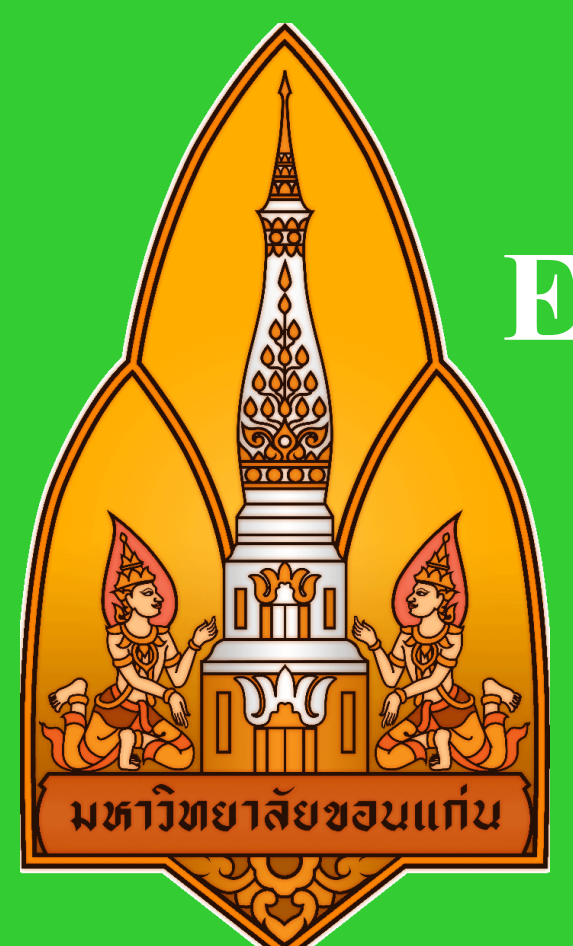


THE STUDY OF SCIENTIFIC CONCEPTS ABOUT CONSERVATION OF MECHANICAL ENERGY THROUGH PREDICT-OBSERVE-EXPLAIN APPROACH FOR GRADE 10 STUDENTS.

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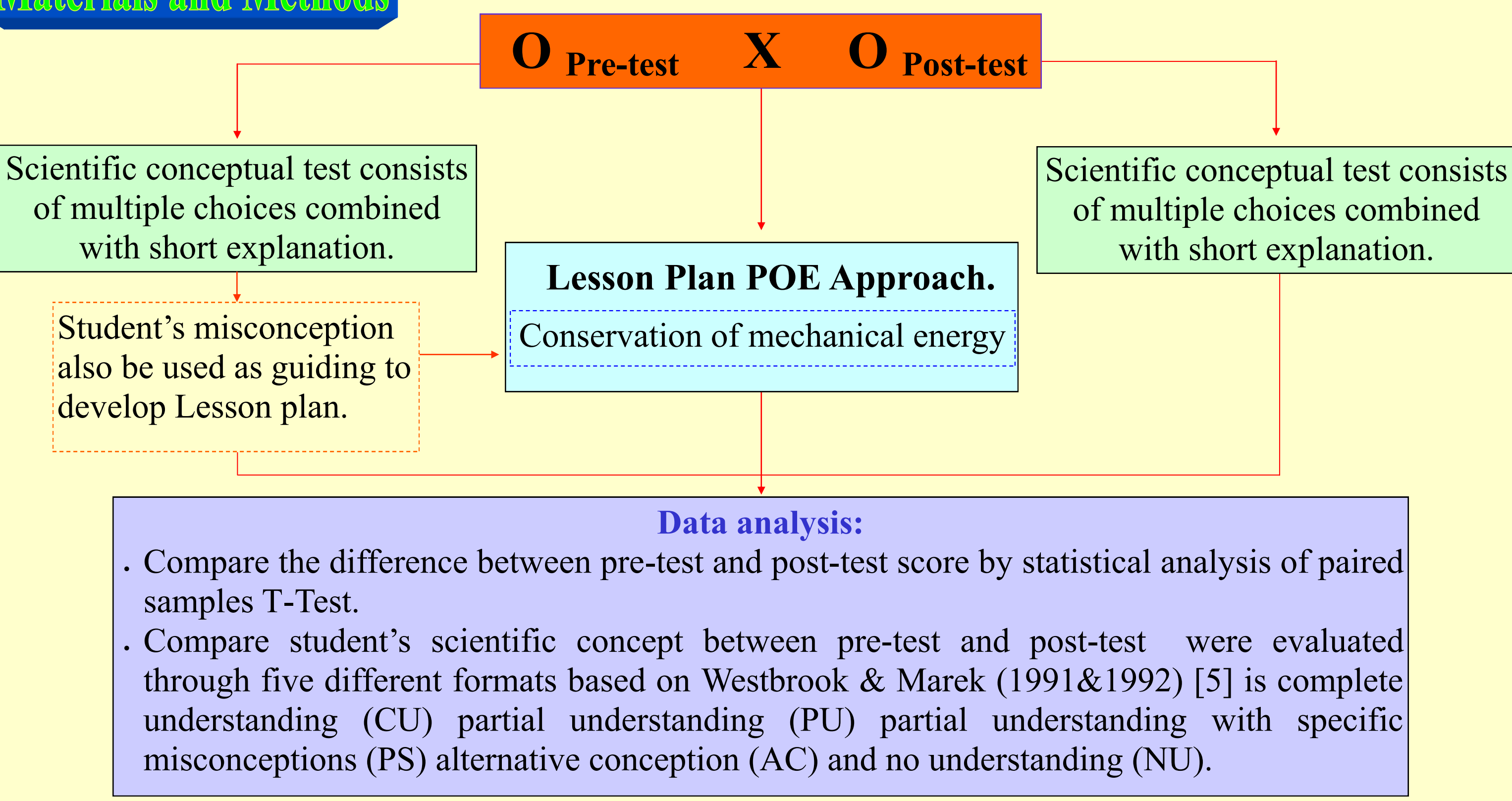


