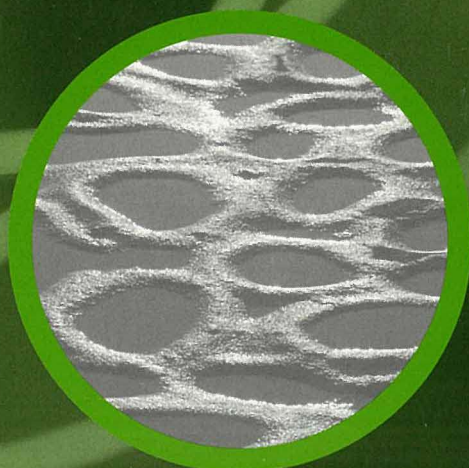
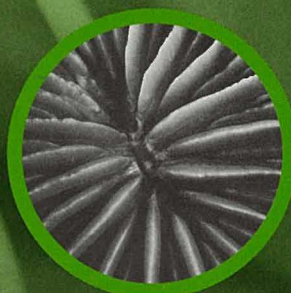
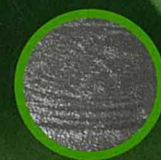




MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

Exploring Issues in **Science Education**



Papers from
a research seminar
on science education
in primary schools, 1999

References

- Abell, S. K. (1990). A case for the elementary science specialist. *School Science and Mathematics*, 90, 291-301.
- Aikenhead, G. S. (1996). Science education: border crossing into the subculture of science. *Studies in Science Education*, 27, 1-52.
- Aikenhead, G. S. (1997). Toward a First Nations cross-cultural science and technology curriculum. *Science Education*, 81 (2), 217-238.
- Aikenhead, G. S. and Jegede, O. J. (in press). Cross cultural science education: a cognitive explanation of a cultural phenomena. *International Journal of Science Education*.
- Albury, R. (1983). Science teaching or science preaching? Critical reflections on school science. In Home, R. (ed.) *Science under scrutiny: the place of history and philosophy of science*. Dordrecht, Reidel Kluwer.
- Alexander, R. (1984). *Primary teaching*. London: Holt, Rinehart and Wilson.
- Alexander, R. (1992). *Policy and practice in primary education*. London: Routledge.
- Alexander, R., Wilcox, J. and Nelson, N. (1995). Discourse, pedagogy and the National Curriculum: change and continuity in primary schools. *Research Papers in Education*, 11 (1), 81-120.
- Anderson, C. W. and Roth, K. J. (1989). Teaching for meaningful and self-regulated learning of science. In Brophy J. (ed.) *Advances in research on teaching. Vol 1*. 265-309. Greenwich, CT: JAI Press Inc.
- Appleton, K. (1995). Student teachers' confidence to teach science: is more science knowledge necessary to improve self-confidence? *International Journal of Science Education*, 17, 357-369.
- Appleton, K. and Asoko, H. (1996). A case study of a teacher's progress toward using a constructivist view of learning to inform teaching in elementary science. *Science Education* 80 (2) 165-180.
- Ashcroft, B., Griffiths, G. and Tiffin, H. (eds) (1995). *The post-colonial studies reader*. London and New York: Routledge.
- Atwater, M. M. and Brown, M. L. (1999). Inclusive reform. *The Science Teacher*, 66, 44-48.
- Baird and Mitchell (1986)
- Baker, R. (1994). Teaching science in primary schools: What knowledge do teachers need? *Research in Science Education*, 24, 31-40.
- Baker, R. and Bell, B. (eds) (1997). *Developing the Science Curriculum in Aotearoa New Zealand*. New Zealand: Addison Wesley Longman.
- Bandura, A. (1986). *Social foundations of thought and action: A social-cognitive theory*. Englewood Cliffs, N. J.: Prentice-Hall.
- Bell, B. F. (1981a). What is a plant: some children's ideas. *NZ Science Teacher*, 31, 10-14.
- Bell, B. F. (1981b). When is an animal not an animal? *Journal of Biological Education*, 15, 3, 213-218.
- Biddulph, F. and Biddulph, J. (1992). *Is it floating?* Auckland: Applecross.
- Biddulph, F. and Osborne, R. (1984). Pupil's ideas about floating and sinking. *Research in Science Education*, 14, 114-124.
- Black, P., Brown, M., Simon S. and Blondel, E. (1996). Progression in Learning - Issues and Evidence in Mathematics and Science. In M. Hughes (ed.). *Teaching and Learning in Changing Times*. Oxford: Blackwell.
- Boohan, R. and Ogborn, J. (1996a) *Energy and Change: Activities for the Classroom*. London: The Association for Science Education.
- Boohan, R. and Ogborn, J. (1996b). *Energy and Change: Introducing a New Approach*. London: The Association for Science Education.
