PROGRAMA DE DOCTORADO EN DIDÁCTICA DE LAS CIENCIAS EXPERIMENTALES Y LA MATEMÁTICA

FACULTAD DE FORMACIÓN DEL PROFESORADO

TESIS DOCTORAL

"CONTRIBUCIÓN AL ESTUDIO DEL APRENDIZAJE DE LAS CIENCIAS EXPERIMENTALES EN LA EDUCACIÓN INFANTIL: CAMBIO CONCEPTUAL Y CONSTRUCCIÓN DE MODELOS CIENTÍFICOS PRECURSORES"

TESIS PRESENTADA PARA OPTAR POR EL GRADO DE DOCTOR EN DIDÁCTICA DE LAS CIENCIAS EXPERIMENTALES Y LA MATEMÁTICA POR LA UNIVERSIDAD DE BARCELONA, DEPARTAMENTO DE DIDÁCTICA DE LAS CIENCIAS EXPERIMENTALES Y LA MATEMÁTICA.

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BIBLIOGRAFÍA

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ACHER, A., ARCÁ, M. Y SANMARTÍ, N. (2007). Modeling as a Teaching Learning Process for Understanding Materials: A case study in primary education. *Science Education, 91* (3), 398-418.

ANDERSON, J. R., GREENO, J. G., REDER, L. M. Y SIMON, H. (2000). Perspectives on Learning, Thinking, and Activity. *Educational Researcher, 4* (29), 11-13.

ANDREWS, R., COSTELLO, P. Y CLARKE, S. (1993*). Improving the quality of argument 5-16*: Final Report. Hull, UK: Esmee Fairbairn Charitable Trust. University of Hull.

ANTÚNEZ, S., DEL CARMEN, L. M., IMBERNON, F., PARCERISA, A. Y ZABALA, A. (2001). *Del proyecto educativo a la programación de aula: el qué, el cuándo y el cómo de los instrumentos de la planificación didáctica.* Barcelona: Graó.

APPLEWHITE, P. Y WILSON, S. (1978). *Understanding Biology*. New York: Holt, Rinehart and Winston.

ARCÁ, M. Y GUIDONI, P. (1989). Modelos Infantiles y Modelos Científicos. Sobre la morfología de los seres vivos. *Enseñanza de las Ciencias, 7* (2), 162-167.

ASTOLFI, J. P. Y PETERFALVI, B. (1993). Obstacles et construction de situations didactiques en sciences expérimentales. *Aster, 16.* París.

AUSUBEL, D. P. (1964). Some psychological aspects of the structure of knowledge. En: S. Elam (Ed.), *Education and the structure of knowledge* (pp. 220-262). Chicago: Rand McNally.

AUSUBEL, D. P. Y ROBINSON, F. G. (1969). *School Learning. An Introduction to Educational Psychology*. New York: Holt, Rinehart and Winston.

BACKSCHEIDER, A. G., SHATZ, M. Y GELMAN, S. A. (1993). Prescholers' ability to distinguish living kinds as a function of regrowth. *Child Development, 64,* 1242-1257.

BARBA, R. H. (1995). *Science in the Multicultural Classroom. A Guide to Teaching and Learning*. Needham Heights, MA: Allyn and Bacon.

BARNES, D. Y TODD, F. (1977). *Communication and learning in small groups*. London: Routledge & Kegan Paul.

BECKER, J. Y VARELAS, M. (1995). Assisting construction: The role of the teacher in assisting the learner's construction of pre-existing cultural knowledge. En L. Steffe (Ed.), *Constructivism in education* (pp. 433–446). Hillsdale, NJ: Erlbaum.

BIDDULPH, F. Y OSBORNE, R. (1984). Pupil's Ideas about Floating and Sinking. *Research in Science Education, 14*, 114-124.

BILLIG, M. (1987). Arguing and thinking: A rethorical approach to social psychology. Cambridge: Cambridge University Press.

BISHOP, A. (1985). The social construction of meaning –a significant development in mathematics education? *For the Learning of Mathematics, 5* (1), 24-28.

