

The effects of polya's problem solving with digital bar model on the algebraic thinking skills of seventh graders

ABSTRACT

There is a dearth of empirical data to support the positive effects of problem solving (PS) combined with digital technology in the classroom, despite claims that these activities improve students' algebraic thinking abilities. Therefore, the purpose of this study was to evaluate how the teaching method known as Polya's problem solving with digital bar model (PSDMB) affected the seventh graders' ability to think algebraically. Ralston's framework, which covers Generalised Arithmetic, Function, and Modelling within the topic of Linear Equation, served as the foundation for the evaluation of algebraic thinking abilities. A quasi-experimental pre-test and post-test control group design was employed. A total of 90 seventh graders, aged twelve- to thirteen-year-olds, from a secondary school in Tambunan, Sabah, Malaysia, made up the sample. Three teaching groups were formed out of these randomly chosen students: PSDMB ($n = 30$), Bar Model (MB) ($n = 30$), and Conventional Problem Solving (CPS) ($n = 30$). Both the pre- and post-algebraic thinking tests were taken by students. The post-test results were analysed using MANCOVA with the students' pre-test results acting as covariates. The results indicated that students in the PSDMB group performed notably better in Generalised Arithmetic, Function, and Modelling than those in the MB group, who, in turn, outperformed those in the CPS group. These results imply that incorporating digital bar model into problem-based learning is a successful strategy for improving seventh graders' algebraic thinking abilities.