The purpose of this research was to study scientific concepts of the student in conservation of mechanical energy both before and after learning through Predict-Observe-Explain (POE) approach. The target group was 34 grade 10 students, Strisuksa School, The Office of Secondary Education District Area 27, Roi-Et, those studied in the second semester, academic of year 2014. The students' scientific concepts in conservation of energy had been studied by using pre-test and the results were used as guiding to develop the conservation of mechanical energy lesson plans. The post-test was done soon after the POE finished. The evaluation tool consisting scientific conceptual test, multiple choices combined with short explanation their answer. The collected data were analyzed by interpreting into groups of scientific concepts and then comparing between pre-test and post-test. The findings revealed that student' scientific concepts in prior learning could be interpreted into various categories and the majority of them were diverged from commonly scientific concepts, but the post-test performed that student scientific concepts generally converging to the scientific concepts. It could be concluded that the POE approach supporting the students to gain their understanding in conservation of energy.

INTRODUCTION

The content of physics is seen very difficult for Thai student similar to other countries around the world [1]. And the research showed that the students contained misconception or non-scientific conceptions about conservation of energy or concept of energy transformations such as the energy could be changed completely from one to another (no energy losses) and conservation of mechanical energy means that energy should be conserved [2]. Furthermore, teaching and learning in 21st century have trends to improve student's ability for transfer their knowledge to their everyday life and understanding the nature. Therefore, it is necessary to promote scientific knowledge for population. In order to development of science literacy and thinking process. Therefore, contemporary science learning activities should be provided effective learning experience of science through the use of actual inquiry based experimentation. Which the Predict-Observe-Explain (POE) method is a teaching strategy by White and Gunstone (1992) and based on the constructivist learning theory [3]. According to Chanserm N. [4] researched about the grade 10 students' learning outcomes of work and energy based on constructivist theory through POE approach. Her performed that POE would gain the student's understanding toward work and energy. Therefore, the researcher was interested in studying scientific concepts about conservation of mechanical energy through POE approach for Grade 10 Students and the research see the benefits and important in development scientific understanding of students.

