The Development of Scientific Concepts on Motion in Uniform Field of Grade 10 Students through Predict-Observe-Explain (POE) by Video Demonstration.

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Abstract

This research was aimed to study and enhance the students' concepts on motion in uniform field through Predict-Observe-Explain (POE) by using video demonstration. There were 29 grade 10 students, second semester of academic year 2014, Nareenukun School Office of Secondary Education Service Area 29. This research was performed in qualitative research designed. There were three main research tools used. Firstly, 6 lesson plans (total 12 hours) on motion in uniform field. Secondly, the evaluation tools consisting of a learning management's journal and a teaching observation form and finally, Force Concept Inventory Diagnostic Test by Eric Mazur (Pearson Prentice Hall, 1997). The results that students are alternative conceptions to move about the direction and magnitude of motion in uniform field and observer was interpreted soon after each learning activity finished. It was found that students have developed their alternative concepts to scientific concepts on motion in uniform field.

***Keywords*:** Motion in uniform field, Video Demonstration**,** Force Concept Inventory

Introduction

The process of teaching science is a process that focuses on the students to learn and understand the nature. Which will focus on giving the students practical knowledge by themself.

Science education research indicates that ideas of students about natural phenomena often differ from accepted scientific views. Ideas differing from accepted scientific explanations are defined as misconceptions or alternative conceptions in science education literature[1]. and many research works have examined common student difficulties in approaching Projectile Motion[5].

However, today there is a focus on education that will develop the country's population, found that the results of International Student Assessment (Program for International Student Assessment: PISA) and the results of educational testing national basic level (Ordinary National Education Test: O-NET), which results from such tests students' test results in Thailand had been lower than average. (The Institute for the Promotion of Teaching Science and Technology).

This study focuses on the using of an active learning strategy called predict–observe–explain (POE). The POE approach consists of three main steps: (1) predicting the results of a demonstration; (2) observing the demonstration; and (3) explaining and discussing the reasons for the results and comparing them with the initial prediction. It elicits students' existing ideas and also promotes discussion of their ideas.[6] The POE strategy is based on the constructivist learning theory, which proposes that students build their own body of knowledge through their experiences. White & Gunstone (1992)

From the condition problems happen in learning process, thus researcher will so its the importance of learning about Motion in Uniform Field, there are also alternative conceptions. The researcher is interested to study about the activities of teaching through Predict-Observe-Explain (POE) by Video Demonstration by using teaching methods. Predict-Observe-Explain (POE) based on the concept of White and Gunstone (1992) with a video demonstration of teaching will result in students have scientific conceptual.

Research methodology

Research Purposes

This research was aimed to study and enhance the students is concepts on motion in uniform field through Predict-Observe-Explain (POE) by using video demonstration.

Participants

The participants involved in this study there were 29 grade 10 students, second semester of academic year 2014(November 2014 – March 2015), Nareenukun School Office of Secondary Education Service Area 29.

Instruments

Data collecting tools in this study consisted of three main tools:
1. Lesson plans (total 12 hours) on motion in uniform field.
2. The evaluation tools consisting of a learning management's journal and a teaching observation form
3. Force Concept Inventory Diagnostic Test, by Eric Mazur (Pearson Prentice Hall, 1997).

Implementation

The participants of this study were 29 grade 10 students in the Science-Mathematics Plan at Nareenukun School in the second semester of the 2014 academic year. The science activities related to motion in uniform field by Video Demonstration. It was implemented for three weeks, four hours a week. Students were asked to participate in the following process:
1) Complete the FCI pre-test related to motion in uniform field.
2) Perform POE science activities related to motion in uniform field, in which they were learned on each activity plan.
3) Complete the FCI post-test related to motion in uniform field.

Data analysis

The collected data in this study included pre- and post- test related to motion in uniform field.

The analysis was performed by identifying mean differences between the pre- and post-test, based on work of Hestenes, Wells and wackhamer, 1992 with the Force Concept Inventory

Results and Discussion

The results of statistical comparative analysis on the students' pre-test, post-test for their conception of motion in uniform field are shown in Table 1.

Table1: Statistical results of the Force Concept Inventory Diagnostic Test by Eric Mazur.

Conceptual Test	Mean	Median	S.D.
Pre-test	3.66	4	1.26
Post-test	7.21	7	2.85

Consider to Table 1, the students obtained learning Predict-Observe-Explain (POE) by Video Demonstration got post-test score (mean 7.21, SD 2.85) higher than the pre-test score (mean 3.66, SD 1.26) related to motion in uniform field.

Table 2. Taxonomy of Alternative and Newtonian Concepts Probed by the Inventory, Presence of the conceptions is suggested by selection of the corresponding Inventory Item. [2]

	Corresponding Inventory Item.	Percentages	
		Pre-test	Post-test
5	impetus dissipation *(I3)	44.83	55.17
	impetus dissipation *(I3), gravity increases as objects fall *(G4), gravity acts after impetus wears down *(G5)	48.28	13.79
	Gravitation [5D]	3.45	31.03
	gravity intrinsic to mass *(G2)	3.45	-
9	Other Influences on Motion Obstacles exert no force*(Ob), air pressure-assisted gravity *(G1)	17.24	-
	Other Influences on Motion Obstacles exert no force *(Ob), impetus supplied by "hit"*(I1)	44.83	51.72
	impetus supplied by "hit"*(I1)	17.24	10.34
	passive [9D]	20.69	37.93
	gravity intrinsic to mass *(G2)	-	3.45
17	force causes acceleration to terminal velocity *(AF6)	48.28	17.24
	acceleration implies increasing force*(AF5), gravity increases as objects fall*(G4)	13.79	34.48
	Constant gravitation force[17C]	10.34	41.38
	gravity intrinsic to mass *(G2)	13.79	3.45
	air pressure-assisted gravity*(G1)	13.79	3.45

Explanation:
The code for Newtonian concept is enclosed in square brackets.
The cods for alternative concept is asterisk.

Table 2. Presents the misconceptions of the students on acceleration of body in uniform field.

Consider of Table 2, the improvement of students' understanding for each categories could be observed to the decreasing of the percentage of star(*) categories as well as the incereasing of percentage of other categories.

For example, the impetus dissipation*(I3), gravity increases as objects fall*(G4), gravity acts after impetus wears down*(G5) the percentage had changed from 48.28 to 13.79, the force causes acceleration to terminal velocity*(AF6) the percentage had changed from 48.28 to 17.24.

Conclusions

The results of this study reveal that the learning through Predict-Observe-Explain (POE) with Video Demonstration has the potential to aid the development of students in scientific conceptions about the motion in uniform field. Found many

scientific concept of student were improved after they had participated the POE activities.

Acknowledgments

This work has been financially supported by the Institute for the Promotion of Teaching Science and Technology (IPST). The authors thank Assoc.Prof.Wiwat Youngdee and Dr.Chaiyapong Ruangsuwan, for assistance with research project, assistance with the English editing. The experts Consulting advice tackling. With attention well consistently. And support for the thesis continues until completion.

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