

The Development of Learning Achievement in The Subject of Integrated Learning Management of Student Teachers, Faculty of Education, Suan Sunandha Rajabhat University Using The 5e Inquiry-Based Learning Model With The R-C-A Questioning Technique

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Abstract

Research Title: The Development of Learning Achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University Using the 5E inquiry-based learning model combined with the R-C-A questioning technique.

The purposes of this research were 1) To develop the learning achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University, by using the inquiry-based teaching model (5E) together with the R-C-A questioning technique. 2) To compare the development of learning achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University, before and after using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique. The samples used in this research were students of the Faculty of Education, Suan Sunandha Rajabhat University who are studying in the 2nd year, academic year 2024, and the total number of samplings used was 17 persons, Using a Judgement Random Sampling. The research instruments were 1) Learning activity plan on integrated learning management using inquiry-based teaching (5E) model with R-C-A questioning technique. 2) Pre- and post-tests to measure learning outcomes on integrated learning management. Multiple choice test with 4 options, including 10 questions. The data were analyzed by the percentage, mean (x), standard deviation (S.D.), relative growth score and t-test dependent.

The results of this research were as follows: 1) Academic achievement in Learning Management Science, on the subject of integrated learning management, using the inquiry-based teaching model (5E) with the R-C-A questioning technique, all students had academic achievement through the evaluation criteria. The post test scores showed that the use of the inquiry-based teaching model (5E) with the R-C-A questioning technique helped develop students' achievement, with the relative development scores mostly at a high level. 2) Academic achievement on the subject of integrated learning management of students after learning management using the inquiry-based teaching model (5E) with the R-C-A questioning technique was significantly higher than before learning management at a statistical level of .05

Keywords: Learning Achievement, Inquiry-based teaching model (5E), R-C-A questioning technique

1. Introduction

From the researcher being the organizer of teaching in the subject of Learning Management Science, it was found that in the topic of integrated learning management, students had problems in understanding the content and did not like teaching in a lecture-only format. Because studying the topic of integrated learning management is quite complex and has a lot of content, students need to have a deep understanding of various aspects. This causes students to feel bored and not be interested or enthusiastic about learning. This causes students to have a negative attitude towards learning and not participate in learning, which results in a lack of understanding and affects the students' academic achievement. Researchers are therefore interested in addressing this issue and must provide appropriate teaching materials and self-learning opportunities for students to develop their understanding and academic achievement. If the issue is not resolved, it will impact students' learning at the next level.

Due to the problem of low academic achievement in the subject of Learning Management Science, the researcher has applied the 5Es of Inquiry-Based Learning teaching model in innovation. This inquiry-based teaching model is a teaching model developed from the inquiry-based learning model, which is a student-centered teaching principle that allows students to explore knowledge through the scientific process, enabling students to discover new knowledge (Thitsana Khaemani, 2023). The inquiry-based learning model (5E) is a teaching model that provides students with opportunities to learn through observation, creating interest, defining problems or questions, researching and finding answers on their own, explaining, predicting or estimating, expanding knowledge, and applying it to other situations (Phichat Kaewpuang, 2020). This can be applied to learning in the subject of Learning Management Science as well, by organizing learning through the teacher's activities in 5 steps as follows: 1. Interest creation step (Engagement) 2. Exploration and search step (Exploration) 3. Explanation step (Explanation) 4. Knowledge expansion step (Elaboration) 5. Evaluation step (Rodger W. Bybee, 2006)

Questioning techniques are an important technique that promotes learning and enhances students' skills in reviewing knowledge. This is followed by linking practical skills and may help promote students' learning and learning to learn (Jiraporn Akkhasompong, 2013). The R-C-A questioning technique is a questioning technique that supports student-centered learning. It encourages students to be effective in their learning outcomes and to apply their knowledge in a concrete way to their daily lives. Teachers ask students to reflect on their feelings and thoughts from a given practice or situation, then connect them to past experiences or existing knowledge, resulting in new knowledge. This knowledge can then be applied to their daily lives, both now and in the future. (Office of the Basic Education Commission, 2011). Organizing learning by using the R-C-A questioning technique in conversations or discussions about content allows students to make connections between learning and daily experiences, see the relationship of events that may actually occur in life, and challenge themselves in solving problems. This develops achievement according to age and meets the expectations of society (Petchrat Chongnimitsathaporn, 2013). This is consistent with (Chatri Samran, 2005) who stated that asking R-C-A questions for students to practice systematically and frequently will seep into the students' hearts. They must also practice alongside it. While actually doing the work, ask questions according to the steps every time. Students will achieve higher learning outcomes, especially in thinking about work, planning work, working according to the plan, and checking the condition of the work. This is to serve as a guideline for developing the teaching and learning process in the subject of Learning Management Science in the future.