Materials and Methods



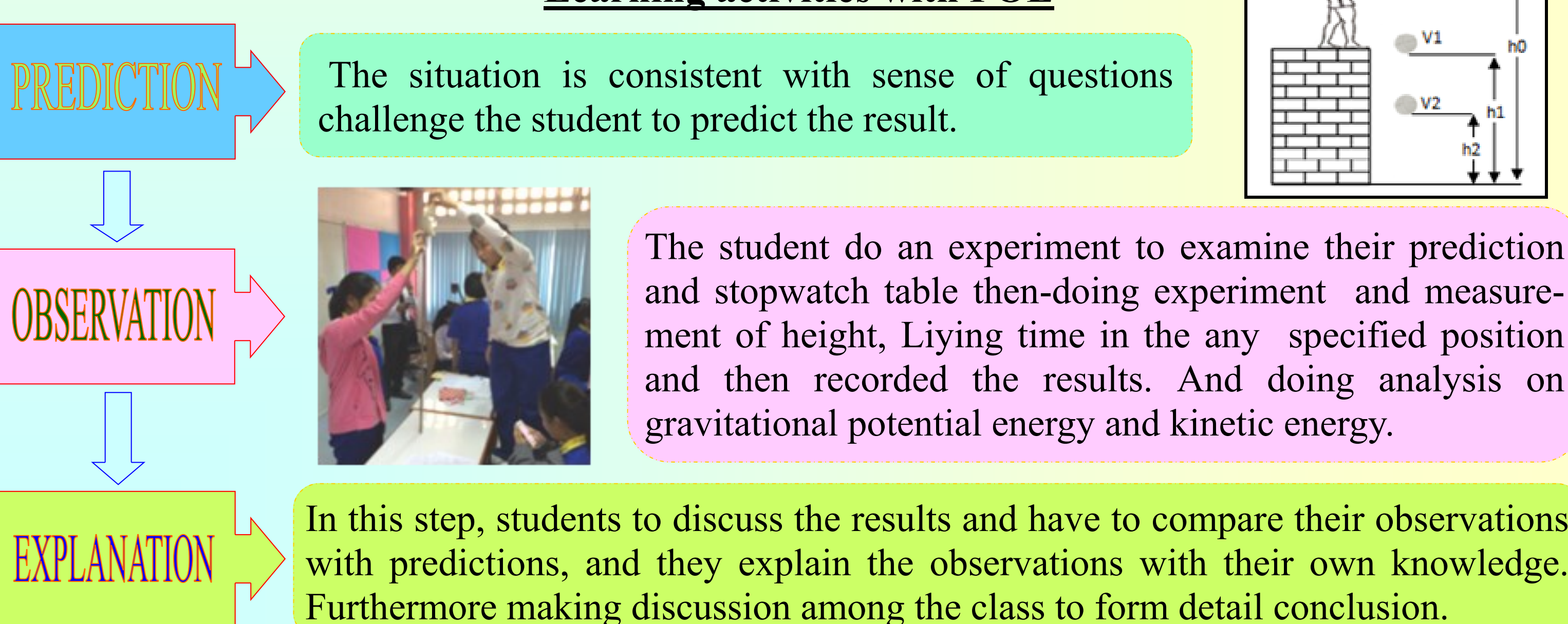
Result and Discussion

Student's Alternative conception

No.	Student's answer
1	The object moves from top to bottom. The energy change from kinetic energy to potential energy.
2	Conservation of mechanical energy is the moment of object under the gravitational forces.
3	If changes form of energy so, the energy of system increases.
4	The object moving down will be the kinetic energy because related to gravitational force.

This table is show student's response to the conceptual test found that their misconception in conservation of mechanical energy in before intervention. Which the evidence is consistent with research found physics is very difficult for Thai student [1] and student's misconception [2]. Which the result were using as a guide for developing lesson plan with POE on steps.

