

COGNITIVE DEMAND IN OBSERVED LESSONS AND NATIONAL TESTING COMPARED TO PISA MATHEMATICS RESULTS IN LATVIA

Ilze France¹, Līga Čakāne¹, Dace Namsone¹, Astrīda Cīrulis²

1 University of Latvia (LATVIA)

2 Concordia University (UNITED STATES)

Abstract

Latvia began major educational reforms in 2006 but Latvian students' performance on the mathematics portion of the Programme for International Student Assessment (PISA) assessment has remained consistent. Latvian students' performance achievement in mathematics as measured by PISA is in the middle of OECD country rankings. Work on new educational reforms was begun in 2016 and the government of Latvia has made it a priority to increase scores on the PISA assessments, especially its percent of top performers. This study explored possible reasons why scores have not increased. An analysis of 5 national tests was conducted as well as an extensive study of classroom teaching practices. PISA's six proficiency levels in mathematics and the Structure of the Observed Learning Outcome (SOLO) taxonomy were used to make comparisons between overall country scores and teaching practices.

An item analysis of the national tests showed that questions rarely required higher levels of cognitive demand. Only 8% of the 8th grade exam can be regarded as requiring deep cognitive thought and none of the 9th grade questions required such thinking. Observed lessons similarly showed that students lacked opportunities to develop thinking and reasoning strategies. An analysis of the cognitive demand present in sampled mathematics lessons showed that only 29% of the lessons indicated the use of higher-order cognitive skills on an acceptable level (2-3 on a scale of 0-3). The question arises if whether the teachers are merely teaching at a level that they know will be on the national tests, or are there more fundamental factors involved. Further research is necessary to understand what teachers understand as the objectives of mathematics instruction and what is higher order cognitive demand at their grade level. An understanding of these questions is necessary for the implementation of instructional practices that will develop success at higher order cognitive demand problems both on assessments such as PISA and in the real world.

Keywords: Cognitive Demand, PISA Mathematics, testing, lesson observation, 21st century skills.