From all that has been said, the researcher conducted a study titled The Development of Learning Achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University Using the 5E inquiry-based learning model combined with the R-C-A questioning technique. The research findings will be used to address the issue of low academic achievement among students. The focus will be on developing students' understanding of Buddhism, using reason and logic to connect this knowledge to everyday situations, and fostering creative thinking and problem-solving skills for future students. This will ultimately lead to more effective personnel development.

2. Objectives

1. To develop the learning achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University, by using the inquiry-based teaching model (5E) together with the R-C-A questioning technique.
2. To compare the development of learning achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University, before and after using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique.

3. Methodology

The population used in this research was the student in Faculty of Education, Suan Sunandha Rajabhat University who were studying in the second-year, during the first semester of the academic year 2024, and the total population number were 420 students in which can be divided into 6 department, as following: Thai Language Department, English Department, Mathematics Department, Early Childhood Education Department, Science Department and Social studies Department.

The samples used in this research were students of the Faculty of Education, Suan Sunandha Rajabhat University who are studying in the 2nd year, academic year 2025, and the total number of samplings used was 30 persons, selected through purposive sampling.

The research tools included 1) Learning activity plan on integrated learning management using inquiry-based teaching (5E) model with R-C-A questioning technique. 2 periods 2) Pre-tests and post-tests to measure learning outcomes on integrated learning management. Multiple choice test with 4 options, including 10 questions.

Data Collections: The researcher conducted the research by issuing a letter of request for assistance to the Faculty of Education, Suan Sunandha Rajabhat University and requests for the permission to conduct research with the second-year students as a sample group. The researcher asked the sample to take a test to measure learning achievement before the experiment. Subsequently, the researcher conducted the teaching according to the learning activity plan on integrated learning management using inquiry-based teaching (5E) model with R-C-A questioning technique. The researchers then administered a post-test to the sample group using an achievement test. When the researcher complied the learning achievement test form completely, and examined the completeness of the information already, then, the data will be analyzed by using the software package respectively.

Data analysis used the calculation of scores with the mean ($\bar{x}$), standard deviation (S.D.) and relative development score (G) and the comparison of learning results before and after

learning by calculating scores with the mean ($\bar{x}$), standard deviation (S.D.) and dependent t-test.

4. RESULTS

The researcher would like to present the results of the data analysis in two parts as follows:

Chapter 1: Results of the development of academic achievement in the subject of integrated learning management of second-year students in the Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique.

The researcher conducted a post-test of 30 second-year students from the Faculty of Education, Suan Sunandha Rajabhat University, who were the sample group. The teaching was organized according to the learning activity plan for the subject of Management Science using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique on integrated learning management for 2 periods. The test was conducted using a pre- and post-test of learning outcomes with 10 multiple-choice questions with 4 options. The criterion was set at 60 percent and the developmental level was divided into 4 levels: very high, high, medium, and low. Details are shown in Table 4.1.

Table 1

The results of developing academic achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique.

No .	Before the experiment		After the experiment		Difference		relative development	
	Score	Evaluation results	Score	Evaluation results	Score	Percentage	Percentage of relative development	levels of relative development
1	2	Failed	6	pass	4	40	50.00	medium
2	3	Failed	9	pass	6	60	85.71	very high
3	2	Failed	7	pass	5	50	62.50	high
4	1	Failed	8	pass	7	70	77.78	high
5	5	Failed	9	pass	4	40	80.00	very high
6	4	Failed	10	pass	6	60	100.00	very high
7	4	Failed	6	pass	2	20	33.33	low
8	3	Failed	7	pass	4	40	57.14	medium
9	2	Failed	9	pass	7	70	87.50	very high
10	0	Failed	6	pass	5	50	50.00	medium
11	4	Failed	9	pass	5	50	83.33	very high

