ADVANCING THE MIDDLE SCHOOL STUDENTS IN SCIENCE LEARNING OF PROPERTIES OF SUBSTANCE THROUGH THE USE OF AN INQUIRY-BASED LEARNING INTEGRATED WITH THE ADOPTION OF HIGH IMPACT PRACTICES

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INTRODUCTION

Science education is designed to enable students to learn through the processes of finding evidences, proving, and discovering based on scientific skills and processes. The lessons science teachers designed for students should be exciting, challenging and engaging. Most importantly, the lessons must be inspiring for the students to gain knowledge by themselves. The students will also need to be competent in the 21st century skills, according to the High-Impact Practices (HIP): HIP guideline. The concept of HIP gained from relevant researches in knowledge design and management and then was concluded to be a practical guideline. It comprised of the lesson design, the cognitive demand of classroom tasks, the group and team learning, the formative assessment, the students' discourse and discussion, the frequent writing inside and outside the class as well as the inquiry-based learning process. This HIP approach that highlighted the self-learning and self-discovery of knowledge by students advanced their skills important to the 21st century.

As a result, the researcher was interested in applying HIP in designing science education together with the inquiry-based learning process for the 7th Grade students of Takuapa "Sena Nukul" School. The study was conducted during the first semester of academic year 2015. The target group was selected by the method of purposive sampling that finally pointed to one classroom of 36 students.

OBJECTIVES

1. To study the model of learning management according to the HIP model in terms of designing the study of science and inquiry system of the 7th Grade students.
2. To compare the achievement of the 7th Grade students before and after studying science and conducting inquiry-based learning process by following the model of HIP.
3. To study the students' satisfaction toward the science education management and the inquiry-based learning process by following the model of HIP.

RESEARCH TOOLS

1.120 Plans for learning management created by the researcher and based on the model of inquiry-based learning according to the 5 steps of the HIP. Each plan took 120 minutes.
2.The test (multiple choices, 40 questions) on the Properties of Substance
3.The questionnaires provided to students after class to evaluate the science education management and inquiry-based process according to the HIP.

RESULT

Table 1 : HIP practical guidelines and the method of educational management for the lesson of Heating.

Session	Activity / Process / Question	Method	HIP Model Used
Warm up (6 minutes)	Lesson 6 Heating 1. Presented pictures / VDO to students and arranged brainstorming session by asking "What happened when the substance was heated?"	Think-Pair-Share	- Lesson design - Assigned tasks appropriate to the thinking level, evaluation during class and discussion - Group study, writing
Introduction (14 minutes)	2. Students wrote the answers in the notebooks. Teacher wrote them in the flipchart. 3.The teacher informed the objectives of study using the PowerPoint presentation.	Brainstorming	- Lesson design - Assigned tasks appropriate to the thinking level, evaluation during class and discussion - Group study, writing
Body (70 minutes)	4. The teacher asked the question:"When each substance was heated, do they maintain original status or change and how?" This question linked to the experiment. 5. Explain / demonstrate the method of heating to substance / the use of alcohol burner / cautions. 6. Review the work of 4 groups and plan the review of experiment no.7-20, observation no. 6.1 Heating the substance specified in the students' manual (page 54-55) 7. Observe the activity of 6.1, no. 7-17 in the students' manual.	Group of 4	- Lesson design - Assigned tasks appropriate to the thinking level, evaluation during class and discussion - Group study, writing
Closing (20 minutes)	8. The group representatives (Mr. Amnuay) took the data collected from the observation and attached the papers written the results in the classroom. Each student groups learned from those result papers. 9. Discussion to reflect the experiment outcomes.	G.W.	- Lesson design - Assigned tasks appropriate to the thinking level, evaluation during class and discussion - Group study, writing
Closing (20 minutes)	***Questions:*** "How to classify the group of substances?" The conclusion guideline should be "Some substances changed when they were heated and returned to original status when they got colder. Some substances converted to products different from their original status whereas some of them did not change when heated."		
Exit (10 minutes)	10. The students wrote the two different kinds of knowledge; namely question and impression. The representative collected the results and attached them in the classroom.	2 kinds of knowledge; question and impression	- Lesson design - Assigned tasks appropriate to the thinking level, evaluation during class and discussion - Group study, writing

CONCLUSION

1. it was found that the teacher applied HIP and Inquiry-Based learning process highlighting the objectives in each learning steps and aiming at the students to work in groups and exchange & discover knowledge. In this regard, the good lesson design was firstly taken into account. The course management model had to focus on inquiring knowledge and assigning tasks appropriately. The teacher did evaluation for the entire session in order to encourage the students to join in activities and to practice the skills of knowledge discovery, thinking, writing and exchanging idea.

2. The evaluation of the students' achievement was made to get students' opinions on their science lesson (the Properties of Substance) and the process of inquiry-based learning conducted as the model of HIP. The evaluation was made before and after class. The target group was purposive samplings; comprising of 36 students in the 7th Grade. The evaluation was to compare the results by taking T-Test of the same sampling group.

Table 2 : The different results of the T-Test by the 7th Grade students in terms of the pre and post achievement tests for the study of science on the Properties of Substance and the Inquiry-Based Learning Process according to the HIP.

Pre and Post Test	N	ΣD	$ΣD^2$	Average Percentage (before class)	Average Percentage (after class)	t
	36	447	5,811	52.08	83.13	27.30**

*** Statistically important at .01*

3. The satisfaction of the 7th Grade students toward the science education on the topic of the Properties of Substance and the use of inquiry-based learning process according to the HIP – The students were most satisfied with running activities independently (4.54 points) whereas the lowest score was the class ambience affecting the students to be responsible to themselves and to groups (4 points).

In terms of activities, they were viewed to be activities encouraging knowledge gain (4.64 points) and to be appropriate to the content (4.14 points).

It could be concluded that the statistical score to measure the achievement on learning science on the topic of the Properties of Substance of the 7th Grade students, Takua Pa "Senanukul" School significantly proved higher performance after the class.

Regarding the benefit gained from the class, it was assessed that the class management simplified the content and made it more understanding (4.42 points). The learning effects enable understanding content and to provide opportunity in making friends obtained the lowest score.