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A Survey of South African Grade 10 Learners' Geometric Thinking Levels in Terms of the Van Hiele Theory

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ABSTRACT The main thesis of the van Hiele theory is that childrens' understanding of geometric concepts can be classified into a sequence of five hierarchical thinking levels, with levels 1 and 5 being the lowest and the highest. However, an additional lower level, level 0, was added in by other researchers. This paper reports on a part of a larger study which focused on the van Hiele levels of geometric thinking amongst a group of Grade 10 learners. The sample consisted of 191 Grade 10 learners from five senior secondary schools in one Education District in the Eastern Cape Province of South Africa. The respective mathematics teachers in each of these schools assisted in the selection process. The schools were selected through purposive sampling. The necessary ethical requirements were met. Participants completed a test on van Hiele levels of geometric thought by responding to questions on basic geometric concepts including the classification and properties of triangles and quadrilaterals which constituted the basis for space and shape component of the South African Grade 10 Mathematics curriculum. The data were analyzed by manual counts and by using Microsoft Excel. The study found that the majority of learners were at level 0, which is a cause for concern. The paper recommends that educators who facilitate geometry learning in grade 10 need to familiarize themselves with the van Hiele levels in order to achieve effectiveness in the teaching/learning interface of geometrical concepts.