THE EFFECT OF USING A TEACHING MODEL TO ENHANCE TECHNOLOGY COMPETENCIES IN SCIENCE SUBJECTS FOR MATTAYOMSUKSA 1 STUDENTS

Pattamaporn Kaewkhongkha

Suan Sunandha Rajabhat University, 1-U-Thong Nok, Dusit, Bangkok, Thailand,
E-Mail: Pattamaporn.ka@ssru.ac.th

ABSTRACT

The objectives of this research are 1) to study technology competency of Mathayomsuksa 1 students in the present condition, 2) to compare technology competency before and after learning with a teaching model to enhance technology competency in science subjects of Mathayomsuksa 1 students. The sample group is 32 Mathayomsuksa 1 students of purposive sampling method from the population of 102 Mathayomsuksa 1 students at the Demonstration School of the University in Bangkok who are studying in the semester 2 academic year 2022. The research tool is a competency assessment for the ability to use technology, which is a form for evaluating learners in 3 aspects: the teacher assesses the learners; self-assessment, learners and peer assessment of learners and a questionnaire on student satisfaction toward the teaching model.

The results showed that the students' technology competency after learning with the teaching model to enhance their technology competency was higher than before learning at significance level .05 in all 3 aspects. The students were satisfied with the teaching model to enhance technology competency at a high level.

Keywords: technological competency, assessment form, satisfaction

INTRODUCTION

Nowadays, it is accepted that Information and Communication Technology (ICT) are important in various fields. Both in changes in ways of life, economy, society, politics, culture, and education. The use of information technology appropriately thus broadening the scope of learning. According to Sakpipatdomrong (2017), today's information technology enables people to communicate widely. People use information technology to search documents, research, and teleconferences. Information technology is very convenient. As a result, Thailand's information technology and communications technology policy framework requires various agencies to use as a guideline for joint development. In terms of education, ICT curricula are encouraged to focus on practical skills and coupled with theoretical knowledge. To prepare new graduates in ICT to be ready for real work. (Ministry of Information and Communication Technology, 2011) Information technology therefore plays an important role in the development of students. That students need to learn to use as a tool to develop knowledge and skills inevitably. The use of information technology to develop education is therefore important for children and youth, who will be an important force in developing the

country for future prosperity. The Basic Education Core Curriculum 2008 (Update 2017) has determined the ability to use technology is an important competency that focuses on the learners. Which is the ability to choose and use different technologies and have technological process skills to develop oneself and society in terms of learning, communication, creative problem solving, correctness, appropriateness, and morality (Ministry of Education, 2017).

The Basic Education Core Curriculum 2008 (Update 2017) has identified 5 core competencies of learners to focus on the development of learners at the basic education level, namely 1) ability to communicate; 2) thinking critically, 3) problem-solving skills, 4) life skills, and 5) the ability to use technology. (Ministry of Education, 2017) Developing competencies in the ability to use technology of learners will consist of knowledge, computer information skills, and learning new skills about browsing and communication skills. Which is important to instill in the students so that they can develop themselves throughout life (Department of Academic Affairs, 2001) But from studying the technology performance of students in the current class. It was found that most of the students had low and intermediate level of technology competency. Consistent with the results of Siritongthaworn (2018) 's study, it was found that the level of competency, knowledge of technology or ability to use technology of industrial management students of 113 people was mostly in the moderate level. Therefore, it is necessary to prepare students to be well-versed in technology. It will help students have a good foundation. There is an opportunity to succeed in higher education.

Basic science learning management at the Mathayomsuksa 1of the science and technology department in demonstration school of university where the researcher is a teacher, has conducted teaching and learning in accordance with the educational management guidelines in the 21st century and in accordance with the indicators of Basic Education Core Curriculum B.E. That every learner should have computer skills and information and communication technology (Computing and ICT Literacy) (Watanyu, Thunthong and Chaleywares, 2019), but the teaching and learning management in the past, it was found that students are still unable to use information technology to search for information. In addition, they are unable to select technology to present workpieces or use it to solve problems appropriately. From these problems, the researcher saw the importance of technology performance and see the problems of students that occur while teaching and learning. This research aims to develop teaching and learning activities that can create technology competencies for learners in science subjects for students in Mathayomsuksa 1 to have higher competencies for using technology and can use technology as a learning tool effectively.

OBJECTIVES

1. Study the technology competencies of students. Mathayomsuksa 1 in present.
2. Comparison of technology competency before and after learning by use a teaching model to enhance technology competency in science subjects of students in Mathayomsuksa 1.

RESEARCH AND METHODS

1. Population and sample

The population was a group of 102 students in a demonstration school of a university in Bangkok. who are studying in class Mathayomsuksa 1 in the second semester of the academic year 2022. The sample consisted of 32 students obtained by purposive selection method, which is a group of students with good grades in science and a group in which the researcher acts as a teacher.