- Boyle-Baise, M. (1999). Bleeding boundaries or uncertain center? A historical exploration of multicultural education. *Journal of Curriculum and Supervision*, 14 (3), 191-215.
- Britzman, D. P. (1998). *Lost Subjects, Contested Objects*. Albany, State University of New York Press.
- Campbell, R. (1994). Managing the primary curriculum: The issue of time allocation. *Education*, March, 3-13.
- Carr, M., Barker, M., Bell, B., Biddulph, F., Jones, A., Kirkwood, V., Pearson, J. and Symmington, D. (1997). The Constructivist Paradigm and Some Implications for Science Content and Pedagogy. In Bell, B. and Baker, R. (eds) *Developing the Science Curriculum in Aotearoa New Zealand*. Auckland: Addison, Wesley, Longman.
- Chalmers, A. F. (1976). *What is this thing called science?* St Lucia, Queensland: University of Queensland Press.
- Chamberlain, G. (1997a). Achievement in science. In R. Garden (ed.) *Mathematics and science performance in middle primary schools*. Wellington: Research and International Section, Ministry of Education.
- Chamberlain, G. (1997b). Review of research. In R. Garden (ed.) *Mathematics and science performance in middle primary schools*. Wellington: Research and International Section, Ministry of Education.
- Chamberlain, G. (1997c). The teachers. In Garden R. (ed.) *Mathematics and science performance in middle primary schools*. Wellington: Research and International Section, Ministry of Education.
- Chamberlain, M. (1996). Achievement in Science - 2. In Garden, R. (ed.) *Science Performance of New Zealand form 2 and form 3 students. Results from New Zealand's participation in the Third International Mathematics and Science Study*. Wellington: Research and International Section, Ministry of Education.
- Chapple, S., Jefferies, R. and Walker, R. (1997). *Māori participation and performance in education: A literature review and research programme*. Wellington: New Zealand Institute for Economic Research.
- Christie, M. (1991). Aboriginal science for the ecologically sustainable future. *Australian Science Teachers' Journal*, 37, 26-31.
- Coburn, W. (1996). Worldview theory and conceptual change in science education. *Science Education*, 80, 579-610.
- Crombie and Johnston (1998)

- Crooks, T. and Flockton, L. (1996). *Science: Assessment Results 1995: National Education Monitoring Report 1*. Dunedin: Educational Assessment Research Unit, University of Otago.
- Cunningham, C. F. and Blankenship, J. W. (1979). Pre-service elementary science teachers' self concerns. *Journal of Research in Science Teaching*, 16, 419-425.
- Davis, B. (1983). *The problems of starting and continuing primary science*. Advanced Diploma Thesis, Department of Educational Studies, Oxford: University of Oxford.
- DeBoer, G. E. (1991). *A history of ideas in science education: Implications for practice*. New York: Teachers College Press.
- Department for Education and Employment (England and Wales, 1998). *Requirements for initial teacher training*. Circular 04/98 Annex A p5.
- Department of Education. (1985). *Reading in Junior Classes*. Wellington.
- Department of Education, Victoria, Australia (19XX). Community Information Service. *SCTP Professional Standards For Teachers of Science*.
- Dill, D. (ed.) (1990). *What teachers need to know: The knowledge, skills and values essential to good teaching*. San Francisco: Jossey-Bass.
- Dobey, D. C. and Schafer, L. E. (1984). The effects of knowledge on elementary science inquiry teaching. *Science Education*, 68, 39-51.
- Driver, R., Asoko, H., Leach, J., Mortimer, E., and Scott, P. (1994). Constructing scientific knowledge in the classroom. *Educational Researcher*, 23, 7, 5-12.
- Driver, R., Leach, J., Millar, R. and Scott, P. (1996). *Young People's Images of Science*. Buckingham: Open University Press.
- Driver, R., Leach, J., Scott, P., and Wood-Robinson, C. (1995). Young People's Understanding of Science Concepts. In Murphy P., Selinger M., Bourne, J., and Briggs, M. (eds) *Subject Learning in the Primary Curriculum*. London: Routledge.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, 41, 1040-1048.
- Education Review Office (1996). *Implementing the 1995 science curriculum*. Wellington.
- Education Review Office (1998a). *Naenae Intermediate School: confirmed accountability report*. Wellington.
- Education Review Office (1998b). *Newlands Intermediate School: confirmed accountability report*. Wellington.
- Education Review Office (1999a). *Corinna School: confirmed accountability report*. Wellington.
- Education Review Office (1999b). *Sacred Heart School: confirmed accountability report*. Wellington.
- Education Review Office (1999c). *Student assessment: practices in primary schools*. Wellington.
- Education Review Office (1999d). *Paraparaumu School: confirmed accountability report*. Wellington.