BLISS, J. Y OGBORN, J. (1983). *Qualitative Data Analysis for Educational Research. A guide to uses of sistemic networks*. Londres: Croom Helm.

BLOOM, B. S. (1979). *Taxonomía de los objetivos de la educación : clasificación de las metas educativas*. Alcoy, Marfil.

BOULTER, C. J. (2000). Language, Models and Modelling in the Primary Science Classroom. En: J. K. Gilbert & C. J. Boulter (Eds.), *Developing Models in Science Education* (pp. 289-305). London: Kluwer Academic Publishers.

BOULTER, C. Y GILBERT, J. (1995). Argument and Science Education. En: Costello, P. J. M. & S. Mitchell (Eds.), *Competing and Consensual Voices. The Theory and Practice of Argumentation.* Great Bretain: Multilingual Matters Ltd.

BOULTER, C. Y GILBERT, J. (1996). Texts and Contexts: Framing Modelling in the Primary Science Classroom. En: G. Welford, J. Osborne & P. Scott (Eds.), *Research in Science Education in Europe. Current Issues and Themes* (pp. 177-188), London: Falmer Press.

BOULTER, C. J. Y BUCKLEY, B. (2000). Constructing a Typology of Models for Science Education. En: J. K. Gilbert & C. J. Boulter (Eds.), *Developing Models in Science Education* (pp. 41-57). London: Kluwer Academic Publishers.

BOULTER, C. J. Y GILBERT, J. K. (2000). Challenges and Opportunities of Developing Models in Science Education. En: J. K. Gilbert & C. J. Boulter (Eds.), *Developing Models in Science Education* (pp. 343-362). London: Kluwer Academic Publishers.

BREWER, W. Y SAMARAPUNGAVAN, A. (1991). Children's theories versus scientific theories: Differences in reasoning or differences in knowledge? En: R.R. Hoffman & D. S. Palermo (Eds.), *Cognition and the symbolic processes: Applied and ecological perspectives* (pp. 209-232). Hillsdale, N. J: Erlbaum.

BROUDY, H. S. (1977). Types of knowledge and purposes of education. En: R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), *Schooling ant he acquisition of knowledge.* Hillsdale, NJ: Lawrence Erlbaum.

BROWN, A. L. (1990). Domain-specific principles affect learning and transfer in children. *Cognitive Science, 14,* 107-133.

BROWN, A. L. (1992). Design experiments: theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences, 2,* 141-178.

BROWN, A. L. Y PALINCSAR, A. S. (1989). Guided, Cooperative Learning and Individual Knowledge Acquisition. En: L.B. Resnick (Ed), *Knowing, Learning and Instruction. Essays in Honor of Robert Glasser* (pp. 393-452). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

BROWN, A. L., ASH, D., RUTHERFORD, M., NAKAGAWA, K., GORDON, A. Y CAMPIONE, J. C. (1993). Distributed Expertise in the Classroom. En: G. Salomon (Ed.), *Distributed cognitions: Psychological and educational consideration* (pp. 188-228). New York: Cambridge University Press.

BROWN, A. L. Y CAMPIONE, J. C. (1994). Guided discovery in a community of learners. En: K. McGilly (Ed.), *Classroom Lessons: Integrating Cognitive Theory and Classroom Practice* (pp. 229– 270), Cambridge, MA: MIT Press/Bradford Press.

BRUNER, J. (1966). *Towards a Theory of Instruction.* Cambridge: Massachusetts.

BRUNER, J. (1985). Vygotsky: a historical and conceptual perspective. En: J. V. Wertch (Ed.), *Culture, comunication and cognition: Vygotskian perspectives.* Cambridge: University Press.

BRUNER, J. (1990). *Acts of meaning.* Cambridge, MA: Hardvard University Press.

BULLOCK, M. (1985). Animism in childhood thinking: A new look at an old question. *Developmenta Psichology, 21,* 217-225.

CAMPELL, N. A Y REECE, J. B. (2002). *Biology*. San Francisco: Benjamin Cummings

CANDELA, A. (1991). Argumentación y conocimiento científico escolar. *Infancia y Aprendizaje, 55,* 13-28.

