

SCAFFOLDING NUMERACY IN THE MIDDLE YEARS

REFERENCES AND FURTHER READING

- Adams, R. J., & Khoo, S. T. (1996). *Quest: Interactive item analysis system. Version 2.1* [Computer software]. Melbourne: Australian Council for Educational Research.
- Anghileri, J. (2001). Development of division strategies for Year 5 pupils in ten English schools. *British Educational Research Journal*, 27(1), 85-103.
- Anghileri, J. (1989). An investigation of young children's understanding of multiplication. *Educational Studies in Mathematics*, 20, 367-385.
- Anghileri, J. & Johnson, D. (1988). Arithmetic operations on whole numbers: Multiplication and division. In T. D. Post (Ed.), *Teaching mathematics in grades K-8. Research based methods*. Boston: Allyn & Bacon.
- Anno, M. & Anno, M. (1983). *Anno's mysterious multiplying jar*. New York: Philomel Books.
- Australian Association of Mathematics Teachers. (1997). *Numeracy=Everyone's business* (Report of the Numeracy Education Strategy Development Conference). Adelaide: AAMT/DETYA.
- Australian Education Council. (1990). *A national statement of mathematics for Australian schools*. Carlton: Curriculum Corporation.
- Barber, M. (March, 1999). *Taking the tide at the flood: Transforming education in the Middle Years*. Keynote address at the Middle Years of Schooling Conference, Melbourne, Australia.
- Barry, B., Booker, G., Perry, B. & Siemon, D. (1988). *HBJ Mathematics 7*. Harcourt Brace Jovanovich Group: Hong Kong.
- Battista, M. (1999). The importance of spatial structuring in geometric reasoning. *Teaching Children Mathematics*, November, 170-177.
- Battista, M., Clements, D., Arnoff, J., Battista, K. & van Auken Borrow, C. (1998). Students' special structuring of 2D arrays of squares. *Journal for Research in Mathematics Education*, 29(5), 503-533.
- Baturo, A. (1997). The implications of multiplicative structure for students' understanding of decimal number numeration. In F. Biddulph & K. Carr (Eds.), *People in mathematics education. Proceedings of the 20th Annual Conference of the Mathematics Education Research Group of Australasia* (pp. 88-97). Rotorua: Waikato Print.
- Black, P. and Wiliam, D. (1998a). Assessment and Classroom Learning, *Assessment in Education*, 5, pp. 7-74.
- Black, P. and Wiliam, D. (1998b). Inside the Black Box: Raising Standards Through Classroom Assessment, *Phi Delta Kappan*, p.139
(Also at www.pdkintl.org/kappan/kbla9819.htm)
- Booker, G., Bond, D., Sparrow, L. & Swan, P. (2004). *Teaching primary mathematics*. Frenchs Forest: Pearson Education Australia.

- Callingham, R. (2003a). Establishing the validity of a performance assessment in numeracy. Paper presented at the NZARE AARE Conference 2003 Educational Research, Risks and Dilemmas, Auckland, New Zealand.
- Callingham, R (2003b). Improving mathematical outcomes in the middle years. In B. Clarke, A. Bishop, R. Cameron, H. Forgasz, & W. T. Seah (Eds.), *Making mathematicians. Proceedings of the 40th Annual Conference of the Mathematical Association of Victoria* (pp. 76-88). Brunswick, Vic: Mathematics Association of Victoria.
- Centre for Applied Educational Research. (2002). *Middle Years Research and Development (MYRAD) Project: Executive Summary*. Melbourne: Faculty of Education. Retrieved May 26, 2008, from <http://www.eduweb.vic.gov.au/edulibrary/public/curricman/middleyear/research/MYRA DExecSummary.doc>
- Clarke, D. (July, 2001). Understanding, assessing, and developing young children's mathematical thinking: research as a powerful tool for professional growth. *Paper presented at the 24th Annual Mathematics Education Research Group of Australasia Conference*, Sydney, Australia.
- Clarke, D. (1995). Constructive assessment: Mathematics and the student. In A. Richards (Ed), *Flair: Forging Links and Integrating Resources. Proceedings of the 15th Biennial Conference of the Australian Association of Mathematics Teachers*, (pp. 72-81). Darwin, Northern Territory.
- Clarke, D. M. (2003). Challenging and engaging students with worthwhile mathematics in the middle years. In B. Clarke, A. Bishop, R. Cameron, H. Forgasz & W. T. Seah (Eds.), *Making mathematicians* (pp. 98-109). Melbourne, Victoria: MAV.
- Clarke, D. M., Sullivan, P., Cheeseman, J. & Clarke, B. (2000). The Early Numeracy Research Project: Developing a framework for describing numeracy learning (pp. 180-187). In J. Bana & A. Chapman (Eds.), *Proceedings of the 23rd Annual Conference of the Mathematics Research Group of Australasia*. Fremantle, Australia: MERGA.
- Clarke, F. B. & Kamii, C. (1996). Identification of multiplicative thinking in children grades 1-5. *Journal for Research in Mathematics Education*, 27(1), 41-51.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences. (2nd Ed.)* Hillsdale, NJ: Lawrence Erlbaum Associates.
- Cohen, J. (1977). *Statistical power analysis for the behavioural sciences. (Revised Ed.)* New York: Academic Press.
- Cohen, J. (1969). *Statistical power analysis for the behavioural sciences*. New York: Academic Press.
- Cramer, K. & Post, T. (1993). Connecting research to teaching proportional reasoning. *Mathematics Teacher*, 86(5), 404-407.
- Curriculum Corporation. (2001). *Maths300*. <http://www.curriculum.edu.au/maths300/index.htm>

