

Development of Science Academic Achievement by Using Inquiry-Based Learning and Problem-Based Learning of Grade 1st Students

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Abstract

The aim of this research was 1) to develop the students' science academic achievement in order to pass the criteria of 70 percent of full score 2) to study the students' satisfaction toward the Inquiry-Based Learning and Problem-Based Learning activities. The research study was conducted on 38, 1st grade students who were 6-7 years old in academic year 2018 from Kasetsart University Laboratory School Kampaeng-Saeng Campus Educational Research and Development Center, Nakorn-Pathom province, Thailand. The research methodology is classroom action research. The research instruments were: 1) 5 lesson plans of the Inquiry-Based Learning and Problem-Based Learning activity, 2) the science academic achievement test, 3) the observation form, and 4) the satisfaction toward learning activity test. In the study, data were obtained via the one group pretest-post test design; analyze the data by using mean, percentage, standard deviation and t-test dependent group. The results were 1. The students' science academic achievement mean scores in pretest and post test were 54.5 and 82.5 percent respectively. It's visible that the students' mean score post test higher than pretest, statistical significance at the level of 0.05 and passed the criteria in post test. 2. The level of students' satisfaction toward Inquiry-Based Learning and Problem-Based Learning activities was in high level. The research found that activities were effect students to learning deeply, assertive, comment, enthusiastic, responsibility, and enjoy to study. Students also analytical and solve the problems under working together, searching information from a variety of learning sources and summarize what they has been learned.

Keywords: Science Academic Achievement, Inquiry-Based Learning, Problem-Based Learning, Grade 1st Students.

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Introduction

Basic education management is education for all, which the state must provide education to develop Thai youth to have desirable characteristics. For the development of the country that still stands in the future. Therefore, the current education management emphasizes on the students to be the actors in the search of knowledge. Which the education management according to the National Education Act 1999 B.E. has established the purpose of providing education that must be to develop Thai people to be perfect humans Both body, mind, intellect, knowledge and morality, ethics and culture in living and able to live happily with others. This approach is in line with the Ministry of Education's policy on national youth development into the 21st century world. The aim is to encourage learners to have morality, love being Thai, have analytical skills, synthesize, have technology skills, can work happily with others and be able to live happily with others in the peace global society. 21st century education, the instructor must adjust the teaching and learning by helping to guide and design the learning activities for each student to be able to assess their progress, must make the students love to learn and with the goal of teaching that will give students life skills, thinking skills and technology skills. In line with Wichan Panich (2012:5) said that true learning is in the real world and in real life, learning the subjects in the classroom is not true learning, it is still a hypothetical learning, the learners must design learning to learn in a condition closest to real life.

For the knowledge and skills in science and technology in the core curriculum of basic education in 2008, focuses on the students to have knowledge, understanding and experience in management. Preserving and utilizing natural resources including the environment in a balanced and sustainable, solve problems and skills in living. In addition, science plays a very important role in the present and future world. It also helps humans to develop their thinking methods. (Office of Academic Affairs and Educational Standards 2008: 1) Therefore, the teaching and learning process must be consistent with the real conditions in life and consider the students who have learning methods.

Problem-Based learning (PBL) and Inquiry-Based Learning are underpinned by a constructivist approach, as such it promotes active learning that allowing students to create new knowledge by using real-world problems as contexts of learning for students to develop skills in critical thinking and problem solving including pulling knowledge according to science in the field of study. It's used as a focal point for student inquiry/investigation. Students are actively involved in solving problems or answering questions. Teacher facilitates, guideline and teaching strategy designed to teach problem-solving skill, content and to develop self-directed learning. (Munthra Thumabuth, 2002: 13) Arpon Seang-rassamee (2000: 14) talking about the meaning of problem-based learning that it is teaching and learning that begins with problems. It's motivating students to be curious and seek more knowledge to solve the problem. This learning style is a process similar to the quest for scientific knowledge and for students to work as a team in which the instructors arrange for the students to face real problems or arrange the situation for the students to face the problem then practice the analysis process Problems and solving problems together as a group. (Tissana khammanee, 2013: 134) In addition, research has shown that problem-based learning management Change in academic performance for the better. Such as research related to problem-based processes by Phatumrat Arwusosakul (2014: 63) study the effects

of learning management in biology by using problems as a base to promote learning achievement in biology for students in grade 5 in Samut Songkhram Province. The results of the research showed that average score biology achievement after learning by problem-base learning higher than the latter.

