Facilitating students' geometric thinking through van Hiele' 5 phase-based learning using tangram

Abstract

The aim of this study was to determine the effects of Van Hiele's phases of learning using tangrams on 3rd grade primary school students' levels of geometric thinking at the first (visual) and second (analysis) level. The study further investigated if high, moderate and low ability students acquire better mastery in geometric thinking at the end of tangram activities. Pre-test and post-test single group experimental design was employed in the study. A total of 221 students enrolled in Grade Three during the 2013 educational year formed the sample. The students learned Two-dimensional geometry and Symmetry through the Van Hiele's phases of learning using tangram. A geometric thinking test was administered to students before and after the intervention. The intervention took place for 3 hours. Paired samples t-tests comparing the mean scores of geometric thinking pre-test and the post-test were computed to determine if a significant difference existed. One-way Multivariate Analysis of Variances (MANOVA) was conducted to compare the students' pretest and posttest mean scores across the three groups: high, moderate and low ability students. The results found that there were significant differences between pre-test and post-test in students' geometric thinking. It was also found that Van Hiele's phases of learning using tangrams was able to significantly promote geometric thinking in the van Hiele's first (visual) and second (analysis) level among high, moderate and low ability students. Low ability students were observed to have the greatest improvement score compared to moderate and high ability students. Thus, the Van Hiele's phases of learning using tangram can be applied in primary school mathematics to help students achieve better level of geometric thinking.