- Ellsworth, E. (1997). *Difference, pedagogy, and the power of address*. New York: Teachers College Press.
- English, C. and Hipkins, R. (1999). Supporting primary teachers in their understanding of some key science concepts while focusing on the development of provisional concepts. *Paper presented at the ASERA conference*. Rotorua, July 8-11.
- Entwistle, N. (1981). *Styles of learning and teaching: an integrated outline of educational psychology for students, teachers and lecturers*. Chichester: John Wiley.
- Fensham, P. (1985). Science for all: A reflective essay. *Journal of Curriculum Studies*, 17, 415-435.
- Fishbein, M. and Ajzen, I. (1975). *Belief, attitude, intention, behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fraser, B. J. (1981). *Test of science-related attitudes (TOSRA)*. Melbourne: Australian Council for Educational Research.
- Fraser, B. J. and Butts, W. L. (1982). Relationship between perceived levels of classroom individualisation and science-related attitudes. *Journal of Research in Science Teaching*, 19, 143-154.
- Fraser, B. J. and Fisher, D. L. (1983). Development and validation of short forms of some instruments measuring student perceptions of actual and preferred classroom learning environment. *Science Education*, 67, 115-131.
- Freedman, M. P. (1997). Relationship among laboratory instruction, attitude toward science, and achievement in science knowledge. *Journal of Research in Science Teaching*, 34, 343-357.
- Fullan, M. (1993). *Changing Forces: Probing the Depths of Educational Reform*. London: Falmer Press.
- Garden, R. A. (1996). (ed.) *Mathematics and Science Performance of New Zealand Form 2 and Form 3 Students*. Wellington: Ministry of Education.
- Garden, R. (ed.) (1997). *Mathematics and science performance in middle primary schools*. Research and International Section, Wellington: Ministry of Education.
- Gardner, P. L. (1975a). Attitudes to science: A review. *Studies in Science Education*, 2, 1-41.
- Gardner, P. L. (1975b). Science curricula and attitudes to science: A review. *Australian Science Teachers Journal*, 21, 23-40.
- Gauld, C. (1982). The scientific attitude and science education: A critical reappraisal. *Science Education*, 66, 109-121.
- Germann, P.J. (1975a) (1975b)
- Germann, P. J. (1988). Development of the attitude toward science in school assessment and its use to investigate the relationship between science achievement and attitude toward science in school. *Journal of Research in Science Teaching*, 25, 689-703.
- Gogolin, L. and Swartz, F. (1992). A quantitative and qualitative inquiry into the attitudes toward science of non-science college students. *Journal of Research in Science Teaching*, 29, 487-504.
- Good, R. (1995). Comments on multicultural science education. *Science Education*, 79 (3), 335-336.
- Gott, R. and Duggan, S. (1995). *Investigative work in the science curriculum*. Buckingham: Open University Press.

- Gribble, W. (1993). *The use of Māori myths and legends as a teaching aid in Earth Sciences*. Unpublished M.Sc. thesis. Hamilton, New Zealand: University of Waikato.
- Gunstone, R. F., Slattery, M., Baird, J. R. and Northfield, J. R. (1993). A case study exploration of development in pre-service science teachers. *Science Education*, 77, 47-73.
- Haami, B. (1993). Cultural knowledge and traditions relating to the kiore rat. Part 1: a Māori perspective. *SAMEpapers* 93, 5-22.
- Haidar, A. H. (1997). Arab prospective science teachers' world view: presuppositions towards nature. *International Journal of Science Education*, 19 (9), 1093-1109.
- Haladyna, T. and Shaughnessy, J. (1982). Attitudes toward science: A review. *Science Education*, 66, 547-563.
- Haladyna, T., Olsen, R. and Shaughnessy, J. (1982). Relations of student, teacher, and learning environment variables to attitudes toward science. *Science Education*, 66, 671-687.
- Hanson, N. R. (1958). *Patterns of discovery*. Cambridge: Cambridge University Press.
- Haraway, D. J. (1997). *Modest Witness@Second Millennium. FemaleMan@ Meets Onco Mouse*. New York: Routledge.
- Harding, S. (1991). *Whose science? Whose knowledge?* Ithaca, Cornell University Press.
- Harding, S. (1993). *The "racial" economy of science*. Bloomington: Indiana University Press.
- Harding, S. (1998). *Is science multicultural?* Bloomington: Indiana University Press.
- Hargreaves, A. (1991). Curriculum reform and the teacher. *The Curriculum Journal*, 2 (3), 249-258.
- Harlen, W. (1988). *Teaching and Learning Primary Science*. London: Harper and Row Ltd.
- Harlen, W. (1997). Primary teachers' understanding in science and its impact in the classroom. *Research in Science Education*, 27 (3) 332-337.