- Cuttance, P. & Stokes, S. A. (2001). Innovation and best practice. In Cuttance, P. & Stokes, S (Eds.), *School Innovation: Pathway to the knowledge society*. DETYA. Retrieved May 26, 2008
http://www.dest.gov.au/sectors/school_education/publications_resources/school_innovation/
- Department of Education, Training & Youth Affairs. (2000). *Numeracy, A priority for all*. Canberra: JS McMillan Printing Group.
- Earl, L. M. (August, 2000). Reinventing education in the Middle Years. *Keynote address at the Middle Years of Schooling Conference*, Melbourne, Australia. Retrieved May 17, 2004, from <http://www.sofweb.vic.edu.au/mys/docs/conf/2000/learl.doc>
- Empson, S. B. & Turner, E. (2006). The emergence of multiplicative thinking in children's solutions to paper folding tasks. *Journal of Mathematical Behaviour*, 25, 46-56.
- Ernest, P. (1988). The attitudes and practices of student teachers of primary school mathematics. In A. Borbas (Ed.), *Proceedings of the 12th International Conference on the Psychology of Mathematics Education Volume 1* (pp. 288-295). Veszprem, Hungary: OOK. Retrieved May 26, 2008, from <http://www.people.ex.ac.uk/PErnest/papers/attitudes.htm>
- Glass, G.V., McGaw, B. & Smith, M. L., (1981). *Meta-Analysis in social research*, London: Sage Publishing.
- Greer, B. (1992). Multiplication and division as models of situations. In D. A Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 276-295). New York: Macmillan.
- Harel, G. & Confrey, J. (1994). *The development of multiplicative reasoning in the learning of mathematics*. Albany: State University of New York Press.
- Hart, K., Johnson, D., Brown, M., Dickson, L. & Clarkson, R. (1989). *Children's mathematical frameworks 8-13: A study of classroom teaching*. Berkshire, England: NFER-Nelson.
- Hill, H. C., Rowan, B. & Loewenberg Ball, D. (2004). Effects of teachers' mathematics knowledge for teaching on student achievement. *Paper presented at the annual Meeting of the American Research Association*, San Diego, CA, April 12. Retrieved May 26, 2008, from <http://aer.sagepub.com/cgi/content/refs/42/2/371>
- Hill. P., Mackay, A., Russell, J. & Zbar, V. (2001). The middle years. In P. Cuttance & S. Stokes (Eds.), *School innovation: Pathway to the Knowledge Society*. DETYA. Retrieved May 26, 2008, from www.aefederal.org.au/Publications/Middleschooling.pdf
- Houston, K. and Neill, N. (2003). Investigating students' modelling skills. In Q-X Ye, W. Blum, K. Houston and Q-Y Jiang (Eds.) *Mathematical modelling in education and culture*. (pp.54-66). Chichester: Horwood Publications.
- Izard, J. F. (2004, March). *Best practice in assessment for learning*. Paper presented at the Third Conference of the Association of Commonwealth Examinations and

Accreditation Bodies on Redefining the Roles of Educational Assessment, South Pacific Board for Educational Assessment, Nadi, Fiji.

Izard, J.F. (2002a). Constraints in giving candidates due credit for their work: Strategies for quality control in assessment. In F. Ventura & G. Grima (Eds.) *Contemporary Issues in Educational Assessment*. (pp. 15-28). MSIDA MSD 06, Malta: MATSEC Examinations Board, University of Malta for the Association of Commonwealth Examinations and Accreditation Bodies.

