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Effects of Learning Management based on the Flipped Classroom Approach on Learning Achievements of Grade 9 Students Learning the Computer Law in Computer Science Course

Muneeroh Phadung[1*], Sithiporn Nilsang[2] and Sumaiyah Saae[3]

[1,3]Science Mathematics and Computer Teaching Program, Faculty of Science Technology and Agriculture,
Yala Rajabhat University, Muang, Yala 95000, Thailand
[2]Laws Program, Faculty of Humanities and Social Sciences, Nakhon Sri Thammarat University,
Muang, Nakhon Sri Thammarat 80280, Thailand

Abstract

The objectives of this research were to (1) investigate learning achievements of computer law in a computer science course of grade 9 students through a flipped classroom approach and (2) study the satisfaction of these students who learn computer law in the computer science course by the flipped classroom approach. By purposive sampling, the samples of the study were 23 students in grade 9. The research instruments were (1) learning plans through the flipped classroom approach, (2) A quiz with pre- and post-test, and (3) satisfaction questionnaires. The statistics analyzed the data was paired sample t-test and one sample t-test as well as mean ($\bar{x}$) and standard deviation (S.D.). The results revealed that (1) the learning achievements of the students were better than those before the course and higher than the criteria with the statistical significance at 0.05. In addition, (2) the students were very satisfied with the flipped classroom approach.

Keywords: Flipped Classroom, Learning Achievement, Computer Science, Computer Law, Students

Introduction

According to the Ministry of Education, the Basic Education Core curriculum B.E. 2551 (A.D. 2008) was improved in 2017. In this regard, the Institute for the Promotion of Teaching Science and Technology was assigned to improve science curriculums since science plays with its important role in present and future global's society. In addition, technology curriculums were enhanced to catch up with very fast changed technology by adding a computing science course and a design and technology course to develop students to understand computational thinking and critical thinking to solve problems systematically and apply computer and information technology knowledge and communication to solve real problems in the present life effectively. Moreover, students would have valued utilizing technology creatively and practice their thinking process in order to completely develop the economy and society of the country through digital technology. Significantly, a new teaching method to teach students to have thinking methods and integration to other subjects were improved to make students understand the importance of computational thinking for knowledge creation included adaptations to other subjects. Learners were also able to solve their daily problems, understand circumstances and risks due to digital technology in order to make their lives happier in their societies (Office of the Education Council, 2021).

There are three scopes of the computing science course. First, computational thinking is design to make students understand and learn a way to think and analytically solve problems as well as have thinking sequences. In addition to programming, the key point of this course is to teach students linking problems to solutions effectively. Second, digital technology including techniques regarded to digital technology in

4.0 era to integrate to other subjects is taught. Third, media and information literacy is purposed to teach students to separate real and unreal data and acknowledge laws and rights in the cyber world in order to apply the media correctly and safely (Institute for the Promotion of Teaching Science and Technology, 2018). However, it was found that the improved computing science course revealed problems of teaching practices because teachers found that there were some problems on applying the curriculum to teach based on changed indicators. Besides, the computing science is considered a new subject of the science curriculums, containing a computer science skill as a new indicator, linking to problem-solving and science and mathematics knowledge as well as using technology as a learning tool (Wangsalae and Swengam, 2021). Unfortunately, it was found that some students believed and had risky online behavior which could make them be victims and be affected from cyber bullying so that they could not separate real and fake information or know about cyber laws or rights (Wongsupa and Thamrongsotthisakul, 2022). Therefore, problems of unknowing and being unable to analyze laws of computer should be realized as what students should know in the digital world.

A concept of flipped classroom is one of learning methods, applied to solve learning and teaching in this era which is a variety of information and technology media. This method is focused on creating new knowledge according to skills, competency, and intellect of each student. Moreover, students would be given independence of thinking and how to seek for new knowledge in any sources outside classrooms. students would also be supported to think and solve critically, be creative, and have interaction with other students. Besides, students are important in this method with focusing on information retrieve in order to be relevant to education changes in the present (Srihiran, 2017).