Learning activities with POE

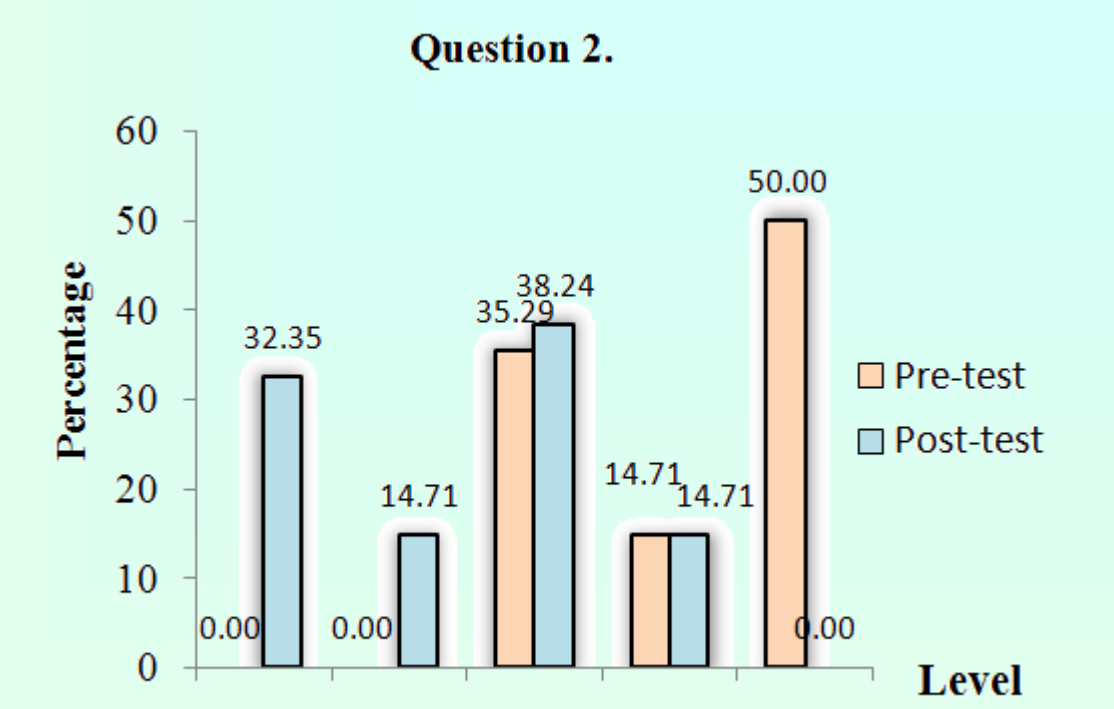
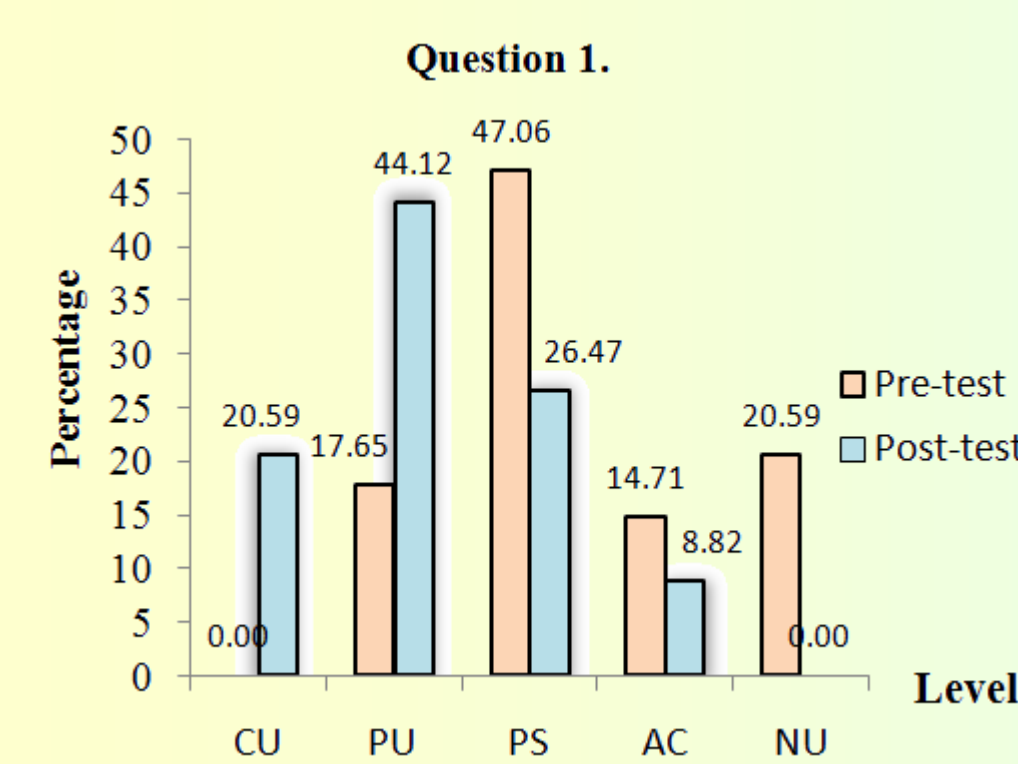


