

Enrichment the High School Student Academic Achievement in Mathematics via the Project Approach Activity

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Abstract

The project approach activity is a supplementary exercise which is similar to the preliminary research. In order to complete the activity, the participant must follow the protocol: planning, reviewing literature, doing the research, analysis, making conclusion and giving presentation, respectively. The objective of this research was to enrich the high school student academic achievement in mathematics via the project approach activity. The activity was limited on the topic “sequences and series”. There were 15 students at room 5/3 (11th grade) Mueang Yang Suksa School, Nakhon Ratchasima, Thailand, participating the activity in the first semester 2010 academic year. In the experiment, the activity was efficient at $E_1/E_2=90.67/89.78$ by the assumption $E_1/E_2=75/75$. The learning progress of the students having the project approach activity was increased significantly ($p<0.05$). It was found that the students were better in analysis and synthesis the knowledge. They were also satisfied by the activity most.

Keywords: activity, project, mathematics

Introduction/Problem

It is announced in section 4 of National Education Act of B.E. 2542 (1999) about direction of education management that “For the management, one has to believe in ability of every student for self-studying and self-developing. The first priority should be given to a student.” (Office of the National Education Commission of Thailand, 1999) For the mathematics education management, it must have activities according to the announcement. The activities have to be appropriate to an individual or a group. The mathematics activities should be done both inside and outside school because the local community is able to be a huge source of knowledge. A good activity provides a skill, analyzing ability, knowledge-integrating ability, synthesis ability, evaluation ability, development ability, applicable ability, merit, ethic and happiness to students. (Institute for the Promotion of Teaching Science and Technology, 2002)

Mathematics is a branch of study that deals with logic, reasoning, deduction, calculation, conclusion and communication. It is a tool for improving the skill and thinking process to a brain. Mathematics is also a tool for science, applied science and technology, agriculture, economics and engineer which can be applied to solve a problem in real life. (Karnjanamayoon, 2000) By the giving reasons, it is necessary to enhance mathematics education.

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Generally, the mathematics activities are not effective. This depends on many factors, for example

- Most of students think that mathematics is not necessary of their real life.
- Mathematics is a difficult subject and hard to understand
- Mathematics is not practical. It is just a theory.
- Many students cannot link mathematics to other subjects.
- The monotone style of instructor gets students bored.
- Students do not really want to understand mathematics deeply, just only want the short cut to get a solution.
- Students cannot think systematically. Their thinking process is not in procedural.

By the given factors, the authors were looking for a mathematics activity which is good for self-studying. The activity should enrich the student to have a good step in thinking process. Moreover, it should be able to solve the suggested problems.

The project approach activity was chosen to be an experiment. The activity is a supplementary exercise which is similar to the preliminary research. In order to complete the activity, the participant must follow the protocol: planning, reviewing literature, doing the research, analysis, making conclusion and giving presentation, respectively. This approach is suitable for individual and group study. It is self-study activity style. The instructor just gives an advice, makes a discussion and gives an evaluation.

The authors applied the activity on the topic “Sequences and Series”. The topic is a basic knowledge for the higher level study, e.g. calculus. “Sequences and Series” concerns about the pattern of numbers. It provides skills of observation, pattern recognition and calculation by using formulas. The activity let participated students work on the topic by following the protocol of project approach. It was found that the students were better in analysis and synthesis the knowledge. The students had more responsibility and were eager to do a research. They were confident to give a presentation. The activity satisfied them very much.

Design/Procedure

The development of the project approach activity on the topic “Sequences and Series” was divided into 9 steps as follows:

1. Choosing the activity

Since there is a cooperation of the schools in the Provincial Administrative Organization of Nakhon Ratchasima and Suranaree University of Technology, the authors participated in the Local Learning Enrichment Network Project (LLEN). There were some activities for enrichment the capability of instructors. One of the outstanding activities, project approach activity, was chosen because it is flexible and more powerful.

2. Curriculum Analysis

The basic education core curriculum B.E. 2551 (A.D. 2008) of mathematics subject group for senior high school was considered. Course description, academic achievement, unit course and lesson plan were analyzed.

3. Literatures review

Documents of mathematics and media assisted instruction were reviewed in order to find appropriate selected content which is harmonious with the standard curriculum.

4. Documents preparation

Document of project approach activity protocol was prepared. It gave the direction for working in the activity. The topic in the document consisted of

- Name of the project
- Name of student(s)
- Academic level
- Project advisor
- Academic Year
- Abstract
- Introduction
- Objective
- Hypothesis
- Review of literatures
- Method
- Procedure
- Conclusion
- Benefit
- Comments

5. Efficiency Measurement Studying

Literatures of mathematics achievement/learning measurement and efficiency of media measurement were review.

