LEARNING ACHIEVEMENT OF INTERACTION SCIENCE SIMULATIONS-BASED PHYSICS

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ABSTRACT

This research aimed to examine the learning achievement of interactive science simulations-based physics; therefore, the interactive science simulations-based self-learning for the duration of 1 semester was designed by the authors. Mid- and post-learning achievement was evaluated, while the analysis and processing were carried using package software to identify the following statistics: number, percentage, mean, standard deviation, t-test, and analysis of variance at statistical significance level of .05 (P= .05).

The research results indicated that, based on mid-learning and final exam scores, there was indifferent learning achievement among students in the groups of interactive science simulations-based and normal physics teaching. Moreover, mid-learning achievement in physics of both groups of Suan Sunandha Rajabhat University students was higher than final exam scores at a statistical significance level of .05.

Keywords: learning achievement, physics teaching, self-learning, Interactive Science Simulations

INTRODUCTION

The crucial mechanism of quality human development for realizing self-development towards desired goals is the integrated education in which the relations between contents and learner's eagerness to learn are linked. It also includes the creation of life-long desired behaviors such as health care, learning curiosity, public consciousness and enthusiasm to work for public interest under sufficiency economy philosophy. Therefore, the provision of higher education is a key element for human and social development.

The participatory learning approach enhances learner-instructor interactions allowing learners to apply knowledge-interconnecting skills for problem-solving, while instructors focus on learning promotion. It can be said that physics knowledge explains a range of interconnected natural phenomena; therefore, the understanding of principles of one given issue is needed for the applicability. However, physics is difficult requiring crystal clear instructional approach and media because of inability to enhance students' content understanding and difficult acquisition of comprehension through five senses. The developed interactive simulations nowadays can provide explanations on a range of physics phenomena including invisible ones. With easiness to understand, students can gain better learning achievement if they apply those interactive science simulations in self- and in-class learning. The authors are thus interested in experimenting whether the incorporation of interactive science simulations in students' self-study will improve their physics understanding. The research findings will benefit lecturers and students studying in the field of science and technology including physics. This is to realize further development of instructional approach.

Research Objectives

1. Achievement of interactive science simulations-based learning approach in physics
2. To compare learning achievement of interactive science simulations-based physics

Research Hypothesis

The learning achievement of interactive science simulations-based physics is different from that of the normal one.

METHODOLOGY

1. This research is experimented with 2 groups (interactive science simulations-based self-study and normal class) of physics-enrolled students of the Faculty of Science and Technology.
2. Research variables are:
    2.1 Learning groups: interactive science simulations-based self-learning and normal class
    2.2 Mid- and post-learning achievement
3. The Fundamental Physics II Achievement Assessment Form is the research tool used in assessing mid- and post-learning achievement.
4. The authors use the said Form in assessing mid- and post-learning achievement. It is then analyzed statistically using package software through the following processes:
    4.1 Descriptive Statistics Analysis
        4.1.1 The lowest and highest values, mean scores and standard deviation are to reflect mid- and post-learning achievement.
        4.1.2 The frequency table and percentage give explanations on the groups of students in the interactive science simulations-based and normal physics classes.
    4.2 The inferential statistics analysis is carried using independence t-test to compare learning achievement in physics among students of Suan Sunandha Rajabhat University. This is categorized according to teaching approach and learning period.

RESULTS

1. It is found that, in comparison to those attending normal class, the students in the interactive science-based class have higher mid-learning achievement and post-learning scores. The score of their mid-learning achievement are 27.71 and 26.88, respectively. Likewise, those in the former group also have higher post-learning scores than their counterparts in the latter group with the achievement scores of 24.80 and 22.75, respectively (Figure 1).