12	2	Failed	7	pass	5	50	62.50	high
13	2	Failed	7	pass	5	50	62.50	high
14	2	Failed	8	pass	6	60	75.00	high
15	1	Failed	7	pass	6	60	66.67	high
16	4	Failed	6	pass	2	20	33.33	low
17	3	Failed	6	pass	3	30	42.86	medium
18	5	Failed	8	pass	3	30	60.00	high
19	4	Failed	7	pass	3	30	50.00	medium
20	5	Failed	10	pass	5	50	100.00	very high
21	2	Failed	8	pass	6	60	75.00	high
22	3	Failed	9	pass	6	60	85.71	very high
23	2	Failed	7	pass	5	50	62.50	high
24	1	Failed	8	pass	7	70	77.78	high
25	5	Failed	7	pass	2	20	40.00	medium
26	4	Failed	9	pass	5	50	83.33	very high
27	2	Failed	6	pass	4	40	50.00	medium
28	1	Failed	8	pass	7	70	77.78	high
29	2	Failed	6	pass	4	40	50.00	medium
30	4	Failed	6	pass	2	20	33.33	low

From Table 4.1, it was found that the academic achievement in the subject of learning management, the topic of integrated learning management, of the second-year students, Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) together with the R-C-A questioning technique, most students had academic achievement passing the assessment at 60 percent in total. When considering each individual, it was found that student's number 6 and 20 had the highest scores of 10 points, representing 100 percent. Next were students' number 2, 5, 9, 11, 22, and 26, with the highest scores of 9 points, representing 90 percent. Next were students' number 4, 14, 18, 21, 24, and 28, with the highest scores of 8 points, representing 80 percent. Students number 3, 8, 12, 13, 15, 19, 23, and 25 had the highest scores of 7 points, representing 70 percent. And students number 1, 7, 10, 16, 17, 27, 29, and 30 had the highest scores of 6 points, representing 60 percent, respectively.

The post-test scores showed that using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique helped improve the achievement of second-year students in the Faculty of Education, Suan Sunandha Rajabhat University. The relative development scores were as follows: Students No. 2, 5, 6, 9, 11, 20, 22, and 26 had very high relative development scores; Students No. 3, 4, 12, 13, 14, 15, 18, 21, 23, 24, and 28 had high relative development scores; Students No. 1, 8, 10, 17, 19, 25, 27, and 29 had medium relative development scores; and Students No. 7, 16, and 30 had low relative development scores, respectively.

Chapter 2: Comparative results of the development of academic achievement in the subject of integrated learning management of second-year students, Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique.

The researcher compared the learning outcomes before and after the study of 30 second-year students in the Faculty of Education, Suan Sunandha Rajabhat University, who were the sample group, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique on integrated learning management for 2 periods. The learning outcomes were tested before and after the study using the integrated learning management test, a multiple-choice test with 4 options and 10 questions, as detailed in Table 4.2

Table 2

Comparative results of the development of learning achievement in the subject of integrated learning management of student teachers, Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique.

Sampling	n		S.D.	Sig.	df	t-test
Pre-test	30	2.8	1.38	.000	26	-15.89
Post-test	30	7.53	1.31			

*Statistical significance at the level of .05

From Table 4.2, it was found that the learning achievement results on integrated learning management of second-year students, Faculty of Education, Suan Sunandha Rajabhat University, after learning management using the inquiry-based learning model (5E) combined with the R-C-A questioning technique ($\bar{x} = 2.8$, S.D.= 1.38) were significantly higher than before learning management ($\bar{x} = 7.53$, S.D.= 1.31) at the .05 level of statistical significance.

5. Conclusion And Future Work

Research on the development of academic achievement in integrated learning management of second-year students in the Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique. The results can be discussed as follows:

1. Academic achievement in the subject of Learning Management Science, on the topic of integrated learning management, of second-year students, Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique. All students had academic achievement through the evaluation criteria, showing that using the inquiry-based teaching model (5E) combined with the R-C-A questioning technique helped develop student achievement, with the relative development scores mostly at a high level. This may be because the 5E inquiry-based teaching method combined with the R-C-A questioning technique stimulates analytical thinking and systematic problem solving, promotes learners' reasoning skills and the ability to explain concepts principledly, leads to in-depth learning and the ability to effectively connect knowledge to various situations, and increases academic achievement. Consistent with the research results of (Sasivimon Khondok, Kittima Panprueksa and Somsiri Singhalop, 2022) who studied the academic achievement on cells and cell function of Mathayom 4/4 students who received 5-step inquiry-based learning (5E) combined with cooperative learning with jigsaw techniques, it was found that the post-test results were significantly higher than before

