REFERENÇES

- Ahlawat, K. S. & Billeh, V. Y. (1982). The factor structure of the Longeot Test: A measure of logical thinking. *Journal of Research in Science Teaching*, 19(8), 647-658.
- Anderson, A. (1995). Effects of the implicit or explicit use of 1 on students' responses when multiplying monomials where n or m = 1. Focus on Learning Problems in Mathematics, 17(1), 34 47.
- Blake, A. J. D. (1980). The predictive power of two written tests of Piagetian developmental level. *Journal of Research in Science Teaching*, 17(5), 435 441.
- Bodin, A. & Capponi, B. (1996). Junior secondary school practices. In A. J. Bishop, K. Clements, C. Keital, J. Kilpatrick, & C. Laborde (Eds.), International handbook of mathematics education (p. 565 614). Kluwer Academic Publishers.
- Booth, L. R., (1984). Algebra: Children's strategies and errors. Windsor, UK: NFER- Nelson.
- Booth, L. R. (1989). A question of structure. In S. Wagner & C. Kieran (Eds.), Research issues in the learning and teaching of algebra (p. 57 - 59). Reston, VA: National Council of Teachers of Mathematics; Hilsdale, NJ: Lawrence Erlbaum.
- Carpenter, T. P. (1980). Research in cognitive development. In R. J. Shumway (Ed.), Research in mathematics education (p. 146 206). National Council of Teachers of Mathematics.
- Carpenter, T. P., Corbitt, M. K., Kepner, H. S., Lindquist, M. M., & Reys, R. E. (1982). Students performance in algebra: Results from the National Assessment. School Science and Mathematics, 82(6), 514 - 531.
- Charbonneau, L. (1996). From Euclid to Descartes: Algebra and its relation to geometry. In N. Bernarz, C. Kieran, & L. Lee (Eds.), Approaches to algebra (p. 15 37). Netherlands: Kluwer Academic Publishers.
- Chalouh, L. & Herscovics, N. (1988). Teaching algebraic expressions in a meaningful way. In A. F. Coxford (Ed.), *The ideas of algebra, K 12* (1988 Yearbook, p. 33 42). Reston, VA: National Council of Teachers of Mathematics.
- Cheah, P.Y. (1984). The cognitive attainment of Form IV and V students in relation to the conceptual demands of the Malaysian chemistry curriculum. Unpublished master's dissertation, University of Malaya.

- Clement, J. (1982). Algebra word problem solutions: Thought processes underlying a common misconception. *Journal of Research in Mathematics Education*, 13(1), 16 30.
- Clement, J., Narode, R., & Rosnick, P. (1981). Intuitive misconception in algebra as a source of mathematics anxiety. Focus on Learning Problems in Mathematics, 3(4), 36 45.
- Collis, K. F. (1971). A study of concrete and formal reasoning in school mathematics. *Australian Journal of Psychology*, 23(3), 289 296.
- Comstock, M. L. (1986). A study of the development of understanding of the concept of variable among seventh grade students. Unpublished Ph.D Dissertation. UMI Dissertation Information Service, The Ohio State University.
- Costello, J. (1991). Teaching and learning mathematics: 11 16. London: Routledge.
- \ Driscoll, M. (1983). Research within research: Secondary school mathematics. Reston, Va: National Council of Teachers of Mathematics.
- Dunne, R. & Jennings, S. (1996). A revised view of the nature of mathematics. Mathematics Teaching, 156, 30 - 33.
- Ekenstam, A. A. & Nilsson, M. (1979). A new approach to the assessment of children mathematical competence. Educational Studies in Mathematics, 10, 41-66.
- Fey, J. T. (1989). School algebra for the year 2000. In S. Wagner & C. Kieran (Eds.), Research issues in the learning and teaching of algebra (p. 199 213). Reston, VA: National Council of Teachers of Mathematics; Hilsdale, NJ: Lawrence Erlbaum.
- Fischbein, E. (1990). Intuition and information processing in mathematical ability. *International Journal of Educational Research*, 14(1), 31 51.
- Fong, H. K. & Chong, T. H. (1995). Solving algebraic word problems. Mathematics Teaching, 151, 34 - 35.
- Harper, E. (1980). The boundary between arithmetic and algebra: Conceptual understanding in two language systems. *International Journal of Mathematics Education in Science and Technology*, 11(2), 237 243.

