

# The interactive computer simulation and learning activity for facilitating students' conceptual understanding on the buoyant force through the CoSci learning platform.

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## Abstract

Learning science, especially in the physics field, there are many varieties of invisible and abstract phenomena that are hard and difficult for students to observe and learn. One of the tools that can help students to understand those phenomena in a better way is computer simulations. The computer simulations are usually used in both on-site classroom and on-line learning platforms. Learning in the COVID-19 pandemic era at present, the computer simulations are very important for helping students to understand the physics concept. Interactive computer simulation can be considered as one of the effective methods of facilitating inquiry learning in science, as it allows students to experience the scientific inquiry process and facilitates students to understand an abstract conception and to understand the relationship between variables of invisible phenomena more clearly in reasonable ways. This study aimed to develop the interactive computer simulation and learning activity for enhancing students' conceptual understanding of the buoyant force on the CoSci learning platform. Totally 18 participants were studying in the twelfth grade in science classrooms of a university-affiliated school project (SCiUS), Khon Kaen University, Thailand, in the academic year 2019. Six basic concepts related to the buoyant force constructed based on the Predict-Observe-Explain strategy (POE) with the interactive computer simulation (i.e., the CoSci learning platform). The learning activity was developed based on students' alternative concepts and used to facilitate students' conceptual understanding of the buoyant force. The learning activity on the CoSci learning platform consisted of eight pie charts such as 1) Main question pie chart, 2) Density pie chart, 3) Water level pie chart, 4) Volume pie chart, 5) Mass pie chart, 6) Weight pie chart, 7) Submerged depth pie chart, and 8) Answer pie chart. There were six interactive computer simulations used in this research including 1) Density simulation, 2) Water level simulation, 3) Volume simulation, 4) Mass simulation, 5) Submerged depth simulation, and 6) Weight simulation. All of these simulations were developed on the CoSci learning platform (<https://cosci.tw/>).

The findings showed that 72.22% of students performed better in the post-test scores than in the pre-test score in all six basic concepts related to the buoyant force after learning buoyant force on the CoSci platform. Furthermore, the most difficult concept for students to learn the buoyant force was the concept related to the mass of the object.

**Keywords:** Interactive computer simulation, conceptual understanding, buoyant force