CANDELA, A. (2001). Modos de representación y géneros en clase de ciencias. *Investigación en la Escuela, 45*, 45-55.

CANEDO-IBARRA, S. P. (2003a). Propuesta y evaluación de actividades de aprendizaje en Educación Infantil. Departamento de Didáctica de las Ciencias Experimentales y de la Matemática. Memoria del DEA. Facultad de Formación del Profesorado. Universidad de Barcelona.

CANEDO-IBARRA, S. P. (2003b). Análisis descriptivo comparativo de documentos curriculares en Educación Infantil. Memoria del DEA: Facultad de Formación del Profesorado. Universidad de Barcelona.

CAPECCHI, M. Y CARVALHO, A. (2000a)**.** Interações discursivas na construção de explicações para fenómenos físicos em sala de aula. *VII Encontro de Pesquisa em Encino de Física*. Março, Florianópolis.

CAPECCHI, M. Y CARVALHO, A. (2000b). *Argumentaçao em uma aula de conhecimento físico com crianças na faixa de oito a dez anos* [En red]. Septiembre 2000. Disponible en: http://www.if.ufrgs.br/public/ensino/

CAREY, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.

CAREY, S. (1992). The origin and evolution of everyday concepts. En: R. N. Guiere (Ed.), *Cognitive Models of Science.* Minneapolis, MN: Minnesota University Press.

CAREY, S. (2000). Science Education as Conceptual Change. *Journal of Applied Developmental Psychology 21* (1): 13–19.

CAREY, S. (2004). *Bootstrapping and the development of concepts* (pp. 59-68). Dedalus, Winter.

CAREY, S. Y SARNECKA, B. W. (2006). The development of human conceptual representations: a case study. En Y. Munakata & Y. H. Johnson (Eds.), *Processes of change in brain and cognitive development* (pp. 473 – 496). Oxford, England: Oxford University Press.

CAREY, S., EVANS, R., HONDA, JAY, E. Y UNGER, C. (1989). An experiment is, when you try it and see if it works: A study of grade 7 students' understanding of the construction of scientific knowledge. *International Journal of Science Education, 11*, 514-529.

CARMICHAEL, P., DRIVER, R., HOLDING, B., PHILLIPS, I., TWIGGER, D. Y WATTS, M. (1990). *Research on students' conceptions in science: A Bibliography*. Center for Studies in Science and Mathematics Education. Leeds: University of Leeds.

CARR, M. (1996). Interviews About Instances and Interviews About Events. En: D. F. Treagust, R. Duit & B. Fraser (Eds.), *Improving Teaching and Learning in Science and Mathematics* (pp. 44-53). New York and London: Teacher College Press.

CARRASCO, J. B. (1997). *Hacia una enseñanza eficaz*. Madrid: Rialp.

CASARINI, M. (1999). *Teoría y diseño curricular*. México: Trillas.

CASTELLÓ, J., GARCÍA, P. Y TILLÓ, T. (1999). *Coneixement del medi natural: diplomatura de mestre en educació infantil*. Barcelona: EUB.

CHAN, C., BURTIS, J. Y BEREITER, C. (1997). Knowledge-building as a mediator of conflict in conceptual change. *Cognition and Instruction 15*, 1–40.

CHI, M. T. H. Y VANLEHN, K. A. (1991). The content of self-explanations. *Journal of learning Science, 1*, 69-105

CHI, M. T. H. (1992). Conceptual change within and across ontological categories: Examples from learning and discovery science. En R. N. Giere (Ed.), *Cognitive models of science* (pp. 129–186). Minneapolis, MN: University of Minnesota Press Minnesota studies in the Philosophy of Science.

CHI, M. T. H. (1997). Quantifying Qualitative Analyses of Verbal Data: A Practical Guide. *The Journal of the Learning Sciences, 3* (6), 271-315.

CHI, M. T. H., SLOTTA, J. D. Y LEEUW, N. (1994). From Things to Processes: A Theory of Conceptual Change for Learning Science Concepts. *Learning and Instruction, 4*, 27-43.

CLANSEY, W. J. (1992). *Knowledge-Based Tutoring: The Guidon Program*. Cambridge: MIT Press.

