THE DEVELOPMENT OF A SCIENCE LEARNING ACTIVITY SET COMBINED WITH INCORPORATING INQUIRY-BASED APPROACHES (5E) ON TOPIC OF THE LIFE OF FLOWERING PLANTS TO DEVELOP ACADEMIC OUTCOMES IN SCIENCE SUBJECTS FOR STUDENTS IN GRADE 2

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ABSTACT

The purposes of this research were 1) to develop a set of science learning activities combined with incorporating inquiry-based approaches (5E) to meet the criteria of 80/80. 2) To compare learning outcomes pre and post- learning management set of science learning activities combined with incorporating inquiry-based approaches (5E) on topic the life of flowering plants of the students. Grade 2.The sample group in this research was Prathomsuksa 2/1 students of Demonstration School of Suan Sunandha Rajabhat University in first semester of academic year 2021 amount 30 students selected by purposive sampling. Instruments used in the research were 1) science learning activity set incorporating with inquiry-based approaches (5E) on topic the life of flowering plants. 2) student learning outcome form. The basic statistics were used to analyze data including percentage, mean and standard deviation (S.D.). The statistics using in the hypothesis examination were t-test. The result found that set of science learning activities combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants to develop academic outcomes in science subjects for students in Grade caused the efficiency of 83.75/83.25 which was higher than the criteria of 80/80. The academic outcomes of students who learned with incorporating inquiry-based approaches (5E) on topic the life of flowering plants of grade 2 students had a higher score after the learning management than pre- learning at the statistically significant level of .05.

Keyword: science learning activity set, inquiry method, academic outcomes

INTRODUCTION

Science was a culture of the modern decade which was knowledge based society and it play an important role in current and future world society. Science was necessary in development of the country in terms of economy, society and industry. Recently, advances science and technology were adapted widespread and fast. Moreover, Science was instrument raise the standard living of the people. Science knowledge also enhanced the capacity to develop the economy and competition with other countries, and it helped people live happily together in the world society (Ministry of Education, 2008). Thailand was a country where applied science in education. Learning management was necessity process in carry the curriculum into practice in the core curriculum. Basic education core curriculum B.E. 2551 was a student-centered

curriculum based on the attitude that everyone could be learn and improved themselves to their full potential (Ministry of Education, 2008). Thus, everyone required improving of scientific knowledge conducive to have knowledge and understanding of nature and human created technology to apply knowledge to practice incorporating rationality with creative and morality. (Ministry of Education, 2009)

Recently, education management in Thailand encounters a lot of problems. Most of the teaching and learning maintain only memorizing and writing, but fails to teach the thinking skills of students which effected their understandable. Student was unable to apply knowledge to solve problems in daily life resulting in learners was unable to thinking process (Punyaphat Kotbutr, Tonsakul Santiboon and Samarn Ekkapim, 2016). Science learning consist of process that required searching, seeking, exploring. Students should be inspect and research through various methods until understand and perceive that knowledge in a meaningful way, and they will be able to create a body of knowledge for themselves to store as information in the brain for a long time, and they can be apply to used (Department of Curriculum, 2003: 146). Most teaching still used teachers as the center in setting of teaching and learning activities, and students only followed activities according to teacher's requirement causing education problems. Therefore, teachers needed to change the teaching and learning process (Department of Curriculum, 2003: 4) to solve these problems in accordance with the Act of National Education Guidelines B.E.2542 on Educational Management that there was policy for teaching and learning which the students were most important. Students were allowed freely to learn, but still take responsibility for their own learning. Thus, students must be ready to learn. The learning management which students were center was leaning that determined goals of activities, learning resources and learning media, and there was evaluation focusing development of people and life. Student center learning model caused their fully potential learning following their aptitude interesting and requirement. The role of teacher was to promoting, motivating and empowering students to search answers. Therefore, current science teaching survey learning was not emphasize only remember of knowledge, but it also includes the process of searching for scientific knowledge that leaners should be used scientific process to find knowledge with themself. Moreover, student required implanting science to achieve the goal of studying science. The main goal of the Basic Education Core Curriculum B.E. 2551in the subject science group emphasize on students to learn about the situation of problems and solving problem process allowing their opportunity to practice process skills in science and creativity with direct experience (Ministry of Education, 2008) which was agree with the aim of studying science nowadays. Arrangement teaching and learning activities using a set of learning activities which Thararat (2007) stated that activity set was media and learning innovations that support students able to learn by themselves. Activity set establish skills for self-learning and seeking knowledge with a teacher as a consultant. They studied about teaching and learning science by using teaching as a search for knowledge found that learning process which allowed students to search for new knowledge by themselves through thinking process and using scientific process was a tool for students to learn in terms of content, principles, theory, and practice. Implementation a set of learning activities used as a teaching and learning tool also enhanced students to learn and finding their interest. Students also able to obtain experience learning .