- Herscovics, N. & Kieran, C. (1980). Constructing meaning for the concept of equation. *Mathematics Teacher*, 73(8), 572 580.
- Herscovics, N. & Linchevski, L. (1994). A cognitive gap between arithmetic and algebra. Educational Studies in Matehmatics, 27(1), 59 78.
- Inhelder, B. & Piaget, J. (1958). The growth of logical thinking from childhood to adolescence. New York: Basic Book Inc.
- Kaput, J. J. & Sims-Knight, J. E. (1983). Errors in translations to algebraic equations: Roots and implications. Focus on Learning Problems in Mathematics, 5(3), 63 - 78.
- Karplus, E. F. & Karplus, R. (1970). Intellectual development beyond elementary school I: Deductive logic. School Science and Mathematics, 70, 398-406.
- Kaur, B. & Boey, H. P. (1994). Algebraic misconceptions of first year college students. Focus on Learning Problems in Mathematics, 16(4), 43 - 58.
- Kieran, C. (1981). Concepts associated with the equality symbols. Educational Studies in Mathematics, 12, 317 - 326.
- Kieran, C. (1989). The early learning of algebra: A structural perspective. In S. Wagner & C. Kieran (Eds.). Research issues in the learning and teaching of algebra (p. 33 56). Reston, VA: National Council of Teachers of Mathematics; Hilsdale, NJ: Lawrence Erlhaum
- Kieran, C. (1992). The learning and teaching of school algebra. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (p. 390-419). National Council of Teachers of Mathematics; NY: Macmillan.
- Kuchemann, D. E. (1981a). Algebra. In K. M. Hart (Ed.), Children's understanding of mathematics: 11 16 (p. 102 119). London: John Murray.
- Kuchemann, D. E. (1981b). Cognitive demands of secondary school mathematics items. *Educational Studies in Mathematics*, 12, 301 316.
- Lawson, A. E. (1978). The development and validation of a classroom test of formal reasoning. *Journal of Research in Science Teaching*, 15(1), 11 24.
- Lawson, A. E. & Blake, A. J. (1976). Concrete and formal thinking abilities in high school biology students as measured by three separate instruments. *Journal of Research in Science Teaching*, 13(3), 227 235.

- Lawson, A. E. & Nordland, F. H. (1976). The factor structure of some Piagetian tasks. *Journal of Research in Science Teaching*, 13(5), 461 466.
- Lawson, A. E., Nordland, F. H., & Devito, A. (1975). A relationship of formal reasoning to achievement, aptitudes and attitudes in pre-service teachers. *Journal of Research in Science Teaching*, 12(4), 423 431.
- Lee. L. L. (1991). Acquisition of science process skills and its relationship to cognitive development. Unpublished master's dissertation, University of Malaya.
- Lee, L. & Wheeler, D. (1989). The arithmetic connection. Educational Studies in Mathematics, 20(1), 41 54.
- Leitzel, J. R. (1989). Critical considerations for the future of algebra instruction. In. S. Wagner & C. Kieran (Eds.), Research issues in the learning and teaching of algebra (p. 25 32). Reston, VA: National Council of Teachers of Mathematics; Hilsdale, NJ: Lawrence Erlbaum.
- Lew. T. S. (1987). The relationship between the cognitive level of Form Four science students and their understanding of physics concepts. Unpublished master's dissertation, University of Malaya.
- Linchevski, L. & Herscovics, N. (1996). Crossing the cognitive gap between arithmetic and algebra: Operating on the unknown in the context of equations. Educational Studies in Mathematics, 30(1), 39 - 65.
- Linchevski. L. & Livneh, D. (1999). Structure sense: The relationship between algebra and numerical contexts. *Educational Studies in Mathematics*, 40(2), 173-196.
- Loh, D. (2000, March 18). Still short of 60 percent in science stream. New Straits Times, p. 7.
- Loh, W. F. (1991). Secondary school students' understanding of algebraic expressions and equations. Unpublished master's dissertation, National University of Singapore.
- MacGregor, M. & Stacey, K. (1993). Cognitive models underlying students' formulation of simple linear equations. *Journal of Research in Mathematics Education*, 24(3), 217 232.
- MacGregor, M. & Stacey, K. (1997). Students' understanding of algebraic notation: 11 15. Educational Studies in Mathematics, 33(1), 1 19.