learning at the .05 level. This is because the 5-step inquiry-based learning (5E) is a teaching model that emphasizes on students learning by themselves, solving problems through the process until they can find answers by themselves. It is also consistent with the research results of (Putthipong Suphamathuankun, 2016) on the development of academic achievement and analytical thinking ability on natural disasters of Mathayom 5 students by organizing learning with the inquiry cycle (5E). It was found that the academic achievement on natural disasters of Mathayom 5 students who learned with the inquiry cycle (5E) was significantly higher than before learning at the .05 level. The 5E inquiry-based learning cycle is a learning management method that can develop the learning process and high-level thinking process very well. It systematically seeks knowledge by oneself, enabling students to understand the lesson, helping to develop thinking skills and resulting in higher academic achievement. This is consistent with the research results of (Nattawadee Ploydee, Thanama Laiphat, and Anong Hansakul, 2023) on the effects of health education learning management using phenomenon-based learning combined with R-C-A questioning techniques on sexual risk behaviors of Grade 6 students. It was found that students who received learning management using phenomenon-based learning combined with R-C-A questioning techniques in both on-site and online classrooms had higher scores on knowledge, practical skills, and attitudes after learning than before learning, with a statistical significance level of .05. It can develop teaching and learning formats for learners to learn effectively. And in line with the research results of (Thirawat Sebram, Duangduean Suwanchinda and Suchin Wisawateeranon, 2021) on the effects of learning management using phenomenon-based learning combined with R-C-A questioning techniques on the academic achievement of Grade 5 students at Maitri Uthit Community School, Nonthaburi Province, it was found that students who received learning management using phenomenon-based learning combined with R-C-A questioning techniques had significantly higher academic achievement than students who received conventional learning at the .05 level. By using the R-C-A questioning technique in conversation or discussion, learners can make connections between learning and daily life experiences, see the relationship of events that may actually occur in life and challenge problem solving, as well as get new ideas to build immunity against surrounding problems continuously and sustainably.

2. The results of the comparison of academic achievement in the subject of Learning Management Science, Integrated Learning Management, before and after studying of second year students, Faculty of Education, Suan Sunandha Rajabhat University, using the inquiry-based teaching model (5E) with the R-C-A questioning technique, had a higher average score after studying than before studying and had a statistically significant difference. From the above research results, it can be seen that the use of the inquiry-based teaching model (5E) with the R-C-A questioning technique can solve the problem of academic achievement in the subject of Learning Management Science. This is consistent with the research results (Weerawit Bunsong, 2024) that used the inquiry-based teaching model (5E) as one of the independent variables. The research results concluded that the reason why the students' academic achievement after learning was higher than before learning may be due to the use of the inquiry-based teaching model (5E), which has appropriate learning activity organizing procedures and focuses on the learner. This allows students to have freedom to study and research knowledge in the learning content. Students develop self-responsibility and are more attentive to working with others. This teaching model inspires students to be interested and curious through the organization of exploration and research activities to obtain sufficient data. Students can then analyze, interpret, and present the data in various formats, leading to a broader expansion of knowledge. This conclusion is consistent with the research of Punyapol Chanfoi et al., who conducted a study on the effect of promoting mathematics learning activity organizing skills using the 5Es teaching model combined with cooperative learning techniques for mathematics students in the Faculty of Education, Suan Sunandha Rajabhat University, who used the 5E

inquiry-based teaching model as one of the variables (Chanfoy P., Srisiriwat T., Phongploenpis S., Banjong S., & Pimpa N. et al., 2024). The research concluded that third-year mathematics students had mathematics learning activity organizing skills after learning using the 5Es teaching model combined with cooperative learning. The percentage of third-year mathematics students who had learning activity organizing skills after learning using the 5Es teaching model combined with cooperative learning had an average score of 14.44, or 72.22 percent, on the achievement test for mathematics learning activities after learning using the 5E teaching model combined with cooperative learning. This research is consistent with the results of the analysis in the research of (Sittichon Chakkhum, 2024), which also used the inquiry-based teaching model (5E) as one of the independent variables. It was concluded that students were able to express their ideas and data that are systematically linked in all 4 aspects: 1) Problem identification 2) Factor analysis 3) Finding the relationship between factors 4) Synthesizing the problem cycle, which helps learners to plan and think of answers step by step and systematically research. In addition, the results of this research also showed that the use of R-C-A questioning technique as an independent variable can effectively develop the academic achievement of second-year students, Faculty of Education, Suan Sunandha Rajabhat University, after studying to be higher than before studying. This is consistent with the research results of (Wattana Suriwan and Angkana Dungkasmid, 2023) that used the R-C-A questioning technique to develop academic achievement. The research results concluded that the students' academic achievement was higher than the specified criteria. This is a result of learning by using phenomenon-based learning together with the R-C-A questioning technique.

Acknowledgements

The author would like to express sincere appreciation to Suan Sunandha Rajabhat University for their invaluable support for this research.

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