CLEMENT, J. (1989). Learning via Model Construction and Criticism. En: J. A. Glover, R. R. Ronning & Reynolds, C. R. (Eds.), *Perspectives on Individual Differences. Hanbook of Creativity* (pp. 341-381). London: Plenum Press.

CLEMENT, J. (2000). Model based learning as a key area for science education. *International Journal of Science Education, 22* (9), 1041-1053**.**

COBB, P. (1990). Multiple perspectives. En: L. P. Steffe & T. Wood (Eds.), *Transforming Children's Mathematics Education: International Perspectives* (pp. 200-215). Hillsdale, NJ: Lawrence Erlbaum Associates.

COBERN, W. W. (1993). Contextual Constructivism. The Impact of Culture on the Learning and Teaching of Science Education. En: K. Tobin (Ed.), *The Practice in Constructivism in Science Education* (pp. 51-69). New Jersey: Lawrence Erlbaum Associates, Publishers Hillsdale.

COCKING, R. P., MESTRE, J. P. Y BROWN, A. L. (2000). New Developmentes in the Science of Learning: Using Research to Help Students Learn Science and Mathematics. *Journal of Applied Developmental Psychology, 21* (1), 1-11.

COHEN, E. (1994). Reconstructing the classroom: Conditions for productive small groups. *Review of Educational Research, 64*, 1-35.

COLL, C. (1991). *Psicología y Currículum: una aproximación psicopedagógica a la elaboración del currículum escolar* Barcelona: Paidós.

COLL, R. (2005). The role of models/and analogies in science education: implications from research. *International Journal of Science Education, 27* (2), 183-198.

CRONBACH, L. J. (1975). Beyond the Two Disciplines of Scientific Psychology. *American Psychologist, 30,* 116-127.

CURRICULUM D'EDUCACIÓ INFANTIL. SEGOND CICLE (PARVULARI). 2008. Departament d'Educació de la Generalitat de Catalunya.

DANIELS, H. (2001). *Vygotsky and Pedagogy*. London and New York: Routledge Falmer.

DENTICI, O. A., GROSSI, M. G., BORGHI, L. DE AMBROSIS Y MASSARA C. I. (1984). Understanding floating: A Study of children aged between six and eight years. *European Journal of Science Education, 3* (6), 235-243.

DENZIN, N. K. Y LINCOLN, Y. S. (1994). *Handbook of qualitative research*. Thousand Oaks. CA: Sage.

DE VRIES, E., K. LUND Y M. BAKER. (2002). Computer-mediated epistemic dialogue: explanation and argumentation as vehicles for understanding scientific notions. *The Journal of the Learning Sciences, 11* (1), 63-103.

DISESSA, A. A. (1982). Unlearning Aristotelian Physics: A study of knowledge-based learning. *Cognitive Science, 6, 37-75.*

DISESSA, A. A. Y SHERIN, B. L. (1998). What change in conceptual change? *International Journal of Science Education, 2* (10), 1155-1198.

DRIVER, R. Y BELL, B. (1986). Students thinking and the learning of science: a constructivist view. *School Science Review, 67,* 443-456.

DRIVER, R. Y OLDHMAN, V. (1986). A constructivist approach to curriculum development in science. *Studies in Science Education, 13,* 107-112.

DRIVER, R. GUESNE, E. Y TIBERGHIEN, A. (1985). Children's ideas and the learning of science. En: R. Driver, E. Guesne, & A. Tiberghien (Eds.), *Children's Ideas in Science* (pp. 1-9). Buckinhan, England: Open University Press.

DRIVER, R., ASOKO, H., LEACH, J., MORTIMER, E. Y SCOTT, P. (1994a). Constructing Scientific Knowledge in the Classroom. *Educational Researcher, 23* (7), 5-12.

DRIVER, R., LEACH, J., SCOTT P. Y WOOD-ROBINSON, C. (1994b)**.** Young People's understanding of science concepts: implications of cross-age studies for curriculum planning. *Science in Education, 24,* 75-100.