From above information, the researcher interested to develop science academic achievement by using Inquiry-Based Learning and Problem-Based Learning in grade 1st students and studies the students' satisfaction. This is in line with the current science teaching and learning policy and for the benefit of being used to improve learning management in other courses.

Objectives: The objectives of this research were 1) to develop the students' science academic achievement in order to pass the criteria of 70 percent of full score, and 2) to study the students' satisfaction toward the Inquiry-Based Learning and Problem-Based Learning activities.

Methodology:

Population and sample: The research study was conducted on 38, 1st grade students who were 6-7 years old in academic year 2018 from Kasetsart University Laboratory School Kampaeng-Saen Campus Educational Research and Development Center, Nakorn Pathom province, Thailand.

Measures: There are 4 measures use in this research 1) Lesson plan of the Inquiry-Based Learning and Problem-Based Learning activity, 2) Science academic achievement test, 3) Observation form, and 4) Satisfaction toward learning activity test.

Data collection: This research is a pre-experimental experimental research design. The research format was pre test-post test one-group design as in table 1.

| pre-experimental | experimental | post-experimental |
|------------------|--------------|-------------------|
| T1 | X | T2 |

Table 1: This is the research design.

| | | |
|----|-------|------------------------|
| T1 | means | test before experiment |
| T2 | means | test after experiment |
| X | means | teaching management |

Data analysis: The researcher analyzed the data with basic statistics in data analysis by using computer software as follows 1) Comparative analysis of academic achievement before and after Using Inquiry-Based Learning and Problem-Based Learning management by T-test for Dependent Samples, 2) Comparative analysis of academic achievement after Using Inquiry-Based Learning and Problem-Based Learning management with criteria of 70 percent of full score by T-test for Dependent Samples, and 3) Comparative analysis of the students' satisfaction toward the Inquiry-Based Learning and Problem-Based Learning activities by mean score and standard deviation score.

Procedure: There are 7 steps of the Inquiry-Based Learning and Problem-Based Learning activity. It's represent process showing how each of steps inter-connects and relate to one another as in figure 1.

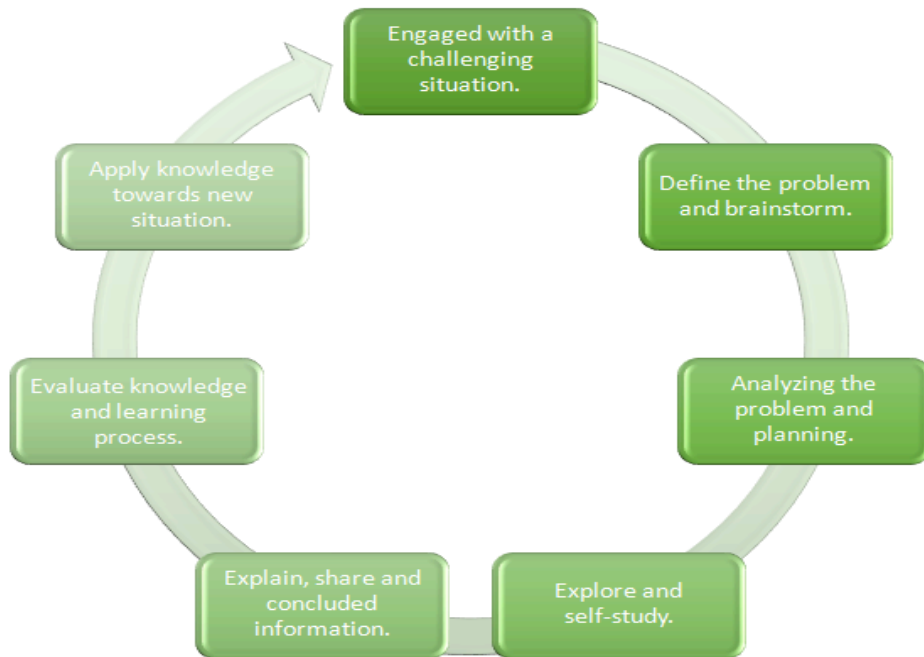


Figure 1: This is the 7 steps of the Inquiry-Based Learning and Problem-Based Learning activity