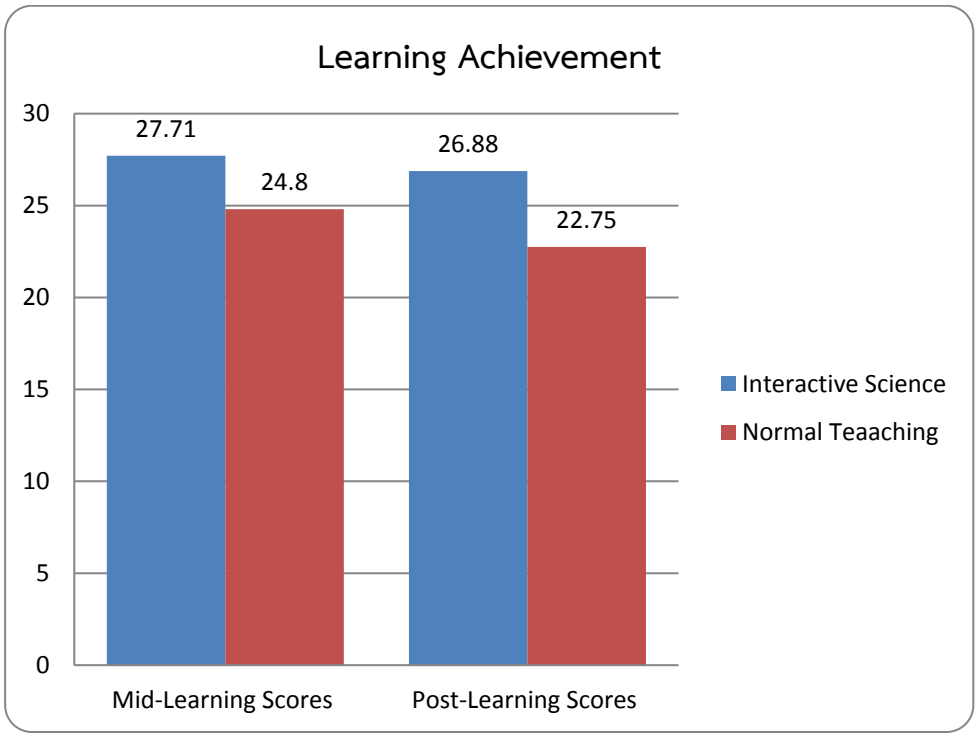

Figure 1 Learning achievement between Interactive Science Simulation and normal groups

2. With respect to mid- and post-learning achievement, normal and interactive science simulations-based teaching groups have indifferent learning achievement in physics (Table 1).

Table 1 Comparison of Percentage of Mid- and Post-Learning Achievement in Physics of Students of Suan Sunandha Rajabhat University, categorized according to Teaching Approach

Mid-Learning	$\overline{X}$	**S.D.**	**t**	**df**	**p-value**
Normal Teaching	89.61	9.53	.83	38	.412
Interactive Science Simulations-Based Teaching	92.38	10.97			
Post-Learning					
Normal Teaching	75.83	12.66	1.52	38	.136
Interactive Science Simulations-Based Teaching	82.73	15.38			

3. Students in both groups have higher mid-learning achievement in physics than post-learning scores at a statistical significance level of .05 (Table 2).

Table 2 Comparison between the Group of Normal and Interactive Science Simulations-Based Teaching Approach, Categorized according to Mid- and Post-Learning Achievement in Physics of Students of Suan Sunandha Rajabhat University

Physics Learning Achievement	**Group**	$\overline{X}$	**S.D.**	**t**	**df**	**p-value**
Normal Teaching	Mid-Learning Score	89.61	9.53	5.73*	25	0.00
	Post-Learning Score	75.83	12.66			
Interactive Science Simulations-based Teaching	Mid-Learning Score	92.38	10.97	2.36*	13	0.03
	Post-Learning Score	82.73	15.38			

** Significance Level of 0.05*

CONCLUSION AND DISCUSSION

In this research, the following issues are used by the author in the discussion.

Regarding students' knowledge based on mid-learning and final exam scores, learning achievement of students in both groups is indifferent. Higher mid-learning achievement in physics than final exam scores at a statistical significance level of .05 is also found among students in both groups. This indicates the same standards of instructional model for science simulations-based and normal t physics teaching leading to indifferent learning achievement. The interactive science simulations-based physics teaching is able to better enhance the learning in comparison to normal class because learners in the former group has opportunity to experience visual situations and to observe processes of change. They use reasons to solve problems, while in-class activities enable them to exchange ideas and principles along with the participation in the instruction. With a more opened learning atmosphere, the efficiency of interactive science simulations-based physics teaching is higher than the normal one. This agrees with Suksom Siwa-amaranan (2009) who claims that the created simulations allow students to face problems and to solve possible future problems in a rational manner. Leaners can develop teamwork skill through the creation of friendlier environment and more engagement in the instruction. They become more far-sighted and can better solve problems through the perception, understanding and use of reasons. Similarly, Sathaphorn Prukthikul (2015) argues that active learning is the constructivist instructional approach with a more focus on learning processes than contents. Learners are enabled to interconnect knowledge or develop knowledge within them as well as to take actions via learning media or activities. Meanwhile, the teacher is an advisor who motivates or facilitates learning process by means of higher thinking process. Learners can thus analyze,

synthesize and evaluate the value of what they learn leading to meaningful learning and efficient applicability in other situations.

SUGGESTIONS

1. Suggestions for the research result implementation

1.1 The interactive science simulations-based teaching should be developed in a continual manner.

1.2 The approach for developing the interactive science simulations-based teaching should be applied into other subjects.

2. Suggestions for future research

2.1 The application of interactive science simulations-based teaching in science subjects should be studied.

2.2 The relations between instructional attitude and interactive science simulations-based teaching should be examined.

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