- Harlen, W., Holroyd, C. and Byrne M. (1995). *Confidence and understanding in teaching science and technology in primary schools*. Edinburgh. The Scottish Council for Research in Education.
- Hattie, J., Clinton, J., Spence, K., Nagle, B., Kelkor, V., Reid, W., Baker, W. and Jaeger, R. (1998). *Evaluating the Paideia program in Guilford County Schools - First Year report: 1997/1998*. Greensboro, NC: University of North Carolina Center for Educational Research and Evaluation.
- Heikkinen, M. W. (1988). The academic preparation of Idaho science teachers. *Science Education*, 72, 63-71.
- Hewson, P. W., Kerby, H. W. and Cook, P. A. (1995). Determining the conceptions of teaching science held by experienced high school science teachers. *Journal of Research in Science Teaching*, 32, 503-520.
- Hewson, W. H. and Hewson, M. G. A. (1984). The role of conceptual conflict in conceptual change and the design of science instruction. *Instructional Science*, 13, 1-13.
- Higgins, J. (1998). *Learning and teaching mathematics in the first two years at school*. Unpublished PhD thesis, Victoria University of Wellington.
- Hirsch, W., and Scott, R. (eds) (1988). *Getting it right*. Auckland: Race Relations Office.
- Hodson, D. (1988a). Experiments in science and science teaching. *Educational Philosophy*, (20), 2, 53-65.
- Hodson, D. (1988b). Toward a philosophically more valid science curriculum. *Science Education*, 72 (1) 19-40.
- Hodson, D. (1998). *Teaching and Learning Science: Towards a personalized approach*. Buckingham, England: Open University Press.
- Hodson, D. and Hodson, J. (1998). From constructivism to social constructivism: A Vygotskian perspective on teaching and learning science. *School Science Review*, 79 (289) 33-41.
- Hohepa, McNaughton and Jenkins (1996)
- Horton, R. (1971). African traditional thought and western science. In Young M. F. D. (ed.) *Knowledge and Control*. London: Collier.
- Hughes, M. (ed.) (1995). *Progression in Learning*. Avon U.K.: Multilingual Matters.
- Jegede, O. J. (1995). Collateral learning and the eco-cultural paradigm in science and mathematics education in Africa. *Studies in Science Education*, 25, 97-137.
- Jegede, O. J. and Aikenhead, G. S. (1999). Transcending cultural borders: implications for science teaching. *Paper presented at the National Association for Research in Science Teaching (NARST)*.
- Jones, A. (1999). The limits of cross-cultural dialogue: pedagogy, desire, and absolution in the classroom. *Educational Theory*, 19 (3), 299-316.
- Kawagley, O. and Norris-Tull, R. (1998). The indigenous worldview of Yupiaq culture: its scientific nature and relevance to the practice and teaching of science. *Journal of Research in Science Teaching*, 35 (2), 133-145.
- Kawasaki, K. (1996). The concepts of science in Japanese and Western education. *Science and Education*, 5, 120.
- Kennedy, M. M. (1998). Education Reform and Subject Matter Knowledge. *Journal of Research in Science Teaching*, 35(3), 249-263.
- Klopfer, L. E. (1971). Evaluation of learning in science. In B. S. Bloom, J. T. Hastings, and G. F. Madaus (eds) *Handbook on Summative and Formative Evaluation of Student Learning*. New York: McGraw-Hill.
- Koballa, T. R. (1986). Teaching hands-on science activities: Variables that moderate attitude-behavior consistency. *Journal of Research in Science Teaching*, 23, 493-502.
- Koballa, T. R. (1988). Attitude and related concepts in science education. *Science Education*, 72, 115-126.
- Krugley-Smolka, E. (1995). Cultural influences in science education. *International Journal of Science Education*, 17 (1), 45-58.
- Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory into Practice*, 34 (3), 159-165.

- LaForgia, J. (1988). The affective domain related to science education and its evaluation. *Science Education*, 72, 407-421.
- Layton D. (1993). Inarticulate Science? Or, Does Science Understand its Publics as well as the Publics Understand Science? *Occasional Publications Mathematics, Science and Technology Education Group*. Faculty of Education, Queen's University, Kingston Ontario.
- Layton, D., Jenkins, E., MacGill, S., Davey, A. (1993). Inarticulate Science? *Perspectives on the Public Understanding of Science and Some Implications for Science Education*. Driffield: Studies in Education.
- Leach, J., Driver, R., Millar, R. and Scott, P. (1995). Progression in learning about 'the nature of science': issues of conceptualisation and methodology. In Hughes M. (ed.) *Progression in learning*. Avon U. k.: Multilingual Matters.
- Learning in Science Project Team. (1989). *Energy For A Change*. Hamilton: Centre for Science and Mathematics Education Research. Waikato University.