Paired samples Statistics of T-Test

Pair	Mean	N	Std. Deviation	Std. Error Mean	t	df	Sig.(2-tailed)
Pre-test	3.41	34	1.520	0.261	-12.333	33	0.000
Post-test	7.76	34	2.559	0.439			

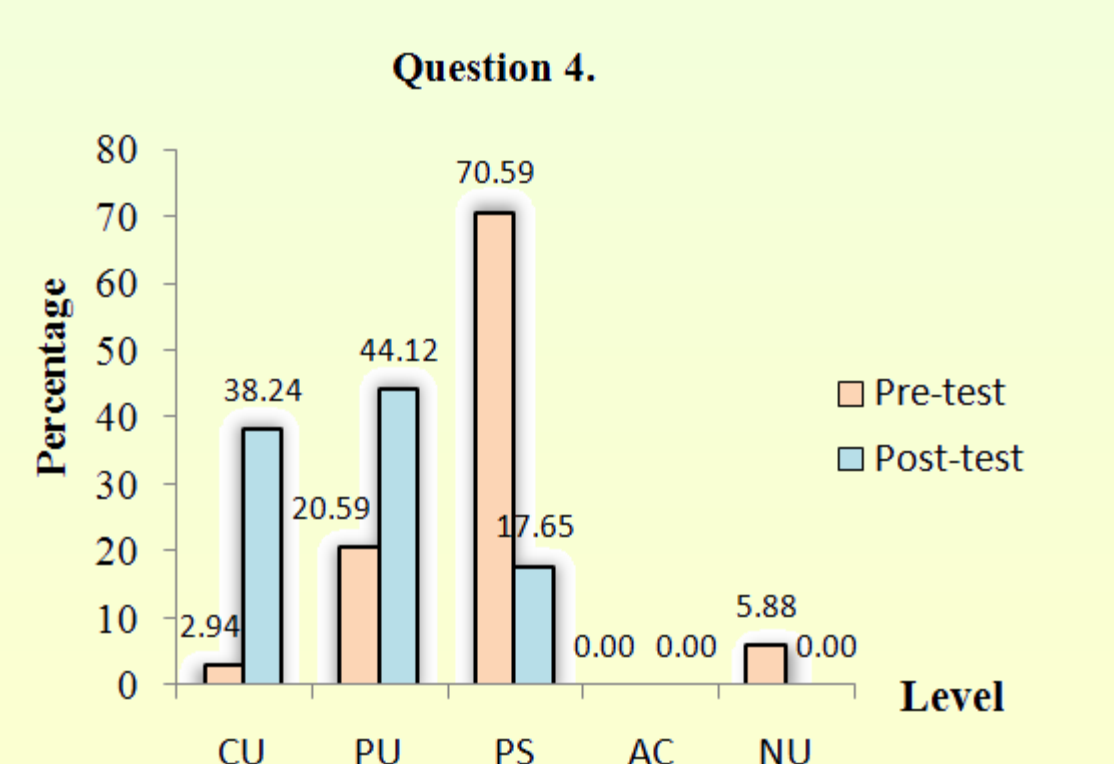
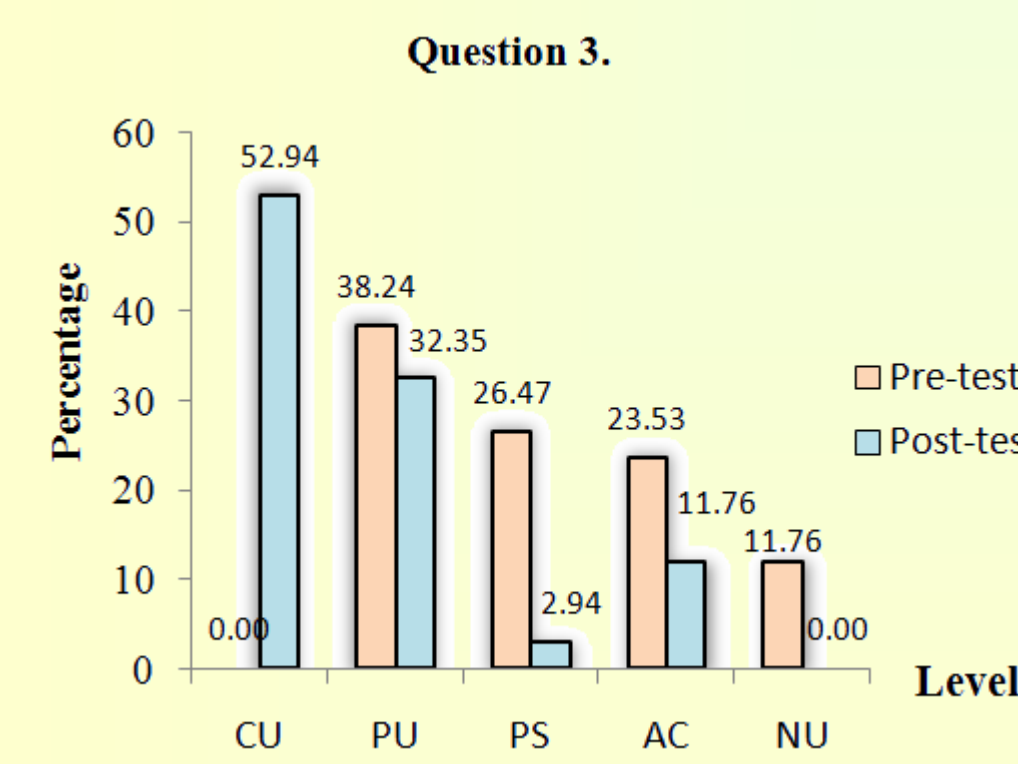
The table is showed that compare pre-test and post-test score about conceptual understanding in conservation of mechanical energy was significantly higher than pre-test score ($t=-12.333$, $df=33$, $p<0.05$)

Compare between Pre-test and Post-test about conceptual understanding by Question.



Concept about definition. Which student had higher level of scientific concept in CU and PU from 17.65% to 64.71%. These students explained that the sum of the kinetic energy and potential energy in one system. The energy will be a constant at various positions.

Concept about principles. Which student had higher level of scientific concept in CU and PU from 0.0% to 47.06%. These students explained that at the high position have potential energy and the lowest position have kinetic energy by potential energy converted to kinetic energy when moving lower but the total of energy will be a constant.



Concept about application. Which student had higher level of scientific concept in CU and PU from 28.24% to 85.29%. These students explained that coconut on the tree and stationary will have potential energy. When moving lower potential energy converted to kinetic energy since it have velocity.

Concept about application. Which student had higher level of scientific concept in CU and PU from 23.53% to 85.29%. These students explained like question 3. From result found that POE would help students higher level of scientific concept which the evidence is consistent with research of Chanserm N. [4].

Conclusions

The student contained lower level of understanding in conservation of mechanical energy, their prior concept had been used for designing the POE lesson. The post-test performed the student understanding in conservation of mechanical energy was higher than the pre-test significantly.

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