

Attitudes toward Science Learning and Problem-Solving Thinking Skill of Mattayomsuksa 4/4 Students at Phadungnaree School

Sukanya Kuengkng and Somsong Sitti
Mahasarakham University, Talat, Thailand

Abstract

Attitudes toward science learning and problem-solving thinking skill are considered to be the factor affecting on learning achievement. Therefore, the examination of these two factors is essential for educational research in terms of science learning achievement enhancing. In this study, the purposes were; to examine attitudes toward science learning compared to 70 percent criteria, to examine problem-solving thinking skill compared to 70 percent criteria, and to consider the relationship between the results of two factors and chemistry achievement. The tools for data collecting were 20-item scientific attitude test and problem-solving thinking test consisting of 5 situations that required the students to identify problem, cause of problem, way to solve problem, and result from designed problem solving in each situation. The data were obtained from 46 mattayomsuksa 4/4 students attending in first semester of academic year 2018, Phadungnaree School, Mahasarakham, Thailand. After analyzed the obtained data, the average score of scientific attitude test was 12.99/20. There were 31.11 percent of student possessed the higher scores when compared to 70 percent criteria. In contrast, there were only 2.22 percent of student possessed the higher scores from problem-solving thinking test when compared to 70 percent criteria. The average score of problem-solving thinking test was 5.28/20. The results showed that this group of students possessed not only low attitude toward science learning, but also low problem-solving thinking skill which were corresponded with their low chemistry learning achievement. According to the results, this study can be a preliminary data for the future research to enhance the science learning achievement by promoting the attitude toward science learning and problem-solving thinking skill.

Keywords: Attitude Toward Science Learning, Problem-solving Thinking Skill, Learning Achievement.

Introduction

Chemistry is one of the core subjects of Thai Curriculum which provided for high school students. According to the core curriculum, the fundamental of Chemistry will be introduced to Mattayomsuksa 4 students with the same content around Thailand. Core ideas of Chemistry is mainly about matter and properties of matter such as the structure of atom, chemical reaction and rate of reaction. Therefore, many subjects are related to Chemistry including Mathematics, Physics, Astronomy and Biology. Moreover, many skills are evolved with Chemistry learning too such as thinking skill and calculation skill (Physical Science Manual for Mattayomsuksa 4-6, IPST Thailand, 2013).

According to the obtained information from Chemistry teacher of mattayomsuksa 4/4 students, Phadungnaree School, showed that this group of 46 students possessed the low Chemistry achievement. Their average final test scores in first semester of academic year 2018 was 5.89 out of 30 points. To explore the problem, teaching and learning observation was take placed in Chemistry class. The students expressed that they felt bored in the class, had less participation and paid less attention to what the teacher was talking to. The students' behaviors related to the teacher interview. Additional information from their teacher was about their ability to solve the problem. The teacher referred to the past exercises that this group of students could barely solve the problem assigning in the class. The problem of this student group should be clarified.

As mentioned before, this study mainly aimed to explore and clarify the problem of mattayomsuksa 4/4 students. Their expressed behavior might come from their attitudes toward science learning. The ability to solve problem may be another one problem of this student group.

In order to explore and clarify the mentioned problem, the purposes of this study were; to examine attitudes toward science learning compared to 70 percent criteria, to examine problem-solving thinking

skill compared to 70 percent criteria, and to consider the relationship between the results of two factors and chemistry achievement.

Method and Materials

This study is a survey research using purposive sampling to select the target group. Participants were 46 mattayomsuksa 4/4 students in Science-Mathematics Program, Padungnaree School, Thailand. The data collection was operated in the second semester in 2018 school year.

The data collecting instrument was 20-item questionnaire from previous study (Sirinapa Nammano, 2017). This 20-item questionnaire consisted of 3 aspects including of complication of scientific content, importance of scientific learning, and satisfaction in scientific learning. Each item was divided into 5 scales-based Likert Scale. The IOC value was 0.94 considered by the 5 experts in field. The second instrument to investigate problem-solving thinking skill is the problem-solving thinking skill test consisting of 5 situations from previous study. Each situation asked student to state 4 steps about the given situation-based Weir (Onuma Glawglar, 2014). First step was to state the problem. Second step was to state the cause of the problem. Third was to design the way to solve problem and last step was to state the result from the designed way to solve problem. The criteria to evaluate each step was shown in TABLE 2.

To gather the data, 46 students of the target group were instructed about the purposes by the researcher before giving the questionnaire and the test. Then, they were allowed to complete the questionnaire in 20 minutes. After that, the students were allowed to start doing the problem-solving thinking skill test in 40 minutes.