- Lee, O. and Anderson, C. (1993). Task engagement and conceptual change in middle school science classrooms. *American Educational Research Journal*, 30, 3, 585-610.
- Lewthwaite, B. (1992). *Teacher perceptions of factors influencing implementation of contextualised science programmes*. Unpublished Masterate Project. Massey University.
- Lewthwaite, B. (1999). Teacher perception of factors influencing the implementation of Science in the New Zealand Curriculum. *Paper presented at the Australasian Science Education research Association conference*, Rotorua, July 9-11.
- Lomax, R. G., Maxwell West, M., Harmon, M. c., Viator, K. A., and Madaus, G. f. (1995). The impact of mandated standardized testing on minority students. *Journal of Negro Education*, 64 (2), 171-185.
- Loo, S. P. (1996). The four horsemen of Islamic science: a critical analysis. *International Journal of Science Education*, 18 (3), 285-294.
- Loucks-Horsley, S., Hewson, P., Love, N. and Stiles, K. (1998). *Designing professional development for teachers of science and mathematics*. Thousand Oaks CA: Corwin Press.
- Loving, C. (1995). Comment on 'multiculturalism, universalism, and science education'. *Science Education*, 79 (3), 341-348.
- Maddock, M. N. (1981). Science education: an anthropological viewpoint. *Studies in Science Education*, 8, 1-26.
- Malcolm (1989)
- Marton, F. and Ramsden, P. (1987). Learning skills, or skill in learning? In J. T. E. Richardson, M. W. Eysenck, and D. W. Piper (eds) *Student Learning*, 155-167. Milton Keynes, England: Open University Press.
- Marton, F. and Säljö, R. (1976). Qualitative differences in learning: 1. Outcome and Process. *British Journal of Educational Psychology*, 46, 115-127.
- Marton, F., Dall'Alba, G. and Beaty, E. (1993). Conceptions of learning. *International Journal of Educational Research*, 19, 277-300.
- McCarthy, Cameron and Crichlow, Warren (eds) *Race, Identity and Representation in Education*. New York: Routledge.
- McDonald, G., Clarke, V. and Kidman, J. (1991). *A study of classrooms containing five-year-olds*. Wellington: NZCER.
- McDonald, G., Clarke, V. and Kidman, J. (1992). *The first three years: new entrants to J3*. Wellington: NZCER.
- McIvor, M. (1995). Redefining science education for Aboriginal students. In Battiste, M. and Barmann, J. (eds), *First Nations education in Canada: The circle unfolds*. Vancouver: University of British Columbia.
- McKinley, E. (1995). *A power/knowledge nexus: writing a science curriculum in Ma-ori*. Unpublished MEd thesis. University of Waikato.
- McKinley, E. (1996). Towards an indigenous science curriculum. *Research in Science Education* 26 (2), 155-167.
- McKinley, E., McPherson W., Waiti, P., and Bell, B. (1992). Language, culture and science education, *International Journal of Science Education*, 14 (5), 579-595.
- Mehan, H., Okamoto, D., Lintz, A. and Wills, J. S. (1995). Ethnographic studies of multicultural education in classrooms and schools. In Banks J. A. and Banks, C. A. (eds) *Handbook of research on multicultural education*. New York, Macmillan.
- Mellado, V. (1998). The classroom practice of pre-service teachers and their conceptions of teaching and learning science. *Science Education*, 82, 197-214.
- Mellado, V., Blanco, L. J. and Ruiz, C. (1998). A framework for learning to teach science in initial primary teacher education. *Journal of Science Teacher Education*, 9, 195-219.
- Metge, J. (1983). *Teaching and learning: he tikanga Māori*. Wellington: New Zealand Department of Education.
- Millar, R. (1987). What is scientific method and can it be taught? In Wellington, J. J. (ed.) *Skills and Processes in Science Education*. New York: Routledge.
- Millar, R., Gott, R., Lubben, F. and Duggan, S. (1995). Children's performance of investigative tasks in science: a framework for considering progression. In Hughes M. (ed.) *Progression in learning*. Avon U. K.: Multilingual Matters.
- Ministry of Education (1992). *Application Series*. Wellington: Learning Media.
- Ministry of Education (1993a). *Science in the New Zealand Curriculum*. Wellington, Learning Media.
- Ministry of Education (1993b). *Te Whariki*. Wellington: Learning Media.
- Ministry of Education (1994). *English in the New Zealand Curriculum*. Wellington: Learning Media.
- Ministry of Education (1996a). *Te Tauāki Marautanga Pūtaiao (National Science Curriculum Statement in Māori)*. Wellington: Learning Media.
- Ministry of Education (1996b). *The Learner as a Reader*. Wellington: Learning Media.
