

The effectiveness of integrated science, technology, engineering and mathematics project-based learning module

ABSTRACT

Physics is a tricky subject to learn, especially when it comes to students applying physics knowledge to the real world and its application. This paper aims to study the effectiveness of the integrated science, technology, engineering, and mathematics project-based learning (iSTEM-PjBL) module in physics on students' belief-specific categories, i.e., real-world connection, conceptual connection and applied conceptual understanding. This research used the quasi-experimental model, employing a two-group pre-survey-postsurvey design. Quantitative data were collected using the Colorado Learning Attitude about Science Survey (CLASS) instrument at two selected schools in Sabah, Malaysia, and Seoul, Korea. The sample size was 88 from Malaysia and 66 from Korea who learned classical mechanics. The students were divided into two groups, respectively, i.e., the experimental group (Malaysia=44, Korea=33) and the control group (Malaysia=44, Korea=33). Participants in the experimental group were intervened with the integrated STEM-PBL physics module, whilst participants in the control group learned physics through a conventional approach for eight weeks. Participants in both groups were then administered a pre-survey before and post-survey after the intervention. This research showed that the integrated STEM-PjBL physics module significantly improved students' real-world connections, conceptual connections, and applied connections after the intervention. The implications and suggestions were also discussed to extend the research further.