2. Research tools

2.1 This research was adapted and developed from the research of Jantalerd (2015), on development of a learning activity model in a camp process that promotes competency information technology for students in Grade 6, which was developed into a teaching model. That consists of 5 steps as follows:

Step 1: Presents an open-ended situation. It is the step in which the teacher presents problems or open-ended situations encountered in daily life for students to observe and solve problems without the teacher suggesting solutions to the students.

Step 2: Explore and search for information. It is a step where students must search for information from learning sources. Students must verify their hypothesis by teachers acting to encourage ask about the credibility of the information the student has retrieved. To prevent the occurrence of scientific misconceptions.

Step 3: Design a solution to the problem. It is the stage where the learners find various ways to solve problems. In which each student presents the information retrieved from information technology media. Then brought to the sub-group discussion to summarize, it is the appropriate solution to the problem of the group.

Step 4: Presents a solution to the problem. Students present solutions to problems using presentation programs in various formats and explain the concepts of problem-solving methods in front of the classroom.

Step 5: Evaluate and summarize ideas. Students discuss and analyze the accuracy of information presented by other students and discuss appropriateness of presentation. After that, the teacher joins the discussion to sum up the knowledge.

2.2 Create a learning management plan according to the teaching model for 2 weeks and create a competency assessment for the ability to use technology of Mathayomsuksa 1 students, adapted from the competency assessment questionnaire for the ability to use technology of the Bureau of Educational Testing of the Basic Education Commission (2012), consisting of 3 aspects: the first, the teachers evaluating the students, the second, the learners' self-evaluation, and the third, peer assessment of the learners. Then presented the learning management plan and competency assessment questionnaire to 3 experts to verify content, the use of language, and the consistency of the learning activities, which experts agree that it is appropriate at a high level

2.3 Create a questionnaire on the satisfaction of learners towards teaching and learning model for enhancing technology competency in science subjects for Mathayomsuksa 1 students, the number of 10 items is a 5-level rubric scores, covering all components of teaching and learning. Bring the created satisfaction questionnaire to 3 experts to examine and then used to collect data on the samples.

METHODOLOGY

The researcher was responsible for teaching and learning according to the model with the subjects in the science on the topic of weather for 2 weeks. Before learning according to the teaching model, the researcher had the students take a pre-learning technology competency assessment questionnaire and then teaching. The researcher observed and recorded the students' participation behavior in the discussion and use of technology in presenting to be used in the behavioral evaluation for the ability to use technology and the development of individual learners. After teaching and learning according to the model is over. The students take a post-test learning behavioral assessment of their ability to use technology. This is the same assessment form as the pre-test learning technology competency assessment. and take a questionnaire to assess the satisfaction with the teaching model that enhances technology competency in science subjects for students in Mathayomsuksa 1.

Data analysis: Analyze the students' ability to use technology by t-test and analyze the satisfaction questionnaire toward teaching and learning according to the model by mean score ($\overline{X}$) and standard deviation (SD). Interpret learners' satisfaction towards the teaching model into 3 levels as follows:

2.50 - 3.00	means satisfied with the teaching and learning model at a high level
1.50 - 2.49	means satisfied with the teaching and learning model at a moderate level
0 - 1.49	means satisfaction with teaching and learning according to the model was at a low level.

RESULTS

The results of the assessment of learners' ability to use technology before and after learning were in three ways: teachers assessed students; self-assessment learners and peers assess learners. The results were found as follows.

1. Comparison results of the ability to use technology before learning and after learning in aspect 1 Teachers assess learners (Table 1)

Table 1: Results of comparing behaviors with ability to use technology before learning and after learning. The teacher assesses the learners.

Assessment	average score (percentage)	Assessment Score (n = 32)		t	Sig
		$\overline{X}$	S.D.		
Before learning	60.61	20.38	2.12	9.61	.00**
After learning	69.70	23.47	1.69		

** Statistically significant at the .05 level

From Table 1, the results of the comparison of behaviors on the ability to use technology before learning and after learning in aspect 1, teachers assessed students. The teachers found that learners' ability to use technology after learning was higher than before learning ($\overline{X}_{post}$= 23.47 > $\overline{X}_{pre}$= 20.38), significantly at the .05 level. They have the average after learning score was 69.70 percent and the average before learning score was 60.61 percent.

2. The results of the comparison of learners' behavior in terms of behavior, characteristics, and attitudes of learners before and after learning in the second aspect, the learners self-assess (Table 2).

Table 2: Results of comparison of learners' behavior in terms of behavior, characteristics, and attitudes before and after learning in the second aspect of learners' self-evaluation.