Therefore, effects of learning management based on a flipped classroom approach on learning achievement of grade 9 students learning the computer law in the computing science course were investigated in order to increase efficiency of the computing science course management according to the 2017 edition of the Basic Education Core curriculum B.E. 2551 (A.D. 2008). Furthermore, the students could be promoted to have digital intelligence quotient as one of the 21st century skills to be digital citizens who could earn for their living and live their lives with quality.

Objectives

1. To investigate learning achievements of the computer law in the computing science course of grade 9 students who learned based on the flipped classroom approach,

2. To study the satisfaction of students who learned based on the flipped classroom approach for the computer law in the computing science course

Methods

Population and samples

The population of the research was 150 grade 9 students at Khumpheewithya in the Office of the Private Education Commission (OPEC) in Bannangsata District, Yala Province.

The samples were 23 students in 3/3 classroom at Khumpheewithya in the Office of the Private Education Commission (OPEC) in Bannangsata District, Yala Province.

Sampling method

A purposive method was used to select the samples who could be representatives of the population.

Research instruments

There were two instruments which were separated into an instrument for the experiment and
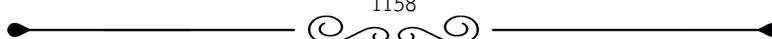
instruments for data collection.

1. The instrument for the experiment was lesson plans of the computer law in the computing science course based on the flipped classroom approach.
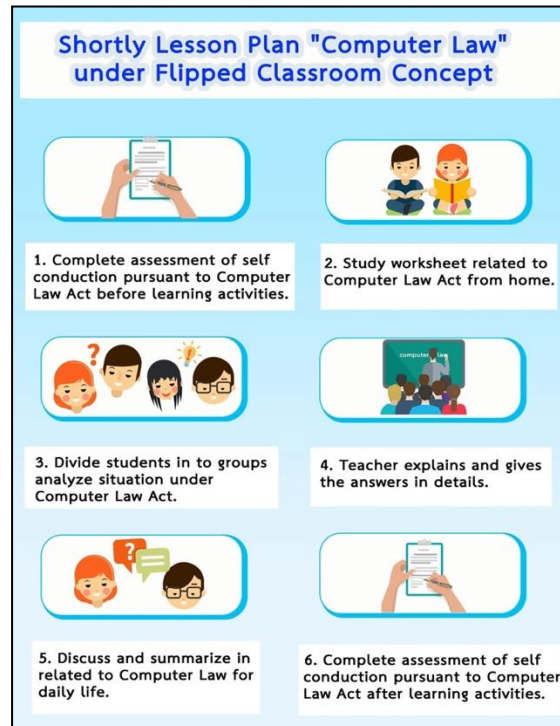

Figure 1 Short lesson plans of the "computer law" based on the flipped classroom approach

2. The instruments used to collect the data were

2.1 A quiz with pre- and post- test. Regarding the quiz, there were 2 essay questions (30 scores), all of which were created to measure student achievement on computer law.

2.2 The satisfaction questionnaire was divided into three sections: the first section concerned general information of respondents; the second was a 5-point Likert rating scale (1 = very high, 2 = high, 3 =average, 4 = fair and 5 = poor) for respondents to select their level of satisfaction with 10 items; and the last section of the questionnaire was an open-ended question which allowed respondents to provide any further thoughts and suggestions they might have optionally.

Data collection

1. Before the experiment on teaching the computer law in the computing science course based on the flipped classroom approach, the grade 9 students were asked to do a pre-test in the first week.

2. Teaching the computer law in the computing science course based on the flipped classroom approach was operated for the grade 9 students.

3. After the experiment, the students were asked to do a post-test and evaluate their satisfaction with their learning of the computer law in the computing science course based on the flipped classroom approach.

Data analysis

The quantitative data were analyzed as the following details:

1. The comparison between the pre-test and the post-test scores of the computer law in

the computing science course was analyzed by paired sample t-test at 0.05 of the statistical significance.