DRIVER, R. Y SCOTT, P. M. (1996). Curriculum Development as Research: A Constructivist Approach to Science Curriculum Development and Teaching. En: D. F Treagust, R. Duit & B. Fraser (Eds.), *Improving Teaching and Learning in Science and Mathematics* (pp. 94-108). New York and London: Teacher College Press.

DRIVER, R., NEWTON, P. Y OSBORNE, J. (2000). Establishing the Norms of Scientific Argumentation in Classrooms. *Science Education, 84* (3), 287-312.

DUIT, R. (1999). Conceptual Change Approaches in Science Education. En: W. Schnotz, S. Vosniadou & M. Carretero (Eds.), *New Perspectives on Conceptual Change* (pp. 263-282). Oxford: Pergamon.

DUIT, R. Y TREAGUST, D. (1998). Learning in Science. From Behaviourism Towards Social Constructivism and Beyond. En: B. J. Fraser & K. G. Tobin (Eds.), *International Handbook of Science Education. Part One* (pp. 3-25). London: Kluver Academic Publishers.

DUIT, R. ROTH, W. M., KOMAREK, M. Y WILBERS, T. (1998). Conceptual change cum discourse analysis to understand cognition in a unit on chaotic systems: towards an integrative perspective on learning in science. *International Journal of Science Education, 20* (9), 1059-1073.

DUIT, R. Y TREAGUST, D. F. (2003). Conceptual change: a powerful framework for improving science teaching and learning. *International Journal of Science Education, 25* (6), 671-688.

DUMBAR, K. Y KLHAR, D. (1989). Developmental differences in scientific discovery strategies. En D. Klhar & K. Kotovsky (Eds.), *Complex information processing: The impact of Herbert A. Simon.* Hillsdale, NJ: Erlbaum.

DUSCHL, R. A. Y HAMILTON R. J. (1998). Conceptual Change in Science and in the Learning of Science. In: B. J. Fraser & K. G. Tobin (Eds.), *International Handbook of Science Eduction. Part II* (pp. 1047-1065). London: Kluver Academic Publishers.

DUSCHL, R. A. Y GITOMER, D. H. (1991). Epistemological perspectives on conceptual change: Implications for educational practice. *Journal of Research in Science Teaching 28,* 839–858.

DUSCHL, R. Y OSBORNE, J. (2002). Supporting and Promoting Argumentation Discourse in Science Education. *Studies in Science Education, 38,* 39-72.

EDUCACIÓN INFANTIL. CURRICULUM (1992). Generalitat de Catalunya. Departament de Ensenyament. Serveri de Difusió i Edicions.

EDWARDS, D. Y MERCER, N. (1987). *Common knowledge*. London: Methuen.

ERDURAN, S. Y DUSCHL, R. A. (2004). Interdisciplinary Characterizations of Models and the Nature of Chemical Knowledge in the Classroom. *Studies in Science Education, 40,* 105-137.

ESHACH, H. Y FRIED, M. N. (2005). Should Science be Taught in Early Childhood? *Journal of Science Education and Technology, 14* (3), 315-336.

ESTERLY, J. B. Y BARBU, M. (1999). The role of size, weight, density, and material in children's developing understanding of buoyancy. Poster presented at the Biennial Meetings of the Society for Research in Child Development, Albuquerque, NM.

FARMERY, C. (2002). *Teaching Science 3-11. The essential guide. Reaching the standar*. London: Continuum.

FENSTERMACHER, G. D. (1979). Philosophy of Research on Teaching: Three Aspects. En: M. C. Wittrock (Ed.), *Handbook of Research Teaching.* New York: McMillan.

FISHER, E. (1993). Distinctive features of pupil–pupil classroom talk and their relationship to learning: How discursive exploration might be encouraged. *Language and Education, 7* (4), 239–257.

FLEER, M. (1995). The importance of conceptually focused teacher-child interaction in early childhood science learning. *International Journal of Science Education, 17* (3), 325-342

FLEER, M. (2002). Sociocultural Assessment in Early Years Education: myth or reality? *International Journal of Early Years Education, 10* (2), 105-120.

FLORES, R. (1995). *Hacia una pedagogía del conocimiento*. Bogotá: McGraw-Hill.

