PROVIDING RESEARCH-BASED GUIDANCE ON GEOMETRY AND MEASURES FOR TEACHERS IN MIDDLE AND HIGH SCHOOLS

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A recent report has suggested that if education is going to embrace evidence-based practice "in a serious way" then the first thing that is needed is better systems "for disseminating the findings of research to teachers on the ground" (Goldacre, 2013, p.16). With this in mind, this poster presents selected elements from a research project that has produced a research-informed resource that brings together, in focused sections, knowledge about mathematics and its teaching and learning in a way that is designed to be useful to teachers working in middle and high schools. The resource consists of a book (Watson, Jones, & Pratt, 2013) and a linked website; see: http://www.nuffieldfoundation.org/key-ideas-teaching-mathematics

The task of producing such a resource was approached through synthesizing a comprehensive range of relevant research about conceptual growth, through education, in key areas of the mathematics curriculum. Aimed at teachers, teacher educators, textbook writers, and curriculum policy makers for mathematics education at the middle and high school level, the resource is structured around seven key mathematical domains: relations between quantities and algebraic expressions; ratio and proportional reasoning; connecting measurement and decimals; spatial and geometrical reasoning; reasoning about data; reasoning about uncertainty; and functional relations between variables. Across these domains, the following are argued to be key powerful mathematical ideas: variable; proportionality; similarity; symmetry; linearity; measure; accuracy; dimensionality; representations; prediction; discrete/ continuous number; transformation; proof.

In geometry education, the research evidence synthesized indicates that teaching needs to attend to two closely-entwined aspects of geometry: the spatial aspects and the aspects that relate to reasoning with geometrical theory. These twin aspects of geometry, it is argued, are not separate, but interlocked. Six themes are identified: spatial relations, 3D geometry, symmetry and transformations, similarity and congruence, geometric diagrams, and geometric proof

In teaching topics in measurement, the synthesis of evidence indicates that the principles of measurement are not straightforward for many learners and may require more attention in school than is sometimes given. If the mathematics of measurement is neglected in teaching, this can store up problems for students when they progress to more advanced topics including graphs of functions, loci and vectors. Six themes are identified: measurement scales, compound measures, geometric measures, measurement and proof, angle measures and estimating measures.

Acknowledgement

References
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Watson, A., Jones, K. & Pratt, D. (2013). *Key ideas in teaching mathematics: Research-based guidance for ages 9-19*. Oxford: Oxford University Press. http://ukcatalogue.oup.com/product/9780199665518.do