Izard, J.F. (2002b). Describing student achievement in teacher-friendly ways: Implications for formative and summative assessment. In F. Ventura & G. Grima (Eds.) *Contemporary Issues in Educational assessment*. (pp. 241-252). MSIDA MSD 06, Malta: MATSEC Examinations Board, University of Malta for the Association of Commonwealth Examinations and Accreditation Bodies.

Izard, J.F. (1998a). Quality assurance in educational testing. In National Education Examinations Authority (Eds.) *The effects of large-scale testing and related problems: Proceedings of the 22nd Annual Conference of the International Association for Educational Assessment*. (pp.17-23). Beijing, China: Foreign Language Teaching and Research Press.

Izard, J.F. (1998b). Validating teacher-friendly (and student-friendly) assessment approaches. In D. Greaves & P. Jeffery (Eds.) *Strategies for intervention with special needs students*. (pp.101-115). Melbourne, Vic.: Australian Resource Educators' Association Inc..

Izard, J., Jeffery, P., Silis, G.F., and Yates, R. L. (1999). Testing for Teaching Purposes: Application of Item Response Modelling (IRM) teaching-focussed assessment practices and the elimination of learning failure in schools. In Peter Westwood & Wendy Scott. (Eds.) *Learning Disabilities: Advocacy and Action* (p 163-188). Melbourne. Australian Resource Educators' Association Inc. (AREA).

Izard, J.F., Haines, C.R., Crouch, R., Houston, S.K., and Neill, N. (2003). Assessing the impact of the teaching of modelling: Some implications. In S.J. Lamon, W.A. Parker, and K. Houston (Eds.) *Mathematical Modelling: A Way of Life: ICTMA 11*, (pp. 165-177.) Chichester: Horwood Publishing.

Izard, J.F. & White, J.D. (1982). The use of latent trait models in the development and analysis of classroom tests. In D. Spearritt (Ed.) *The Improvement of Measurement in Education and Psychology*. Hawthorn, Vic.: Australian Council for Educational Research.

Jacob, L. & Willis, S. (2003). The development of multiplicative thinking in young children. In L. Bragg, C. Campbell, G. Herbert & J. Mousely (Eds.), *Mathematics education research: Innovation, networking, opportunity. Proceedings of the 26th annual conference of the Mathematics Education Research Group of Australasia*, (460-467). Deakin University, 6th – 10th July.

Jacob, L. & Willis, S. (2001). Recognising the difference between additive and multiplicative thinking in young children. In J. Bobis, B. Perry & M. Mitchelmore (Eds.), *Numeracy and beyond. Proceedings of the 24th Annual Mathematics Education Research Group of Australasia Conference, Vol. 2*, (306-313). Sydney: MERGA.

- Kenny, P., Lindquist, M. & Heffernan, C. (2002). Butterflies and Caterpillars: Multiplicative and proportional reasoning in the early grades. In B. Litwiller & G. Bright (Eds.), *Making sense of fractions, ratios and proportion* (pp. 87-99). NCTM Yearbook. Reston: NCTM.
- Keijzer, R. & Terwell, J. (2001). Audrey's acquisition of fractions: A case study into the learning of formal mathematics. *Educational Studies in Mathematics*, 47, 53-73.
- Lamon, S. (2002). Part-whole comparisons with unitizing. In B. Witwiller & G. Bright (Eds.), *Making sense of fractions, ratio and proportion*. NCTM Yearbook (pp. 79-86). Reston, VA: NCTM.
- Lamon, S. (2001). Presenting and representing: From fractions to rational numbers. In A. Cuoco & F. Curcio (Eds.), *The roles of representation in school Mathematics* (pp. 146-165). Reston, VA: NCMT.
- Lamon, S. (1999a). *Teaching fractions and ratios for understanding*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Lamon, S. (1999b). *More in-depth discussion of the reasoning activities in "teaching fractions and ratios for understanding"*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Lamon, S. (1996). The development of unitizing: it's role in children's partitioning strategies. *Journal for Research in Mathematics Education*, 27(2), 170-193.
- Lampert, M. (2001). *Teaching problems and the problems of teaching*. New Haven: Yale University Press.
- Langrall, C. & Swafford, J. (2000). Three balloons for two dollars: developing proportional reasoning. *Mathematics Teaching in the Middle School*, 8(4), 254-261.
- Lesh, R., Behr, M. & Post, T. (1987). Rational number relations and proportions. In C. Janvier (Ed.), *Problems of representations in the teaching and learning of mathematics* (pp. 41-58). Hillsdale, NJ: Lawrence Erlbaum.
- Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. California: Sage Publications.
- Louden, W., Chan, L., Elikins, J., House, H., Milton, M., Nichols, S., Rivalland, J., Rohl, M. & Van Kraayenoord. (2000). *Mapping the Territory*. Canberra: DETYA.
- Mack, N. (2001). Building on informal knowledge through instruction in a complex content domain: partitioning, units and understanding multiplication of fractions. *Journal for Research in Mathematics Education*, 32(3), 267-295.
- McClain, K. & Cobb, P. (2001). Supporting students' ability to reason about data. *Educational Studies in Mathematics*, 45(1-3), 103-129.
- Masters, G. N. (1982). A Rasch model for partial credit scoring. *Psychometrika*, 47, 149-174.
- Mighton, J. (2003). *The myth of ability*. Melbourne: Text Publishing Company.