    2. The comparison between the post-test scores of the computer law in the computing science course and 70 percent of the mean score was analyzed by one sample t-test at 0.05 of the statistical significance.

    3. The satisfaction of the students who learned the computer law in the computing science course based on the flipped classroom approach was analyzed by basic statistics of mean $(\bar{x})$ and standard deviation (S.D.).

Results

Table 1. The comparison between the pre-test and the post-test scores of the computer law in the computing science course of grade 9 students based on the flipped classroom approach

Outcomes	Number of students	$\bar{x}$	S.D.	t	Sig
Pre-test	23	10.14	2.19	-18.94*	.000
Post-test		22.42	3.30		

* p < 0.05

    According to Table 1, it was found that the post-test scores ($\bar{x}$ = 22.42, S.D. = 3.30) of 23 grade 9 students learning the computer law in the computing science course were higher than their pre-test scores ($\bar{x}$ = 10.14, S.D. = 2.19), with the statistical significance at 0.05.

Table 2. The comparison between the post-test scores of the computer law in the computing science course of grade 9 students based on the flipped classroom approach and 70 percent of the mean score

Learning achievements	Number of students	Full score	70 percent	$\bar{x}$	S.D.	t	Sig
Score	23	30	21	22.42	3.30	-86.33*	.00

* p < 0.05

    As can be seen Table 2 showed that 23 students gained higher scores of learning achievements of the computer law than the criteria, with the statistical significance at 0.05 ($\bar{x}$ = 22.42, S.D. = 3.30).

Table 3. The satisfaction of grade 9 students who learned the computer law in the computing science course based on the flipped classroom approach

Items	$\bar{x}$	S.D.	Satisfaction level
Process and steps of teaching			
1. Instructions and rules of learning were provided.	4.41	0.76	Very satisfied
2. Follow-up was set to check every assignment.	4.05	0.75	Very satisfied
3. Besides the lectures, interesting techniques were added.	4.27	0.74	Very satisfied
4. Lessons were well prepared.	4.55	0.55	The most satisfied
Learning activities			
5. The learning activities were appropriate to the lessons.	4.75	0.43	The most satisfied

6. The learning activities made the students more confidents to speak and answer questions.	3.94	0.82	Very satisfied
7. Opportunities were given to the students to express their opinions and ask some questions regarding their interest.	4.52	0.69	The most satisfied
8. The learning activities made the students understand more lessons.	4.02	0.73	Very satisfied
9. The learning activities promoted cooperative learning.	4.05	0.82	Very satisfied
10. Opportunities were given for discussion and suggestions from the teacher.	4.25	0.69	Very satisfied
Total	**4.28**	**0.69**	**Very satisfied**

According to Table 3, the findings revealed that the satisfaction of grade 9 students who learned the computer law in the computing science based on the flipped classroom approach was at a very high level ($\overline{x}$ = 4.28, S.D = 0.69). For each item, the most satisfaction item was the appropriate learning activities to the lessons ($\overline{x}$ = 4.75, S.D = 0.43), followed by good lesson preparation ($\overline{x}$ = 4.55, S.D = 0.55), and opportunities for the students to express their opinions and ask some questions regarding their interest ($\overline{x}$ = 4.52, S.D = 0.69), respectively.

Discussion

The interesting findings in this research were discussed as the following details:

The learning achievements of the computer law in the computing science course of grade 9 students after learning through the flipped classroom approach were higher than those before the lessons with the statistical significance at 0.05, and higher than the criteria with the statistical significance at 0.05. These results were relevant to a study by Kanthamala, Ingard and Insa-ard (2017) investigating grade 9 students learning an information technology 5 course knowledge creation as well as problem-solving skills through the flipped classroom approach. The results revealed that the students learning through the flipped classroom approach gained higher scores than students learning by a traditional approach with the statistical significance at 0.05. The students with the flipped classroom approach also gained the scores of knowledge creation ($\overline{x}$ = 4.55, S.D = 0.58) and problem-solving skills ($\overline{x}$ = 4.43, S.D = 0.52) at a very high level.