The quantitative data was analyzed using preliminary statistics which were mean value and standard deviation value. To interpret the result, mean value of each item was compared to the given criteria below.

Table 1: The criteria for attitude toward science learning interpretation

<i>mean value</i>	<i>interpretation</i>
0 - 2.49	low
2.50 - 3.49	moderate
3.50 - 5.00	high

Table 2: The criteria to evaluate each step toward science learning interpretation

<i>step</i> <i>score</i>	<i>state the problem</i>	<i>state the cause of problem</i>	<i>design the way to solve problem</i>	<i>state the result form the designed way</i>
4	most relevant to the situation	most relevant to the situation	most relevant to the cause	most relevant to the designed way and the cause
3	relatively relevant to the situation	relatively relevant to the situation	relatively relevant to the cause	relatively relevant to the designed way and the cause
2	less relevant to the situation	less relevant to the situation	less relevant to the cause	less relevant to the designed way and the cause
1	least relevant to the situation	least relevant to the situation	least relevant to the cause	least relevant to the designed way and the cause

Results

Attitude toward Science Learning

According to TABLE 3, mean value in aspect of complication of science content was 2.89 which considered in moderate level. The standard deviation was ranging from 0.89 to 1.01 and the average of standard deviation was 0.96. Item number 2 and item number 19 were considered in low level which stated that *I do not like to read science book and I think science is hard to understand* respectively. Item

number 8 and 17 were considered in high level which stated that *I think science content is challenge to overcome and I think there are new interesting science contents that wait to uncovered.*

Table 3: The results in aspect of complication of science content

<i>number of items</i>	<i>M</i>	<i>S.D.</i>	<i>interpretation</i>
2	2.78	0.89	moderate
3	2.2	0.96	low
8	3.76	0.90	high
11	2.58	1.06	moderate
17	3.73	0.93	high
19	2.31	1.01	low
mean	2.89	0.96	moderate

As seen in TABLE 4, mean value in aspect of importance of science learning was 3.85 considering in high level. All items in this aspect were considered in high level too. Standard deviation was ranging from 0.74 to 1.11 and the average of standard deviation was 0.92.

Table 4: The results in aspect of importance of science learning

<i>number of items</i>	<i>M</i>	<i>S.D.</i>	<i>interpretation</i>
6	4.18	0.80	high
9	4.07	0.88	high
10	4.11	0.74	high
13	3.44	0.86	high
15	3.76	1.06	high
18	3.58	1.11	high
20	3.80	1.02	high
mean	3.85	0.92	high

The mean value in aspect of satisfaction in science learning was shown in TABLE 5, Item number 4, 7, 12, 14 and 16 were considered in moderate level. Item number 1 was considered in high level stated that *I feel that science learning is fun.* Item number 5 was considered in low level which stated that *I will like science if there is no test.* Standard deviation was ranging from 0.75 to 1.16.

After analyzed the obtained data, the average score of overall scientific attitude test was 12.99 out of 20 points. There were 31.11 percent of student possessed the higher scores when compared to 70 percent criteria.

Table 5: The results in aspect of satisfaction in science learning

<i>number of items</i>	<i>M</i>	<i>S.D.</i>	<i>interpretation</i>
1	3.53	0.75	high
4	2.64	1.08	moderate
5	1.80	1.13	low
7	3.33	1.14	moderate
12	3.27	1.12	moderate
14	3.07	1.16	moderate
16	2.71	1.11	moderate
mean	2.91	1.07	moderate

Problem-Solving Thinking Skill

The result of problem-solving thinking skill test was shown in TABLE 6. The average score of 4 steps were 0.94, 1.55, 1.59 and 1.24 respectively. The least average score was the step of stating the problem and the highest average score was the step of designing the way to solve problem. Overall average score of problem-solving thinking skill test was 5.28 out of 20 points. There were 2.22 percent of student possessed the higher scores from problem-solving thinking skill test when compared to 70 percent criteria.

Table 6: The results of problem-solving thinking SILL test

<i>steps</i>	<i>average score</i>
1. state the problem	0.94
2. state the cause of problem	1.55
3. design the way to solve problem	1.59
4. state the result form the designed way	1.24

Discussion

Attitude toward Science Learning

According to the aspect of complication of science content results, most students in this group though that science is hard to understand and they did not like to read science book. In contrast, they though that science is challenge and interesting to uncover new science knowledge. The results in the importance of science learning indicated that this group of students realized how importance of science is in life. The last aspect showed that this group of students satisfied in science learning in moderate level. They though that science learning is fun but they did not like to do the science test.

