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Using NAEP to analyze eighth-grade students' ability to reason algebraically.

Middleton, James A. (ed.) et al., Large-scale studies in mathematics education. Cham: Springer (ISBN 978-3-319-07715-4/hbk; 978-3-319-07716-1/ebook). Research in Mathematics Education, 179-207 (2015).

Summary: After describing the content and scoring of NAEP mathematics assessments, this chapter focuses on performance on individual NAEP items as a means for documenting the algebraic reasoning skills of eighth-grade students. In general, performance on algebraic reasoning is similar to performance on the grade 8 mathematics NAEP in recent years – performance was stable on the majority of items and increased modestly in the remainder. Many eighth graders can understand and explain relationships between two variables in different settings and formats. Many are also able to plot points but few are able to use slope and intercept or determine which points to plot to connect an equation and a graph. When it comes to solving word problems involving linear relationships, it appears that many students employ intuitive strategies such as guess and check although some are able to use formal algebraic methods. Logistical and methodological issues that arise when using NAEP data are also addressed. These issues include adjusting analyses to account for the sampling method used by NAEP and limitations in statistical power when working with subsets of the NAEP data. The chapter closes with examples of the types of statistical techniques we are using to determine whether clusters of items developed by analysis of item content are valid from a measurement perspective.

Classification: C43 E53 H23 H33 D63 D20

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