- Misailidou, C. & Williams, J. (2003). Diagnostic assessment of children's proportional reasoning. *The Journal of Mathematical Behaviour*, 22(3), 335-368.
- Mulligan, J. & Mitchelmore, M. (1997). Young children's intuitive models of multiplication and division. *Journal for Research in Mathematics Education*, 28(3), 309-330.
- Mulligan, J. & Mitchelmore, M. (1996). Children's representations of multiplication and division word problems. In J. Mulligan & M. Mitchelmore (Eds.), *Children's number learning: A research monograph of the Mathematics Education Research Group of Australasia* (pp. 163-184). Adelaide: Australian Association of Mathematics Teachers.
- Narode, R. (1993). Algorithms supplant understanding: Case studies of primary students' strategies for double digit addition and subtraction. In R. J. Becker & B. J. Preece (Eds.), *Proceedings of the fifteenth annual meeting of the North American chapter of the International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 254-260). San Jose, CA: Centre for Mathematics and Computer Science Education, San Jose State University.
- National Board of Employment, Education & Training. (1992). *The middle years of schooling (Year 6-10): A discussion paper*. Canberra: Australian Government Publishing Service.
- National Board of Employment, Education & Training, (1993). *In the middle: Schooling for young adolescents*. Project paper no. 7. Canberra: Australian Government Publishing Service.
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: NCTM.
- National Council of Teachers of Mathematics. (1995). *Assessment standards for school mathematics*. Reston, VA: NCTM.
- OECD. (1996). *Shaping the 21st century: The contribution of development co-operation*. Paris: Development Assistance Committee, OECD.
- Otero, G. (March, 1999). Learning Ain't what it used to be: Student engagement strategies for 21st century school. *Paper presented at the Middle Years of Schooling Conference: Redesigning the Middle Years*. Melbourne Convention Centre, Melbourne, Australia.
- Post, T., Cramer, K., Harel, G., Keiren, T. & Lesh, R. (1998). Research on rational number and ratio. *Proceedings of the 20th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Vol. 1*, (pp. 89-93). Columbus, Ohio: The ERIC Clearinghouse for Science, Mathematics, and Environmental Education.
- Quintero, A. (1986). Children's conceptual understanding of situations involving multiplication. *Arithmetic Teacher*, 33, 5, 34-37.
- Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests*. Chicago: University of Chicago Press (original work published 1960, Copenhagen: Danish Institute for Educational Research).