From these education problems, the researcher has studied learning management by using a inquiry-based approaches (5E) that enhanced learners as self-learning or created knowledge with themselves by scientific processes. The teacher only facilitated students to achieve their goals. The method of finding of knowledge focuses on the learners as the center of learning or teaching method that learners practiced to search for knowledge by using a reasoning process to find the right knowledge. The teacher required asking questions that encourage students to think about solving problems methods by themselves and able to apply problem-solving in daily life. In inquiry-based teaching which teachers display a role to support, guide, help, and solve problems during teaching and learning. Therefore, the researcher will apply science learning activity set along with advantage of inquiry-based approaches (5E) in science teaching on topic of the life of flowering plants for students in Grade 2 and believes that learners develop higher learning achievements.

Objectives of the research

1. To develop a set of science learning activities combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants of Grad 2 students to achieve the 80/80 criteria.

2. To compare the learning achievements pre and post learning management with science learning activities combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants of Grad 2 students.

Research hypothesis

1. A set of science learning activities combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants of Grad 2 students that developed had efficiency according to the criteria of 80/80

2. The learning outcome of the students who managed to learn by using the science learning activities set combined with incorporating inquiry-based approaches (5E) after learning was higher

Scope of research

1. Population and sample

1.1 Population

The population used in this research was 116 students in Grade 2, of Demonstration School of Suan Sunandha Rajabhat University in first semester of academic year 2021

1.2 Sample group

30 students in grade 2/1 of Demonstration School of Suan Sunandha Rajabhat University in first semester of academic year 2021 obtained by purposive sampling

2. Scope of variables

2.1 Scope of variables

The independent variable was a set of science learning activities combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants.

The dependent variable was the student's learning achievement after learning with the science learning activity set combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants.

Research methodology

A set of science learning activities combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants. The one-group pretest-post-test design was used as a study model with the following research tools:

1. Data collecting Tools

    1.1 Tools used in research were:

        1. A set of science learning activities combined with inquiry-based approaches (5E) on topic of the life of flowering plants.

        2. Learning management Plan, Science learning unit of life of flowering plants, content validity and index of Item Objective Congruence (IOC)

2. Tools used for data collection were:

    2.1 Achievement test on the life of flowering plants was a multiple-choice test 4 options amount 40 items using for grade 2 students to evaluate leaning achievement pre and post-learning By using the learning management package using the science learning activity set combined with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants of students in Grade 2

3. Data collection

    3.1 Efficiency evaluation of a set of science learning activities along with incorporating inquiry-based approaches (5E) on topic of the life of flowering plants. The details were as follows:

        1. Take the scores of all students from the final test of the activity set to find the mean and calculate the percentage of the total score which were the process efficiency (E1) of the set of activities that the researcher has developed.

        2. When students completed the activity set, and then students performed the achievement test on the life of flowering plants (multi-choice) amount 40 items.

        3. Take the scores from the learning achievement test on the life of flowering plants (multi-choice) for 40 items to determine the the mean and calculate the percentage of the total score which were the process efficiency (E2) of the set of activities that the researcher has developed.

    3.2 Comparison of learning achievements pre and post the learning management with the science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants. The obtained score from pre and post - test was calculated the mean and standard deviation. The difference between post-test and pre-test scores was analyzed by using the t-test statistics (Dependent Samples).