- Ministry of Education (1997). *Ministerial Taskforce on Science and Mathematics*. Wellington.

- Ministry of Education (1998). *Making Better Sense of the Material World*. Wellington: Learning Media.
- Ministry of Education (1999). *Making Better Sense of the Physical World*. Wellington: Learning Media.
- Mullholland, J. and Wallace, J. (1996b). Breaking the Cycle: Preparing Elementary Teachers to Teach Science. *Journal of Elementary Science Education*, 8(1), 17-38.
- Myers, R. E. and Fouts, J. T. (1992). A cluster analysis of high school science classroom environments and attitude toward science. *Journal of Research in Science Teaching*, 29, 929-937.
- National Council for Accreditation of Teacher Education (USA) (1998). *Program Standards for elementary teacher education*.
- Needham, J. (1969). *The grand titration: science and society in East and West*. Toronto: University of Toronto Press.
- New Zealand Qualifications Authority (1998). *New Zealand Teacher Education Standard. Performance Criteria*. Wellington.
- Nicholls, J. G. (1984). Achievement motivation: conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 91, 328-346.
- Nicholls, J. G., Patashnick, M. and Nolen, S. B. (1985). Adolescents' theories of education. *Journal of Educational Psychology*, 77, 683-692.
- Ninnes, P. (in press). Re-thinking multicultural science education: representations, identities and texts. In Maxwell Hines, S. (ed.) *Multicultural Science Education*. New York: Peter Lang Publishers.
- Nolen, S. B. (1988). Reasons for studying: motivational orientations and study strategies. *Cognition and Instruction*, 5, 269-287.
- Nolen, S. B. and Haladyna, T. M. (1990). Motivation and studying in high school science. *Journal of Research in Science Teaching*, 27, 115-126.
- Nuthall, G. and Alton-Lee, A. (1995). Assessing classroom learning: How students use their knowledge and experience to answer classroom achievement test questions in science and social studies. *American Educational Research Journal*, Spring, 32, (1), 185-223.
- Ogawa, M. (1995). Science education in a multisience perspective. *Science Education*, 79 (5), 583-593.
- Ogawa, M. (ed.) (1997). *Effects of Traditional Cosmology on Science Education*. Japan: Faculty of Education, Ibaraki University.
- Ogbu, J. (1995). Understanding cultural diversity and learning. In Banks J. A. and McGhee Banks, C. A. (eds), *Handbook of research on multicultural education*. New York: Macmillan.
- Oliver, J. S. and Simpson, R. D. (1988). Influences of attitude toward science, achievement motivation, and science self-concept on achievement in science: a longitudinal study. *Science Education*, 72, 143-155.
- Ollershaw, C. and Ritchie, R. (1997). *Primary Science: Making it Work*. London, David Fulton.
- Osborne, J. and Simon, S. (1996). Primary science: past and future directions. *Studies in Science Education*, 26, 99-147.
- Osborne, J., Driver, R. and Simon, S. (1998). Attitudes to science: issues and concerns. *School Science Review*, 79(288), 27-33.
- Osborne, R. and Biddulph, F. (1985). *Learning in science project (primary): final report*. Hamilton: University of Waikato.
- Osborne, R. and Freyberg, P. (1985). *Learning in science: the implications of children's science*. London: Heinmann.
- Pedersen, J. E. and McCurdy, D. W. (1992). The effects of hands-on, minds-on teaching experiences on attitudes of pre-service elementary teachers. *Science Education*, 76, 141-146.
- Pere, R. R. (1982). *Ako: concepts and learning in the Māori tradition*. Working Paper 17. Hamilton: University of Waikato.
- Perry, W. G. (1988). Different worlds in the same classroom. In Ramsden P. (ed.) *Improving Learning: New Perspectives* (145-161). London: Kogan Page Ltd.
- Pfundt, H. and Druit, R. (1985). *Bibliography: Students' alternative frameworks and science education*. Kiel, UK: IPN.
- Pomeroy, D. (1994). Science education and cultural diversity: mapping the field. *Studies in Science Education*, 24, 49-73.
- Popkewitz, T. S. and Brennan, M. (eds) (1998) *Foucault's challenge: discourse, knowledge and power in education*. New York, Teachers College Press.
- Purdie, N., Hattie, J. and Douglas, G. (1996). Student conceptions of learning and their use of self-regulated learning strategies: a cross-cultural comparison. *Journal of Educational Psychology*, 88, 87-100.
- Ramsden, P. (1988). Studying learning: improving teaching. In P. Ramsden (ed.) *Improving Learning: New Perspectives* (1331). London: Kogan Page Ltd.
- Raymo, C. (1992). Dr Seuss - Dr Einstein. Children's Books and Scientific Imagination. *The Hornbook Magazine*. Sept/Oct.