Some results from the Attitude toward science learning test did not corresponded to the former teaching and studying observation. Most students knew how importance science is in life and though science learning is fun but few students paid attention and participated in class. The reason might come from the old style of teaching. Students got less chance to participate because teacher used the lecture-based teaching as a teacher-centered traditional approach which can cause lower learning achievement (Acar & Tarhan, 2008). Nowadays, active learning methods requiring actively participated students is the alternative way to help students to integrate their knowledge, thinking skill and other skills in order to promote the meaningful learning. The additional consequence is the positive attitude toward learning (Michael & Modell, 2003; Acar & Tarhan, 2010). Moreover, teacher may promote the attitude in the aspect of satisfaction in science learning by using alternative ways to evaluate students instead of testing only.

Problem-Solving Thinking Skill

As seen in TABLE 6, all steps from problem-solving thinking skill test possessed mean value less than 2 out of 4 meaning below 50 percentage. The results indicated that students in this group could barely state the problem from the given situations. Few students could state relevantly. Next, students could barely predict the results from their own designed ways in the last step. All results from the problem-solving thinking skill test corresponded to the former teacher interview. The Chemistry teacher exercises and problems assigning in class were hard to solve for students. The results could clarify that most student cannot understand the message from exercises and problems in class. As stated before, teacher-centered traditional approach allows student to have less participation. Students had less chance to practice the integrated skill such as the problem-solving thinking skill. For this reason, there should be the problem-solving thinking model applied in school because the skill to solve problem is not only important for learning but also important for life when encountered problems (Alberida & Lufri, 2018). Problem-solving thinking skill was possibly the main problem of this student group that need to solve.

Conclusions

Based on the findings, 46 mattayomsuksa 4/4 students attending in the first semester of academic year 2018, Padungnaree School, the average score of scientific attitude test was 12.99/20. There were 31.11 percent of student possessed the higher scores when compared to 70 percent criteria. Most student possessed the negative attitude toward the aspect of complication of science content but they realized how important science is. The last aspect indicated the students satisfied in science learning in moderate level. Obviously, they do not like science testing. The average score of problem-solving thinking test was 5.28/20. The least score was from stating problem step and predicting the results from the designing way. There were only 2.22 percent of student possessed the higher scores from problem-solving thinking test when compared to 70 percent criteria. The results obviously showed that this group of students possessed not only low attitude toward science learning, but also low problem-solving thinking skill which were corresponded with their low chemistry learning achievement. According to the results, this study can be a preliminary data for the future research to enhance the science learning achievement by promoting the attitude toward science learning and problem-solving thinking skill.

Acknowledgements

The author would like to thank IPST Thailand for supporting this study, Dr. Somsong Sitti who was always gave the good advices and 46 mattayomsuksa 4/4 students attending in the first semester of academic year 2018, Padungnaree School, who attended this study.

References

- Acar B., & Tarhan L. (2008). *Effects of cooperative learning on students' understanding of metallic bonding*. Res.Sci. Edu, 38, 401-420.
- Acar B., & Tarhan L. (2010). *Promoting active learning in high school chemistry: learning achievement and attitude*. Procedia Social and Behavioral Sciences 2, pp 2625-2630
- H. Alberida, Lufri. (2018). *Problem Solving Model for Science Learning*. IOP Conf. Series: Materials Science and Engineering 335
- Michael, J. A & Modell, H. I. (2003). *Active learning in secondary and college science classrooms: A Working Model for Helping the Learner to Learn*, Lawrence Erlbaum Associates.
- Onuma Glawglar. (2014). *Comparisons of Learning Achievement, Problem-Solving Thinking Skill and Scientific Attitudes of Matthayomsueksa 2 Students Who Learned Using the Organization of Socioscientific and Concept Mapping Learning Activities and Problem Based Learning and Concept Mapping Learning Activities*. M.E.d dissertation, Mahasarakham University, Thailand.
- Sirinapa Nammano. (2017). *Development of the Ability in Physics Problem-Solving and Attitude toward Physics of Matthayomsueksa 5 Students by Using Problem-Based Learning with Concept of Metacognition*. M.E.d dissertation, Mahasarakham University, Thailand.
- The institute for the promotion of Teaching Science and Technology Thailand. (1013). *Physical Science Manual for Mattayomsuksa 4-6: Chemistry*, pp. 3.