The 7 steps of the Inquiry-Based Learning and Problem-Based Learning activity are follow

- 1) **Engaged with a challenging situation.** Teachers identify an appropriate problem or challenging situation for course and students. Organize students in group and engage student collaboratively in teams. This achieved by having students identify their strengths and weaknesses which will assist them as they assume different roles during the process,
- 2) **define the problem and brainstorm.** Students read and discuss their team members' current knowledge and experiences that relate to the situations. Brainstorm possible solution and accept everyone's contributions,
- 3) **Analyzing the problem and planning.** Students write out the problem statement in their own words for example the possible solution to problem, the actions to be taken with timeline, and what their team needs to know to solve the problem,
- 4) **Explore and self-study.** Students investigate and finding by following the requirements of the activity. The findings include the problem statement, question, gathered data, analysis of the data, and support for solutions. This step shows the process and outcome of the activity,
- 5) **Explain, share and concluded information.** Students present their solution and review what their have learned,
- 6) **Evaluate knowledge and learning process.** Students reflect on their knowledge and the learning process, assessment, and
- 7) **Apply knowledge towards new situation.** Students are engaged with challenging situation, prior knowledge is activated, and questions are provoked.



Figure 2: These are students' activity pictures

Result:

1. The students' science academic achievement means score compare between pretest and posttest. From the data collection found that the students' mean score pretest and posttest of science academic achievement test was 5.42 and 8.25 of full score 10. The students' mean score posttest higher than pretest, statistical significance at the level of 0.05 as in table 2.

| test | full score | mean score | S.D. | t | Sig. |
|----------|------------|------------|------|--------|-------|
| Pretest | 10.00 | 5.45 | 0.32 | 11.372 | 0.003 |
| Posttest | 10.00 | 8.25 | 0.26 | | |

Table 2: This is the students' science academic achievement means score compare between pretest and posttest.

2. The students' science academic achievement score compare with criteria of 70 percent of full score. From the data collection found that the students' mean score posttest was 8.25 of full score 10, the students' standard deviation was 0.26, and the students't-test score was 1.678. The students' mean score posttest higher than the criteria of 70 of full score, statistical significance at the level of 0. 05 as in table 3.

| test | full score | mean score | S.D. | t | Sig. |
|----------|------------|------------|------|-------|-------|
| Posttest | 10.00 | 8.25 | 0.26 | 1.678 | 0.000 |

Table 3: This is the students' science academic achievement score compare with criteria of 70 percent of full score.

3. The students' satisfaction toward the Inquiry-Based Learning and Problem-Based Learning activities. From the data collection found that The level of students' satisfaction score with the following sub-points 1) Enjoy to do activity was 4.30, 2) Like the place to study was 4.50, 3) Lesson easy to understand was 4.00, 4) Content interesting and useful was 4.80, and 5) Teacher give advice and help was 4.00 of full level 5.00. The level of students' satisfaction toward Inquiry-Based Learning and Problem-Based Learning activities was in high level as in table 4.

| Components of students' satisfaction. | mean score | level of students' satisfaction |
|---------------------------------------|------------|---------------------------------|
| 1. Enjoy to do activity | 4.30 | high level |
| 2. Like the place to study | 4.50 | high level |
| 3. Lesson easy to understand | 4.00 | high level |
| 4. Content interesting and useful | 4.80 | high level |
| 5. Teacher give advice and help | 4.00 | high level |
| Average | 4.30 | high level |

Table 4: This is the level of students' satisfaction toward the Inquiry-Based Learning and Problem-Based Learning activities.