- Malaysia (1989). Kurikulum bersepadu sekolah menengah: Huraian sukatan pelajaran Matematik Tingkatan Dua. Pusat Perkembangan Kurikulum. Kementerian Pendidikan.
- Malaysia (1989). Kurikulum bersepadu sekolah menengah: Huraian sukatan pelajaran Matematik Tingkatan Tiga. Pusat Perkembangan Kurikulum. Kementerian Pendidikan.
- Ng, K. L. (1991). A study of Malaysian Form Five science students' understanding of concepts in electricity. Unpublished master's dissertation, University of Malaya.
- Niaz, M. (1989). Translation of algebraic equations and its relation to formal operational reasoning. *Journal of Research in Science Teaching*, 26(9), 785 – 793.
- Noss, R. (1986). Constructing a conceptual framework for elementary algebra through Logo programming. Educational Studies in Mathematics, 17(4), 335 - 357.
- Palanisamy, K. V. (1986). Cognitive development and acquisition of the mathematical concepts of fraction, ratio and proportion: A study of a sample of Malaysian urban secondary school pupils. Unpublished master's dissertation, University of Malaya.
- Rosnick, P. (1981). Some misconceptions concerning the concepts of variable. Mathematics Teacher, 74(6), 418 - 420.
- Sfard, A. (1991). On the dual nature of mathematical conceptions: Reflections on processes and objects as different sides of the same coin. *Educational Studies in Mathematics*, 22(1), 1 36.
- Sfard, A. & Linchevski, L. (1994). The gains and pitfalls of reification: The case of algebra. Educational Studies in Mathematics, 26(2 3), 191 228.
- Shemesh, M., Eckstein, S. G., & Lazarowitz, R. (1992). An experimental study of the development of formal reasoning among secondary school students. *School Science and Mathematics*, 92(1), 26 30.
- Sulong, K. (1990). Tahap paras perkembangan kognitif guru pelatih maktab perguruan dan hubungannya dengan pencapaian akademik. Unpublished master's dissertation, University of Malaya.
- `Tall, D. & Thomas, M. (1991). Encouraging versatile thinking in algebra using the computer. Educational Studies in Mathematics, 22(2), 125 147.

- Thayalarani, S. (1998). Kefahaman tiga orang pelajar Tingkatan Tiga tentang ungkapan algebra. Unpublished master's project paper, University of Malaya.
- Thorpe, J. A. (1989). Algebra: What should we teach and how should we teach it? In S. Wagner & C. Kieran (Eds.), Research issues in the learning and teaching of algebra (p. 11 24). Reston, VA: National Council of Teachers of Mathematics; Hilsdale, NI: Lawrence Erlbaum.
- Tirosh, D., Even, R., & Robinson, N. (1995). Simplifying algebraic expressions: Teacher awareness and teaching approaches. *Educational Studies in Mathematics*, 35(1), 51 64.
- Usiskin, Z. (1988). Conceptions of school algebra and uses of variables. In A. F. Coxford (Ed.), *The ideas of algebra, K-12* (1988 Yearbook, p. 8 19). Reston, VA: National Council of Teachers of Mathematics.
- Vaidya, S. & Chansky, N. (1980). Cognitive development and cognitive style as factors in mathematics achievement. *Journal of Educational Psychology*, 72(3), 326 330.
- Valanides, N. C. (1996). Formal reasoning and science teaching. School Science and Mathematics, 96(2), 99 107.
- Wagner, S. (1981). Conservation of equations and function under transformation of variable. *Journal for Research in Mathematics Education*, 12(2), 107 118.
- Wagner, S. (1983). What are these things called variables? *Mathematics Teacher*, 76(6), 474 479.
- Ward, C. R., Nurrenbern, S. C., Lucas, C., & Herron, J. D. (1981). Evaluation of cognitive development. *Journal of Research in Science Teaching*, 18(2), 127 130.
- Yee, P. S. & Soon, S. Y. T. (1996). Students' perceptions of simple algebraic expressions. Journal of Science and Mathematics Education in Southeast Asia, 19(2), 52 67.
- Yong, M. S. (1989). Creativity: A study of Malaysian students. Kuala Lumpur: Cordia Publication.
- Zainudin, A. (1995). Kesilapan algebra dan masalah dalam pendidikan mathematik di peringkat sekolah menengah. Berita Matematik, 46, 9 - 14,