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Boester, Timothy; Lehrer, Richard

Visualizing algebraic reasoning.

Kaput, James J. (ed.) et al., Algebra in the early grades. London: Routledge (ISBN 978-0-8058-5472-5/hbk; 978-0-8058-5473-2/pbk). Studies in Mathematical Thinking and Learning Series, 211-234 (2008).

From the text: According to *A. D. Aleksandrov, A. N. Kolmogorov, and M. A. Lavrent'ev* [Mathematics, its content, methods, and meaning. Cambridge, MA: MIT Press (1969)], “Arithmetic and geometry are the two roots from which has grown the whole of mathematics” (p. 24). Algebra is generally understood as having derived from the arithmetical root. In Chapter 9, the authors highlight algebra’s indebtedness to the geometric root of mathematics, noting that “spatial structure serves as a potentially important springboard to algebraic reasoning, but also that algebraic reasoning supports coming to ‘see’ lines and other geometric elements in new lights.” Their argument is not historical but rather psychological: “Visualization bootstraps algebraic reasoning and algebraic generalization promotes ‘seeing’ new spatial structure”.

Classification: H10 G40 C30 E40

Keywords: algebraic reasoning; visualization; geometry; generalization; spatial structure; research; design studies; grade 6; lower secondary; meta-representational competence; representational competencies; graphical representations; coordinates; modes of representation; complicated sorting; comparing the slopes of lines; ratio; patterns in tables; similarity; early education in algebra