4. Data analysis

    In this research, the researcher analyzed the data as follows:

    1. The efficiency of the science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants of Grade 2 students to meet the

determined criteria 80/80 was analyzed by using the formula E1/E2. The statistics used were mean and percentage.

2. The difference between pre-test and post-test scores were analyzed by using t-test (Dependent Samples)

3. Efficiency of the 40i tem learning achievement scale was analyzed by finding difficulty index or Easiness) and the value of classified power by items.

Research results

1. Efficiency analysis results (E1/E2) of the science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants of Grade 2 students met the 80/80 criteria. This finding found that students done post-test with science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants receiving an average score of 33.50 from 40 points (full score) representing a percentage (E1) was 83.75 and the learning achievement test on the life of flowering plants (multiple choice) amount 40 items received an average score of 33.30 from 40 points (full score) representing a percentage (E2) was 83.25. Efficiency of the science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants of Grade 2 students was higher than the determined 80/80 criteria.

2. The results of the analysis of learning achievement were comparative pre and post-learning by using the science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants of Grade 2 were shown in Table 1.

Table 1 showed the analysis of learning achievement pre and post-learning.

Test	N	$\bar{x}$	SD	t	Sig
Pre-learning	27	12.53	2.012	-17.039	.000
Post-learning	27	29.53	5.328		

Statistically significant .05

From Table 1, the results revealed that the learning achievements of Grade2 students when learning with the science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants received the mean score pre- learning was 12.53, the standard deviation was 2.012, and the mean score post-leaning was 29.53, and the standard deviation was 5.328. Grade 2 students studied with a science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants received higher academic achievement post-learning than pre-learning as statistically significant at the .05 level.

Discussion of research results

From the research on the development of science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants to develop achievements in learning science subjects for students in Grade 2, there were discussion points as follows:

Performance analysis results (E1/E2) of the science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants to develop achievements

in learning science subjects for students in Grade 2 met the 80/80 criteria. This finding found that students done post-test with science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants receiving an average score of 33.50 from 40 points (full score) representing a percentage (E1) was 83.75 and the learning achievement test on the life of flowering plants (multiple choice) amount 40 items received an average score of 33.30 from 40 points (full score) representing a percentage (E2) was 83.25. Efficiency of the science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants of Grade 2 students was higher than the determined 80/80 criteria in accordance with the research of Wutmanop (2014) has developed a set of inquiry-based approaches (5E) on the unit of life and the subsistence of plants for Grade 1 students and the study found that the developed inquiry-based approaches (5E) activity set has an efficiency value of 82.76/82.14 which was higher than the determined standard 80/80. Grade 1 student who learned with an inquiry-based activity set (5E) on the unit of life and plant life received a higher average score of academic achievement than pre-learning with statistical significance at the .01 level

The results of the comparative analysis of learning achievement pre and post- learning by using the science learning activities set combined with inquiry-based approaches (5E) on topic of the life of flowering plants of students in grade 2 showed that the learning achievements of Grade2 students when learning with the science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants received the mean score pre-learning was 12.53, the standard deviation was 2.012, and the mean score post-leaning was 29.53, and the standard deviation was 5.328. Grade 2 students studied with a science learning activity set combined with inquiry-based approaches (5E) on topic of the life of flowering plants received higher academic achievement post-learning than pre-learning as statistically significant at the .05 level according to the hypothesis. This finding obtained these result because learning management by using the science learning activities set combined with inquiry-based approaches (5E) was a teaching strategy that enhanced students understand thing to learn by themselves and created interest. Students were encouraged to learn and acquire scientific process skills consistent with the research of Nittayarod (2016) developed a set of science activities on topic of systems in the human body using the inquiry-based approaches (5E) in Grade 2 students found that the learning achievement after leaning with the science activity set was significantly higher than pre-learning with statistically significant at the .01 level.

Recommendations

Recommendations for applying the research results

1. According to this research, multi-media should be determined time to use appropriately for the level of use.

2. Using the skill set with students in Grade 1, teachers should clearly explain or read the instruction set for students to understand.

Recommendations for further research

1. Learning should be designed multimedia along with practicing skill sets to develop science process skills at other levels

2. There should be a design for using multimedia along with a skill training set to further develop process skills in other subject groups.

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