

## Instructional efficiency of the integration of graphic calculators in teaching and learning mathematics.

### ABSTRACT

This quasi-experimental study with non-equivalent control group post-test only design was conducted to investigate the effects of using graphing calculators in mathematics teaching and learning on Form Four Malaysian secondary school students' performance and their meta-cognitive awareness level. Graphing calculator strategy refers to the use of TI-83 Plus graphing calculator in teaching and learning of Straight Lines topic. The experimental group underwent learning using graphing calculator while the control group underwent learning using conventional instruction. Three instruments were used in this study namely, Straight Lines Achievement Test, Paas Mental Effort Rating Scale and Metacognitive Awareness Survey. The data were analysed using independent t-test and planned comparison test. The findings indicated that the graphing calculators' instruction enhanced students' performance and induced higher levels of metacognitive awareness among students. Less mental effort were invested during the learning and test phases and hence increased 3-dimensional instructional efficiency index in learning of Straight Lines topic. Hence it can be implied that integrating the use of graphing calculators in teaching and learning of mathematics was more efficient than the conventional instruction strategy. Eventhough some students experience difficulties in using graphing calculators initially during learning, they responded overwhelmingly that graphing calculators improves their understanding of the Straight Lines topic. Hence, the usage of the graphing calculator lends as an effective strategy in teaching and learning of mathematics.

**Keyword:** Graphing calculators; Instructional efficiency; Mathematical learning.