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SP - (16684) - VIRTUAL LABORATORY ACTIVITIES AS AN ALTERNATIVE TO HANDS-ON LABORATORY ACTIVITIES IN TEACHING THERMOCHEMISTRY

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Short Abstract

Virtual laboratory experiment (VLE) activities are an emerging curriculum resource. Although the use of VLE in chemistry education has been seen to promote improvements in student conceptions and achievement, some educators are still reluctant about this idea because of established benefits of hands-on laboratory experiments. With this in mind, this research aims to provide empirical evidences to support the claim that using VLE can provide gains in student understanding of thermochemistry concepts. This quasi-experimental study included two intact sections that the author handled. Two student groups were formed and were assigned to VLE ($n = 35$) and the control group ($n = 32$). Before implementing two learning activities (VLE and a similar hands-on experiment), pre-test in Thermochemistry Concept Inventory (TCI) and Science Process Skills (SPS) were initially done to establish similarities among the students. Analysis of pre-test scores suggest that there was no significant difference between the two groups in terms of TCI scores ($t(65) = .380, p = .705$) while there was significant difference found in the SPS scores ($t(65) = -2.497, p = .015$), suggesting SPS as a covariate. ANCOVA revealed that there is significant difference in TCI post-test scores [$F(1,64) = 4.617, p = .035$] with small effect size ($\eta^2 = 0.067$) across the groups considering their science process skills test result. The paired samples t-test ($t(34) = 4.379, p = .001$) with medium effect size ($g = .729$) further supported that students improved their conceptual understanding. However, post-test mean scores of the students in TCI were found to be relatively low thus suggesting that more curriculum resources be used in conjunction with the use of VLE to better improve student conceptual understanding in thermochemistry.