

# **EMPIRICAL HIERARCHY OF STUDENTS' ATTAINMENT OF GEOMETRIC TRANSFORMATIONS IN PRIMARY SCHOOL**

Xenia Xistouri and Demetra Pitta-Pantazi

Department of Education, University of Cyprus

## **Abstract**

This study describes a developmental “map” of understanding and skills in the context of rigid geometric transformations (translations, reflections and rotations) in primary school. A specially developed test aiming to measure students’ abilities in geometric transformations was administered to a sample of 166 primary school students of the fourth, fifth and sixth grade. The test was developed using different types of tasks suggested in literature. The tasks were organised into four categories, for each one of the three geometric transformations. The categories are 1) recognition of image, 2) recognition of transformation, 3) identification of parameters of transformation and 4) construction of image. The map was constructed using RASCH measurement methodology. We interpreted the scale resulting from the RASCH analysis as a hierarchy of five levels of geometric transformations abilities. Our results suggest that students’ understanding develops over five levels: wholistic image, motion of an object, mapping of an object, mapping of the plane, and self-regulated mapping of the plane. Students seem to traverse through this hierarchy by experiencing three types of reasoning: visual wholistic reasoning, spatial reasoning and self-regulation of spatial reasoning.

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