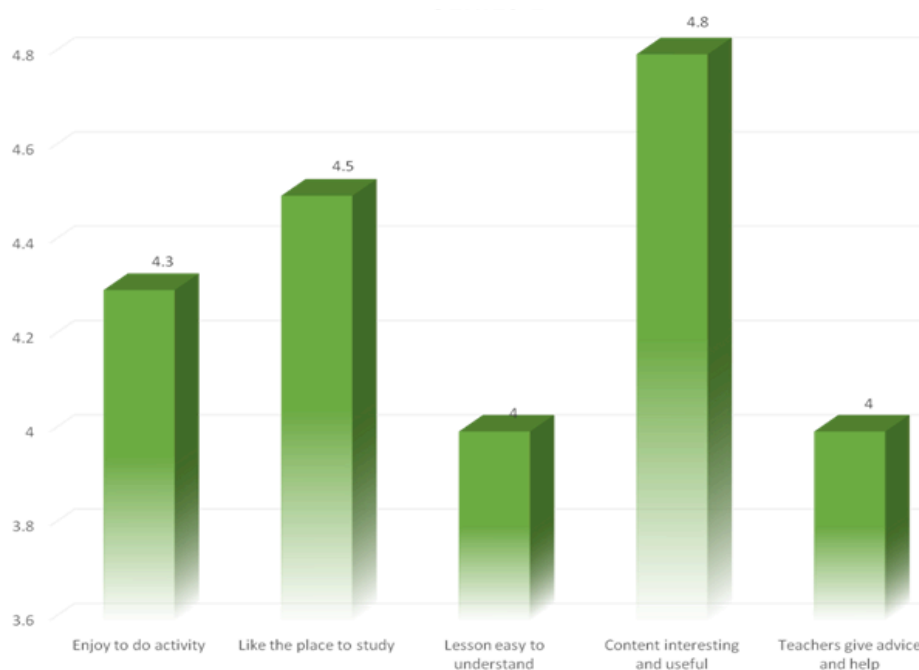


Figure 3: This is the level of students' satisfaction toward the Inquiry-Based Learning and Problem-Based Learning activities.

Conclusion

The science academic achievement Academic achievement of students grade 1st by using inquiry-based learning and problem-based learning after learning higher than before learning and the students' mean score posttest higher than the criteria of 70 because the learning management stimulates the interest of students to become enthusiastic in their activities. Therefore allowing students to learn that can create self-understanding. In each step of learning management allowing students to act on their own and focusing on the training of group work skills, the exchange of opinions among members within the group. In addition, the content that is included in the learning activity it's not too difficult or too easy for the learners. Teachers are

arranged from easy to difficult, consideration of the potential of intellectual development of students is important. These activities results in a higher student achievement.

This study conclude that there is considerable support for the Inquiry-Based Learning and Problem-Based Learning activities workable because it encourages the activation of prior knowledge in the group setting and provides opportunities for elaboration on that knowledge. These activities facilitate the comprehension of new information related to the problem and enhance long-term memories. In addition, there is evidence that problems arouse situational interest that drives learning. Flexible provided by cognitively and socially congruent teachers also seems to be reasonably effective. Group work encourages students to study regularly. Initially, students do not study much beyond the learning issues generated; the development of personal agency in self-study needs time to develop. Students also analytical and solve the problems under working together, searching information from a variety of learning sources and summarize what they has been learned.

References

- Arpon Seang-rassamee. (2000: 14). *The effects of problem-based learning on self-learning characteristics Academic achievement in environmental science and satisfaction with study Teaching of Matthayom 4 students (pp.14)*. Chulalongkorn University, Master of Education Thesis.
- Ministry of Education. (2008). *Core of basic education curriculum year 2008*. Bangkok.
- Munthra Thumabuth. (2002). *Developing quality of learning by using Problem-Based Learning (pp.13)*. Bangkok: Academic journal.
- Office of Academic Affairs and Educational Standards. (2008). *Efficient teaching strategies (pp.1)*. Bangkok: Teachers Council of Thailand Ladprao Press.
- Phatumrat Arwusosakul. (2014). *The results of learning management in biology by using problems as a base to promote Learning Achievement in Biology and Problem Solving Ability for Grade I Students. Mattayom 5 (pp.63)*. Burapha University, Master of Education Thesis.
- Tissana khammanee. (2013). *Teaching science: knowledge for effective learning process management*. Bangkok: Chulalongkorn University Press.
- Wichan Panich. (2012). *Ways to create learning for students in the 21st century (pp.5)*, Bangkok: Sodsri-Saritwong Foundation Press.
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