- Razack, S. H. (1998). *Looking White People in the Eye*. Toronto: University of Toronto Press.
- Rhine, S. (1998). The role of research and teachers' knowledge base in professional development. *Educational Researcher*. June-July, 27-31.
- Roberts, M. (1993). Scientific knowledge and cultural traditions. Part 2: a Pākehā view of the kiore rat in New Zealand. *SAMEpapers* 93, 23-45.
- Roberts, M. (1998). Indigenous knowledge and western science: perspectives from the Pacific. In Hodson D. (ed.) *Science and Technology Education and Ethnicity: an Aotearoa New Zealand Perspective*. Wellington: The Royal Society of New Zealand.
- Rosebery, A. and Puttick, G. (1998). Teacher Professional Development as Situated Sense-Making: A Case Study in Science Education. *Science Education*, 82 (6) 649-677.
- Russell, T., Qualter, A. and McGuigan, L. (1995). Reflection on the implementation of National Curriculum Science Policy for the 5-14 age range: Findings and interpretations from a National Evaluation Study in England. *International Journal of Science Education*, No. 3, 482-492.

- Salter, D. M. and Robertson, S. L. (1999). Teachers talk about science. *Paper presented at the annual conference of the Australasian Science Education Research Association*, Rotorua, New Zealand: July 1999.
- Scharmann, L. C. and Orth Hampton, C. M. (1995). Co-operative learning and pre-service elementary teacher science self-efficacy. *Journal of Science Teacher Education*, 6, 125-133.
- Schibeci, R. A. (1984). Attitudes to science: an update. *Studies in Science Education*, 11, 26-59.
- Schibeci, R. A. (1989). Home, school, and peer group influences on student attitudes and achievement in science. *Science Education*, 73, 13-24.
- Schibeci, R. A. and McGaw, B. (1981). Empirical validation of the conceptual structure of a test of science-related attitudes. *Educational and Psychological Measurement*, 41, 1195-1201.
- Schibeci, R. A. and Riley, J. P. (1986). Influence of students' background and perceptions on science attitudes and achievement. *Journal of Research in Science Teaching*, 23, 177-187.
- Schoon, K. J. and Boone, W. J. (1998). Self-efficacy and alternative conceptions of science of pre-service elementary teachers. *Science Education*, 82, 553-568.
- Schuell, T. (1987). Cognitive psychology and conceptual change. Implications for teaching science. *Science Education*, 7 (2), 239-250.
- Schunk, D. H. (1995). Inherent details of self-regulated learning include student perceptions. *Educational Psychologist*, 30, 213-216.
- Scott, D. (1993). Opportunities to learn science in primary classrooms. *Paper delivered to Science Education Symposium, NZARE Conference*, Hamilton, December
- Scott, D. (1997). *Opportunities to learn science in primary classrooms*. Unpublished MA thesis, Victoria University of Wellington.
- Shrigley, R. L. (1974). The correlation of science attitude and science knowledge of pre-service elementary teachers. *Science Education*, 75, 45-56.
- Shrigley, R. L., Koballa, T. R. and Simpson, R. D. (1988). Defining attitude for science educators. *Journal of Research in Science Teaching*, 25, 659-678.
- Shulman, L. (1986). Those who understand: Knowledge and growth in teaching. *The Educational Researcher*, 15 (2) 4-14.
- Shulman, L. (1987). Knowledge and teaching: foundations of the new reform. *Harvard Educational Review*, 57, 1-22.
- Singh, M. G. (1995). Edward Said's critique of orientalism and Australia's 'Asia Literacy' curriculum. *Journal of Curriculum Studies*, 27 (6), 599-620.
- Skamp, K. (1989). General science knowledge and attitudes towards science and science teaching of pre-service primary teachers: implications for pre-service units. *Research in Science Education*, 19, 257-267.
- Skamp, K. (1998). *Teaching Primary Science Constructively*. Sydney: Harcourt Brace.
- Sleeter, C. (1993). How white teachers construct race. In McCarthy, Cameron and Crichlow, Warren (eds) *Race, Identity and Representation in Education*. New York: Routledge.
- Snively, G. and Corsiglia, J. (1998). *Discovering indigenous science: implications for science education*. Paper presented at the National Association for Research in Science Teaching (NARST), San Diego, California.
- Solomon, J. (1983). Messy, contradictory and obstinately persistent: a study of children's out-of-school ideas about energy. *School Science Review*, 65, 225-233.
- Solomon, J. (1994). The rise and fall of constructivism. *Studies in Science Education*, 23, 1-19.
- Stahky, L. L., Krockover, G. H., and Shepardson, D. P. (1999). Third grade students' ideas about lunar phases. *Journal of Research in Science Teaching*, 36(2), 159-177.