Assessment	Assessment forms learn	Average score (percentage)	Assessment Score (n = 32)		t	Sig
			$\overline{X}$	S.D.		
Behavior and characteristics	before	79.43	1.78	0.42	2.95	.00**
	after	94.53	2.00	0.22		
Attitude	before	87.86	4.53	0.51	3.22	.00**
	after	93.48	4.78	0.42		

** Statistically significant at the .05 level

From this table, the comparative results of learners' behavior in terms of behaviors, characteristics, and attitudes before and after learning in the second aspect were self-assessed. It was found that the behavior and characteristics of the learners after learning had a higher average score than before learning. ($\overline{X}_{after}$ = 2 > $\overline{X}_{before}$ = 1.78). Self-assessment learners had a mean score higher than before learning. ($\overline{X}_{after}$ = 4.78 > $\overline{X}_{before}$ = 4.53) significantly at the .05.

3. The results of comparing the ability to use technology before learning and after learning in the third aspect to peer assessment of the learners. (Table 3)

Table 3: Results of comparison of the behaviors of the ability to use technology before learning and after learning in the third aspect of peer assessment of learners.

Average score	Average score (percentage)	Assessment Score (n = 32)		t	Sig
		$\overline{X}$	S.D.		
Before learning	74.61	0.74	0.76	6.68	0.00**
After learning	92.58	0.93	0.09		

** Statistically significant at the .05 level

From this table, the results of the comparison of behaviors on the ability to use technology before learning and after learning in the third aspect were peer assessed learners. It was found that after learning friends found that learners' ability to use technology after learning was higher than before learning at the ($\overline{X}_{after}$ = 0.93 > $\overline{X}_{before}$ = 0.74) significantly at the .05.

4. The results of the study of satisfaction toward teaching and learning management with a teaching model to enhance technology competency, in science subjects for Mattayomsuksa 1 students. (Table 4)

Table 4: Satisfaction towards teaching and learning management model to enhance technology competency in science subjects for Mattayomsuksa 1 students.

Activity	$\overline{X}$	S.D.	Results of level
1. Students clearly know the purpose of learning.	3.00	0.00	high level
2. The content is accurate and suitable for learning.	2.84	0.37	high level
3. The process of organizing learning activities is continuous.	2.78	0.42	high level
4. Encourage students to develop critical thinking processes.	2.78	0.42	high level
5. Encourage students to use technology in their activities.	3.00	0.00	high level
6. Activities to help develop students' morality/ethics in using technology.	3.00	0.00	high level
7. Encourage students to use technology in teamwork.	3.00	0.00	high level
8. Students can use technology to solve problems in activities.	3.00	0.00	high level
9. Encourage students to have a positive attitude towards the use of information technology.	2.91	0.30	high level
10. Students can understand more science content.	2.59	0.50	high level
Average	**2.89**	**0.20**	**high level**

From the table, after the learning management according to the teaching model to enhance the competency of technology in science subject for Mathayomsuksa 1 students. The researcher had students complete a 10-item satisfaction questionnaire on teaching and learning management. It was found that, on average, all aspects ($\overline{X}$ = 2.89) were satisfied with teaching and learning according to the model was at a high level. When considering item by item, it was found that the 5 aspects that the learners were most satisfied with were 1) teaching model with clear objectives, 2) encouraging students to use technology in activities, 3) activities to help develop students' morality/ethics in using technology, 4) encourages students to use technology in teamwork, and 5) students can use technology to solve problems in activities.

DISCUSSIONS AND CONCLUSIONS

Results from research to study the effect of using a teaching model to enhance competency in technology in science subjects for Mattayomsuksa 1 students can be summarized and discussed as follows:

1. The results of comparing the students' ability to use technology before and after learning were modeled using a behavioral assessment that consisted of 3 aspects: 1) the teacher assesses

the learners, 2) the learners self-evaluation, and 3) peers assess learners. It was found that students had higher average scores after learning than before learning in all aspects. That is, students' behaviors, ability to use technology, characteristics, and positive attitudes towards using technology increased. It shows that teaching and learning using a teaching model to enhance technology competency. Can encourage students to develop their competency in using technology. Because the activity model arranged for the learners to do real work and use group processes in the activities. According to Boriboonsub (2017) study on the development of information technology and communication skills of military technical students' using online learning, the research results found that after learning according to the developed model. Students have higher skills in information and communication technology than before and have good skills in all aspects. It shows that theoretical learning builds knowledge. The knowledge of the learners will arise from real practice or from real situations. and interact with friends. Allows students to create knowledge by themselves. (Grabinger and Dunlap, 1995)

2. After learning management with a teaching model to enhance competency in technology in science subjects for Mathayomsuksa 1 students. The researcher asked the students to complete a questionnaire on their satisfaction with the teaching and learning management. On average, all aspects were at a high level, indicating that the teaching and learning approach here encourages students to use technology that can enhance their technological competency for students. Students can apply their knowledge of technology to explain or solve everyday situations.

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