using a collaborative learning model with the STAD technique in order to promote learning outcomes and desirable mathematical characteristics for primary school students grade 6.

Population and Sample Groups

Population

The population used in this research were primary school students grade 6, under KhonKaen Primary Educational Service Area Office 1.

Sample Groups

The sample group used in this research was primary school students grade 6, in second semester, Academic Year 2020, HuaiwaWittayakhom School under the KhonKaen Primary Educational Service Area Office1. In total of 30 students were obtained by selecting a cluster sampling.

Statistics used for analysis

1. Basic statistics such as percentage, mean, and standard deviation.

2. The statistics used for quality analysis, the tools used to collect the data, such as finding the validity value, finding the difficulty value or easiness value, the discriminant index, finding the reliability value, and the difficulty or easiness index.

3. Analysis for the Efficiency on Set of Mathematical Learning Activities.

Conclusion of Research Results

1. The results of the development a set of mathematics learning activity that using a learning collaborative model with STAD technique on numerical factorization of primary school students grade 6, it was found that the results of assessing the suitability a set of the activities. Overall, it is at the highest level. A set of effective mathematic learning activities that can be used in teaching and learning management.

2. Learning outcomes on numerical factorization using a set of learning, collaborative model with STAD techniques for primary school students grade 6 found that more than 60% of students had good numeracy skills and more than 55% of students had good problem-solving skills. Overall, from the trend every set of activities has a good level of quality.

7. Discussion results of study

1. The development a set of mathematics learning activity that using the collaborative learning model with STAD technique on numerical factorization for primary students grade 6 have steps are as follows.

Step 1: the preparation and introduction of the lesson are grouping students. Inform the learners the purpose and introduce them to the lesson by reviewing the original content by letting the learners answer questions.

Step 2: the teacher introduces the new content by explaining, introducing, discussing, asking and assigning assignments to each group of students.

Step 3: the group activity stage, is for students to divide their responsibilities for group work assigned by using STAD techniques in teaching and learning management.

Step 4: the performance examination and testing procedure is to check whether the learners have completed their duties or not, and what the performance results are and check what they have learned from learning in each set of activities.

And **Step 5:** the lesson summary is that students together summarize the lesson and discuss together within the group.

Analyze group work processes and evaluate results, identify strengths and areas for improvement, and rate and reward the group with the highest average score.

2. Learning outcomes on numerical factorization that using a set of collaborative learning model with STAD techniques for primary students grade 6. It found that the assessment of understanding analysis and the skills, pre-study and post-study process of students who received learning activities from set of a learning activity using a collaborative learning model with STAD techniques. The learning evaluation test which was scored pre-study the average at 18.86 and post-study, achieved an average score of 35.56 from the t-test. The analysis and process skills of post-study students were significantly higher than pre-study a set of activities using the collaborative learning model with the STAD technique, with statistical significance at level 0.01 based on the research hypothesis. And the results of the evaluation of computational thinking and problem-solving skills using a set of collaborative learning model with the STAD techniques for or primary students grade 6 found that more than 60% of the students had good numeracy skills; and more than 55% of students have good problem-solving skills. Therefore, overall, from the popular base, there was a good level of quality, learning using a set of mathematical learning activities using a cooperative learning with STAD technique can improve learning outcomes. The students' understanding, analysis and process skills are appropriately enhanced. This is because the activity set focuses on cooperative learning, focusing on working as a group, helping each other. Help each other to solve problems causing students to develop unity, determination to study and pay attention to learning. They also helped to explain the content when the group members did not understand more clearly the content, with the teacher to closely advise and help.

3. Results of desirable mathematic traits of students from studying on numerical factorization, using a set of collaborative learning model with STAD techniques for primary school student grade 6. It was found that more than 55 percent of students had desirable characteristics, mathematical of the collaboration, prudence and the responsibility is at a good level. Therefore, overall, from the popular base, there is a good level of quality, possibly due to each activity has clarified the activity procedures before starting the activity, which make students understand how to do the activities and how to behave in various activities. Especially, when doing activities together as a group, it will be noticed that students will be enthusiastic. Help each other in brainstorm, work and listen to the opinions of fellow group members, explain the content to each other. Help each other to check the results in order to complete the work that has come out in every step and try to solve the problem by themselves. When encountering obstacles and then having the determination to perform tasks or activities in order to successfully complete the activity. Although, sometimes there may be students who refuse to perform the activity teachers and fellow group members will also encourage and reinforce positivism, such as the groups that always diligent and help each other on a regular basis. Teachers will have awards or praise, not limited to one group. If all groups work hard and help each other within a group, they will receive a reward or a compliment. Including a collective agreement on the submissions on time. On-time submissions are also graded. If an activity sheet fails to be submitted on time, students take it back to work as a homework and drop it off to the teacher the next hour or the next day to make students feel comfortable. In line with the theory related to the teaching of mathematics of (Thainakhammanee, 2009, page 57), Operant Conditioning of Skinner's theory has been discussed. Any action, if reinforced, is more likely to recur and can help adjust or cultivate the desired habit.

8. Suggestions for further research

1. A set of learning activity should be developed using a set of collaborative learning model with STAD techniques with subject mathematics and other subjects. To develop study skills and to make students more interested in learning.

2. The results of learning activities should be studied using a set of learning activities on other variables such as mathematical process skills, reasoning skills, creativity and characteristic skills that desires in other fields of mathematics for example discipline and in having self-confidence.

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