

Models and Modeling in Science Education 5

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Visualization in Mathematics, Reading and Science Education

Visualizations—either self-created or external visual stimuli used as an aid to learning—are probably as old as learning itself. Yet surprisingly little research has been done either into how precisely they help us learn, or how to produce ones that are effective pedagogical tools. This volume, a comprehensive review of theory and research on the use of visualization in mathematics, science and reading, contrasts the two dominant theoretical paradigms of how people construct and interpret visualizations. However, the authors never lose sight of practical applications, providing frequent, accessible synopses of research findings in addition to succinct summaries of how the research affects practice. Written by a team with decades of experience in research and practice in the three subjects, the chapters show how cognitive psychology can enhance practical pedagogy, place visualizations in their proper historical context, and analyze in detail the effectiveness of paper-, computer- and video-based visualizations, with some surprising results.

The book is published at a time when, it seems, there is no limit to the art of creating visualizations, as powerful computers make graphics ever more colorful and realistic and 'interactivity' is firmly established as a buzzword in the educational lexicon. The aim of the volume is to explore some central questions in the field, including how to evaluate visualizations and whether or not they can act as an aid to reading development, and to mathematics and science learning. The authors also point to potentially fruitful subjects for future research, and offer their own conclusions and recommendations. As the debate continues over the value of visualizations, with polarized arguments on the one hand lauding them and on the other dismissing them as gimmicks, this book introduces a voice of reason to the discussion that will be welcomed by psychologists and educationalists alike.

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