- Stanley and Brickhouse (1994)
- Stark, R. and Gray, D. (1999). Science knowledge and its sources: the views of Scottish children. *The Curriculum Journal*, 10 (1), 71-83.
- Stefanich, G. P. and Kelsey, K. W. (1989). Improving science attitudes of pre-service elementary teachers. *Science Education*, 73, 187-194.
- Stevens, C. and Wenner, G. (1996). Elementary pre-service teachers' knowledge and beliefs regarding science and mathematics. *School Science and Mathematics*, 96, 2-9.
- Summers, M. (1992). Improving primary school teachers' understanding of science concepts - theory into practice. *International Journal of Science Education*, 14, 24-40.
- Talton, E. L. and Simpson, R. D. (1986). Relationship of attitudes toward self, family, and school with attitude toward science among adolescents. *Science Education*, 70, 365-374.
- Talton, E. L. and Simpson, R. D. (1987). Relationship of attitude toward classroom environment with attitude toward achievement in science among tenth grade biology students. *Journal of Research in Science Teaching*, 24, 507-525.
- Thomas, N. (1980). The Primary Curriculum: survey findings and implications. In Richards, C. (ed.) *Primary Education*. London: A. and C. Black.
- Tilgner, P. G. (1990). Avoiding Science in the Elementary School. *Science Education*, 74 (4), 421-431.
- Tobin, K. and Espinet, M. (1989). Impediments to change: Applications of coaching in high school science teaching. *Journal of Research in Science Teaching*, 26, 105-120.
- Treagust, D. F. (1995). Enhancing students' understandings of science using analogies. In Hand, B. and Prain, V. (eds) *Teaching and Learning in Science: the Constructivist Classroom*. Australia: Harcourt, Bruce and Co.

- Tyler, R. (1997). Notions of coherence and progression in children's ideas: curriculum implications. *Paper presented at Conference of the Australasian Science Education Research Association*, Adelaide, 4 -7 July 1997.
- Udy, K. (1997). The schools. In Garden, R. (ed.) *Mathematics and science performance in middle primary schools*. Wellington: Research and International Section, Ministry of Education.
- Van Rossum, E. J. and Schenk, S. M. (1984). The relationship between learning conception, study strategy and learning outcome. *British Journal of Educational Psychology*, 54, 73-83.
- Venville, G., Wallace, J. and Loudon, W. (1998). A State-wide Initiative: The Primary Science Teacher-Leader Project. *Research in Science Education*, 8(1), 17-38.
- Viennot, L. (1979). Spontaneous reasoning in elementary dynamics. *European Journal of Science Education*, 1, 205-221.
- Wallace, P. R. (1996). *Paradox lost: Images of the quantum*. New York: Springer.
- Weiss, I., Matti, M. and Smith, P. (1994). *Report of the 1993 National Survey of Mathematics and Science Education*. Chapel Hill, NC: Horizon Research, Inc.
- Wellington College of Education (1998). Why Focus on Concepts? Primary Science Booklet Project. *Working Paper No. 1*. (unpublished).
- Wellington College of Education (1999). Developing the Concept Templates. Primary Science Booklet Project. *Working Paper No. 2*. (unpublished).
- Wenner, G. (1993). Relationship between science knowledge levels and beliefs toward science instruction held by pre-service elementary teachers. *Journal of Science Education and Technology*, 2, 461-468.
- Westerback, M. F. (1982). Studies on attitude toward teaching science and anxiety about teaching science in pre-service elementary teachers. *Journal of Research in Science Teaching*, 19, 603-616.
- White, R. (1999). Research on alternative conceptions: past, present, and future. *Paper presented at the ASERA conference*. Rotorua, July 8-11.
- White, R. and Gunstone, R. (1992). *Probing Understanding*. London: Falmer Press.
- Willson, V. I. (1983). A meta-analysis of the relationship between science achievement and science attitude: Kindergarten through college. *Journal of Research in Science Teaching*, 20, 839-850.
- Wolpert, L. (1993). *The unnatural nature of science*. Cambridge, Mass: Harvard University Press.
- Wong, A. F. L. and Fraser, B. J. (1996). Environment-Attitude associations in the chemistry laboratory classroom. *Research in Science and Technological Education*, 14, 91-102.
- Woolnough, B. (1994). *Effective science teaching*. Buckingham, England: Open University Press
- Yates, S. and Goodrum, D. (1990). How confident are primary school teachers in teaching science? *Research in Science Education*, 20, 300-305.
- York, J., Irvine, J. and Darlene, E. (1995). Learning styles and culturally diverse students: a literature review. In Banks, J. A. and Cherry, A. (eds) *Handbook of research on multicultural education*. New York: Macmillan.
- Zimmerman, B. J. and Martinez-Pons, M. (1990). Student differences in self-regulated learning: relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, 82, 51-59.