6. Achievement Measurement

The pretest and posttest for achievement/learning measurement on the topic “Sequence and Series” were developed. Both pretest and posttest were multiple choice mathematics problems, which consisted of 15 items each. They were parallel tests. A questionnaire on student satisfaction toward three parts was prepared, where the three parts were learning and teaching activities using the module, media and teaching materials, and evaluation. For each part, there were 5 questions as evaluated by using 5 points scale. There were also 10 questions as evaluated by using 5 points scale for attitude test toward mathematics teaching.

7. Recruitment

The presentation about mathematics project approach activity was given to 85 grade 11th level students (Muthayomsuksa 5) at Mueang Yang Suksa School, Mueang Yang Sub-District, Mueang Yang District, Nakhon Ratchasima, Thailand. There were 15 students interested in participating in the activity.

8. Implementation

The pretest was given to the recruited students. After that, the students started their activity. Since the project approach activity was a supplementary activity, the students had to do it out of the regular study class. However, the students could consult about it for all available time. After finishing the conclusion parts, each of participating students had to give the presentation to friends and instructors. Hereafter, the students must take the posttest and filled up the questionnaire and attitude test.

9. Extension

Since the students who participated the activity had more self-confident. They were sometimes asked to be a instructor assistant to help their friends. It was found that they also used the same activity to other subjects.

Finding/Analysis

1. In the experiment, the module was efficient at $E_1/E_2=90.67/89.78$ by the assumption $E_1/E_2=75/75$. (See more detail in Table 1)

2. It was found that students had better academic achievement significantly after using the module ($p<0.05$). (See more detail in Table 2)

3. The students were satisfied by the project approach activity very highly (4.91 from 5). (See more detail in Table 3)

4. The students had a very good attitude to mathematics subjects (4.83 from 5). (See more detail in Table 4)

Table 1 The pretest, in-between test and posttest scores of students using the mathematical module

Test	Sample	Total Scores	Percentage	\bar{X}	S.D
In-between	15	15	90.67	13.60	0.63
Post	15	15	89.78	13.47	0.83

Table 2 The comparison of pretest and posttest of using the mathematical module

Test	Sample	\bar{X}	S.D.	t	df	Sig.
Pretest	15	8.60	1.45	-15.88*	14	0.00
Posttest	15	13.47	0.83			

* $p<0.05$

Table 3 The student satisfaction toward the mathematical module as evaluated by using 5 point satisfaction scales (n = 17).

Evaluated Items	Results		Interpretation
	\bar{x}	S.D.	
Learning and Teaching Activities	4.91	0.29	very satisfied
1. Students enjoyed participating in classes	4.87	0.35	very satisfied
2. Students felt comfortable and happy in class hours	4.73	0.46	very satisfied
3. Students could learn and studied by themselves continuously and the learning atmosphere was not stressful	5.00	0.00	very satisfied
4. Students were pleased to find the answers by themselves	4.93	0.26	very satisfied
5. Students had enough time to study by themselves	5.00	0.00	very satisfied
Media and Teaching Materials	4.91	0.29	very satisfied
6. Media and teaching materials were interesting	4.89	0.31	very satisfied
7. Media and teaching materials were attempting to learn	4.87	0.35	very satisfied
8. Learning from media and teaching materials helped students to better understand and easy to remember	4.87	0.35	very satisfied
9. Media and teaching materials encouraged students to study and perform on their own	5.00	0.00	very satisfied
10. Media and teaching materials were adequate for all students	4.93	0.26	very satisfied
Evaluation	4.80	0.41	very satisfied
11. Students were happy and eager to answer questions and they could check the answers immediately	4.92	0.27	very satisfied
12. Students wanted to have homework at the end of each class	4.93	0.26	very satisfied
13. Students had the opportunity to know their scores after their perform	4.80	0.41	very satisfied
14. When there was the test, students were always satisfied with their scores	5.00	0.00	very satisfied
15. Students were satisfied with the admiration after answering the questions	4.87	0.35	very satisfied
Total	4.91	0.29	very satisfied

Table 4 The student attitude toward mathematics teaching (n = 17)

Evaluated Items	Results		Interpretation
	\bar{x}	S.D.	
1. Students liked mathematics	4.93	0.26	very good
2. Mathematics helped people to become logical	5.00	-	very good
3. Mathematics could be used in daily life	4.86	0.35	very good
4. Everybody should study mathematics	5.00	-	very good
5. It was not necessary to study mathematics	4.79	0.46	very good
6. Mathematics was boring	4.79	0.62	very good
7. Students were forced to study mathematics	4.71	0.49	very good
8. Mathematics got students stress	4.86	0.59	very good
9. Students should study mathematics less	4.86	0.41	very good
10. I wanted to learn mathematics everyday	4.86	0.35	very good
Total	4.83	0.41	very good

Recommendation

It can be concluded that the project approach mathematics activity on the topic “Sequences and Series” is an effective tool which enhances student academic achievement. It satisfied the students very much.

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