- Ross, K. N. (1978). "Sample Design for Educational Survey Research", *Evaluation in Education*, Vol. 2, pp. 105-195.
- RMIT University/DEET. (2003). *Researching numeracy teaching approaches in primary schools*. Melbourne: Commonwealth Department of Education Science and Training.
- Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Simon, D. (2005). *Multiplicative thinking*. Unpublished manuscript.
- Simon, D. (2004). *Scaffolding Numeracy in the Middle Years Linkage Project 2003-2006: Project information*. Unpublished manuscript.
- Simon, D. (2003). *Researching numeracy teaching approaches in primary schools: Final Report 2003*. Melbourne: Commonwealth Department of Education, Science and Training & RMIT University.
- Simon, D. (2002a). *Partitioning – the missing link in building fraction knowledge and confidence*. Unpublished manuscript.
- Simon, D. (2002b). *There's more to counting than meets the eye (or the hand)*. Unpublished manuscript.
- Simon, D. & Booker, G. (1990). Teaching and learning for, about and through problem solving. *Vinculum*, 27(2), 4-12.
- Simon, D. & Breed, M. (2005). *A new use for an old tool – Cuisenaire*. Unpublished manuscript.
- Simon, D., Breed, M. & Virgona, J. (2005). From additive to multiplicative thinking – the big challenge of the middle years. In J. Mousley, L. Bragg & C. Campbell (Eds.), *MAV Annual Conference* [CD-ROM]. 1 & 2 December 2005, Bundoora, Australia: The Mathematical Association of Victoria.
- Simon, D., Izard, J., Breed, M. & Virgona, J. (2006). The derivation of a learning assessment framework for multiplicative thinking (pp. 113-120). In J. Novotna, H. Moraova, M. Kratka & N. Stehlikova (Eds.), *Proceedings of the 30th Conference of the International group for the Psychology of Mathematics Education – Mathematics in the centre*. Prague, Czech Republic: PME.
- Simon, D. & Virgona, J. (2001). Roadmaps to numeracy – reflections on the Middle Years Research Project. Paper presented to the Australian Associate for Research in Education Conference, Fremantle, Perth. www.aare.edu.au
- Simon, D. & Virgona, J. (2004). *From their point of view – Middle Years' students' perceptions of school mathematics*. Unpublished manuscript.
- Simon, D., Virgona, J. & Corneille, K. (2001). *The Middle Years Numeracy Research Project final report*. Bundoora: RMIT University.
- Simon, M. (1995). Reconstructing mathematics pedagogy from a constructivist perspective. *Journal for Research in Mathematics Education*, 26(2), 114-145.

- Slavin, R. (1993). Students Differ, So What? *Educational Researcher*, 22(9), 13.
- Slovin, H. (2000). Moving to proportional reasoning. *Mathematics Teaching in the Middle School*, 6(1), 58-61.
- Smith III, J. P. (2002). The development of students' knowledge of fractions and ratios. In B. Witwiller & G. Bright (Eds.), *Making sense of fractions, ratio and proportion. NCTM Year Book* (pp.3-17). Reston, VA: NCTM.
- Sowder, J., Armstrong, B., Lamon, S., Simon, M., Sowder, L., & Thompson, A. (1998). Educating teacher to teach multiplicative structures in the middle grades. *Journal of mathematics teacher education*, 1, 127-155.
- Steffe, L. P. (1994). Children's multiplying schemes. In G. Harel & J. Confrey (Eds.), *The development of multiplicative reasoning in the learning of mathematics* (pp. 3-39). Albany: State University of New York Press.
- Sullivan, P., Clarke, D. M., Cheeseman, J. & Mulligan, J. (2001). Moving beyond physical models in learning multiplicative reasoning. In M. van den Heuvel-Panhuizen (Ed.), *Proceedings of the 25th Annual Conference of the International Group for the Psychology of Mathematics Education, Vol. 4*, (pp. 233-240). Utrecht: PME.
- Taber, S. B. (2002). Go ask Alice about multiplication of fractions. In B. Witwiller & G. Bright (Eds.), *Making sense of fractions, ratio and proportion. NCTM Yearbook* (pp.61-71). Reston, VA: NCTM.
- Takahashi, A. & Yoshida, M. (2004). Ideas for establishing lesson-study communities. *Teaching Children Mathematics, May*, 436-443.
- Thompson, C. & Bush, W. (2003). Improving middle school teachers' reasoning about proportional reasoning. *Mathematics Teaching in the Middle School*, 8(8), 389.
- Watson, J., Kelly, B. and Izard, J. (2004). Student change in understanding of statistical variation after instruction and after two years: An application of Rasch analysis. Refereed paper presented at the AARE Conference in Melbourne, Nov.-Dec. 2004. (<http://www.aare.edu.au> [search code WAT04867]). Melbourne, Vic.: Australian Association for Research in Education.
- Willis, S. (2005). Oversights and insights: mathematics teaching and learning. In M Coupland, J Anderson, & T Spencer (Eds.), *Making mathematics vital: Proceedings of the 20th biennial conference of the Australian Association of Mathematics Teachers* (pp.35-41). AAMT Inc: Adelaide.
- Willis, S. (1990). Numeracy and society: the shifting ground. In S. Willis (Ed.), *Being numerate: What counts?* (pp.1-23). Hawthorn, Victoria: ACER.
- Wilson, M. (1992). Measurement models for new forms of assessment. In M. Stephens & J. Izard. (Eds.) *Reshaping assessment practices: Assessment in the mathematical sciences under challenge*. (pp. 77-98). Melbourne, Vic.: Australian Council for Educational Research.
- Wright, B.D. & Masters, G.N. (1982). *Rating scale analysis*. Chicago, IL.: MESA Press.

Wright, B.D. & Stone, M.H. (1979). Best test design. Chicago, IL.: MESA Press.