

Integrating STEM in an Engineering Design Process: The Learning Experience of Rural Secondary School Students in an Outreach Challenge Program

Abstract

This research was conducted to evaluate the learning experience of Grade Ten students from two Malaysian rural secondary schools that adopted the integration of STEM in an Engineering Design Process (STEM-EDP) approach vis-à-vis an outreach challenge program. A total of 89 students undertook a ten hour program which engaged them in designing and building three different prototypes as well as answering higher order thinking questions. Data on students' learning experience were captured through participants' responses to a six-point Likert scale questionnaire, teachers' field notes, and open-ended questions. The questionnaire result reveals statistically significant gains in knowledge or skills about, attitudes toward, and practices on STEM. The STEM-EDP outreach challenge program brought awareness to rural school students of their potential as problem solvers, thinkers, creators, and collaborators. Students were able to simultaneously broaden their boundaries in knowledge and competency even though they experienced difficulties in tackling challenges associated with STEM activities. Findings suggested that the STEM-EDP approach can be applied as a means for fostering creativity, problem solving skills, and thinking skills among rural secondary school students.