The satisfaction of the students learned the computer law in the computing science course through the flipped classroom approach was at a very high level ($\overline{x}$ = 4.28, S.D = 0.69) and in accordance with a study by Phetdee, Donsingha, and Sengsri (2022) investigating satisfaction of students learning decimals through the flipped classroom approach. The results showed that grade 7 students at Janokrong School were very satisfied with this learning management.

It could be seen that the mentioned flipped classroom approach was in line with active learning which responded to learning management in 21st century. In this approach, teacher roles of teachers were reduced, and student roles were increased; therefore, students could have opportunities to take actions and think to gain their experiences. In addition, students could have chances to interact with their friends and teachers in learning activities inside and outside their classrooms. Their knowledge could be created when they take action by listening, speaking, reading, writing, discussion, and reflects for what they have learned (Phoyen, 2021).
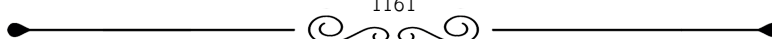
Conclusion and Suggestion

The effects of the flipped classroom approach on the learning achievements of grade 9 students learning the computer law in the computing science course showed that the students gained higher scores of the post-test than their pre-test scores and the criteria with the statistical significance at 0.05. Besides, the students were very satisfied with the learning management based on the flipped classroom approach. They also express their opinions that the flipped classroom approach should be used instead of the traditional ways of teaching because it was better to take action of learning activities than lectures. However, it was suggested for further studies that the flipped classroom approach should be applied to other subjects so that students could learn by themselves, have less homework, and have more time for learning activities in classrooms. In addition, students could practice their skills to have more responsibilities and know how to seek for more knowledge, including adapting technological techniques to facilitate learning activities based on the flipped classroom approach.

Acknowledgment

References

Institute for the Promotion of Teaching Science and Technology (2018). *Guide to the use of basic science curriculum according to science learning standards and indicators (Revised 2017), Basic core curriculum, B.E. 2551, Technology (computing science) at primary and secondary levels*. Bangkok: Institute Promote the teaching of science and technology, Ministry of Education. (in Thai)

Kanthamala, L., Ingard, S., and Insa-ard, S. (2017). The Effects of the Flipped Classroom Teaching Method in Enhancing the Knowledge and Problem Solving Skills of Matthayomsueksa Three Students in Information Technology. *Veridian E-Journal, Silpakorn University*, 5. 10(2), 2521-2534. (in Thai)

Office of the Education Council. (2021). *Guidelines for the Promotion of Computing Science Teaching Management to Improve Learner Skills in the 21st Century*. Bangkok: Office of the Education Council. (in Thai)

Phoyen, K. (2021). Active Learning : Learning satisfy Education in 21[st]century. *journal of education Silpakorn University* 19(1), 11-28. (in Thai)

Phetdee, P., Donsingha, R., and Sengsri, S. (2022). The Development of Mathematics Learning Achievement on Decimal Using Flipped Classroom for Mathayomsuksa 1 Students. *Vocational Education Innovation and Research Journal*, 5(1), 203-219. (in Thai)

Srihiran, W. (2017). Critical Thinking with Flipped Classroom. *Graduate Studies Journal Sakon Nakhon Rajabhat University*, 13(65), 19-28. (in Thai)

Wangsalae, S. and Swengam, W. (2021). Guidelines of computing science instruction for lower secondary school. *Journal of the Association of Researchers*, 26(1), 116-132. (in Thai)

Wongsupa, Y. and Thamrongsotthisakul, W. (2022). Online Learning Development of Phenomenon-Based Learning and Reflective Thinking to Develop Empathy in Cyberbullying for Grade 12 Students. *Silpakorn Education Research Journal*, 14(2), 427-445. (in Thai)