THE DEVELOPMENT OF SCIENTIFIC CONCEPT ON THE TOPIC OF BUOYANT FORCE FOR GRADE 12 STUDENTS USING THE BUOYANT FORCE EXPERIMENT SET

Nattapong Joysriket[a] and Jiradawan Huntula[b]

Presenting Author: Nattapong Joysriket (nutjoysriketbc20@gmail.com)
[a]Science and Technology Department of Phibunmangsahan School, Ubon ratchathani, Thailand.
[b]Science Education program, Faculty of Education, Khon Kaen University, Khon Kaen, Thailand

KEYWORDS: Predict-Observe-Explain Teaching Method, Understanding of Scientific Concepts, Buoyant Force Experiment Set

This research aimed to develop a series of experiments set on buoyant force and develop students' understanding of scientific concepts on the buoyant force for grade 12 students. Based on the Predict-Observe-Explain (POE) teaching method. The target groups were students in two schools in Khon Kaen Province; there were 22 grade 12 students in Nam Phong Suksa School and 34 grade 12 students in Khon Kaen Wittayayon II school (Saman Sumetho). This research uses a Quasi-Experimental Research model. Two categories of research tools were used in the study:

1) The instruments used in the experiment were a series of experiments on buoyant force and two POE learning management plans. The activity using the experimental series on buoyancy consisted of 6 activities.
   - NO.1 Experiment with three clay blocks which is the same mass but in different shapes (sphere, cube, pyramid, etc.).
   - NO.2 Experiment with weighing objects which is the same volume but in different masses
   - NO.3 Measure the buoyant force of objects of different volumes but in the same mass.
   - NO.4 Experiment to find the buoyant force of one object which is in three different liquids (oil, water, salt water).
   - NO.5 Measure the buoyant force when objects are at different depths.
   - NO.6 How does the amount of liquid above the sinking object affect buoyancy?
2) The instrument used to collect the data was the eight items of the Two-Tier Diagnostic test about scientific conceptions of buoyant force. Data analysis was used to average the scores before and after classes.

THE FINDINGS

The students showed 5 scientific misconceptions about buoyant force. 1) Depth affects the buoyant force. 2) Amount of water under the material effects buoyant force. 3) The buoyant force is inversely proportional to the density of the liquid. 4) The volume of a sinking object does not affect the magnitude of the buoyant force. 5) Different densities of liquid did not affect the magnitude of the buoyant force.

The results showed that students in both schools who were taught about buoyant force by using the Buoyant Force experiment Set, were able to develop scientific concepts of buoyant force. When considering the scores for each item, we found that the most misconception of the buoyant force experiment set developed in NO.3 misconception (96.43% of the sample). The next, in order was NO.1 misconception (87.50% of the sample) and NO.2 misconception (73.21% of the sample).

REFERENCES

Cartier, J. (2000). *Using a modeling approach to explore scientific epistemology with high school biology students.* United State of America: University of Wisconsin Madison.

Sangsupata, S. (1993). *Development of a two-tiered multiple-choice test to measure misconceptions in physics among high school students in Thailand* (Unpublished Ph.D. thesis). Oregon State University, Thailand.

Supasorn, S. (2015). Grade 12 Students' Conceptual understanding and mental models of galvanic cells before and after learning by using small-scale experiments in conjunction with a model kit. *Chemistry Education Research and Practice, 16*, 393-407.

Tisana Khemmanee. (2011). *Pedagogical science*. Bangkok. Chulalongkorn University.

Wanjaree Mangsing (2012). Understanding of scientific consensus on climate of Mathayom Suksa 1 students after applying teaching strategies to change the opinion of Heeson & Hewson. *KKU Journal Graduate Research, 6*(2), 186-195.

Proceedings of the IUPAP International Conference on Physics Education, ICPE 2022 5-9 December 2022, page 106, ISBN: 978-1-74210-532-1.