FRAENKEL, J. R. Y WALLEN, N. (2003). *How to Design and Evaluate Research in Education*. Fifth Edition. New York: McGraw-Hill.

FRENCH, L. (2004). Science as a center of a coherent, integrated early chilhood curriculum. *Early Childhood Research Quarterly, 19*, 138-149.

FURNHAM, A. (1992). Lay understanding of science: Young people and adults's ideas of scientific concepts. *Studies in Science Education, 20*, 29-64.

GAGNÉ, R. M. (1977). *The conditions of learning.* New York: Holt, Rinehart and Winston.

GALLIMORE, R. Y THARP, R. (1990). Teaching mind in society: Teaching, schooling, and literate discourse. En: L. C. Moll (Ed.), *Vygotsky and education*. Cambridge: Cambridge University Press.

GELMAN, R. (1990). First principles organize attention to and learning about relevant data: Number and animate-inanimate distinction as examples. *Cognitive Science, 14,* 79-106.

GELMAN, R. SPELKE, E. Y MECK, E. (1983). What preschoolers know about animate and inanimate objects. En: D. Rogers & J. A. Sloboda (Eds.), *The acquisition of simbolic skills* (pp. 279-326). New York: Plenum.

GELMAN, S. A. (1988). The development of induction within natural kind and artifact categories. *Cognitive Psychology, 20* (1), 65-95.

GELMAN, S. A., Y MARKMAN, E. M. (1986). Categories and induction in young children. *Cognition, 23,* 183-209.

GELMAN, S. A. Y KREMER, K. E. (1991). Understanding natural cause: Children's explanations of how objects ant their properties originate. *Child Development, 62,* 396-414.

GELMAN, S. A. Y OPFER, J. E. (2002). Development of the Animate-Inanimate Distinction. En: U. Goswami (Ed.), *Blackwell Handbook of Childhood Cognitive Development* (151-164). Oxford, UK: Blackwell Publishing.

GIBSON, H. L. Y CHASE, C. (2002). Longitudinal Impact of an Inquiry-Based Science Program on Middle School Students' attitudes Toward Science. *Science Eduaction, 86,* 693-705.

GIERE, R. N. (1988). *Explaining Science. A Cognitive Approach*. Chicago y Londres: The University of Chicago Press.

GIERE, R. N. (2002). Discussion note: Distributed cognition in epistemic cultures. *Philosophy of Science, 69*, 637–644.

GIERE, R. N. (2004). How models are used to represent reality. *Philosophy of Science, 71* (5), 742–752.

GIL-PÉREZ, D. (2003). Constructivism In Science Education: The Need For A Clear Line Of Demarcation. En: D. Psillo, P. Kariotoglou., V. Tselfes, E. Hatziksaniotis, G. Fassoulopoulus & M. Kallery (Eds.), *Science Education research in the Knowledge-Based Society* (pp. 9-11). London: Kluwer Academic Publishers.

GILBERT, J. K. Y BOULTER, C. J. (1998). Learning Science Through Models and Modelling. En: B. Fraser & K. G. Tobin (Eds.), *International Handbook of Science Education. Part One* (pp. 53-66). London: Kluwer Academic Publishers.

GILBERT, J. K., BOULTER, C. J. Y ELMER, R. (2000a). Positioning Models in Science Education and in Design and Technology Education. En: J. K. Gilbert & C. J. Boulter (Eds.), *Developing Models in Science Education* (pp. 3-17). London: Kluwer Academic Publishers.

GILBERT, J. K., BOULTER, C. J. Y RUTHERFORD, M. (2000b). Explanations with Models in Science Education. En: J. K. Gilbert & C. J. Boulter, (Eds.), *Developing Models in Science Education* (pp. 193-208). London: Kluwer Academic Publishers.

GIORDAN, A. Y DE VECCHI, G. (1988). *Los orígenes del saber. De las concepciones personales a los conceptos científicos.* Sevilla: Diada Editores.

GIORDAN, A., RAICHUARG-JEAN, MARC, D., GAGLIARDI, R. Y CANARY, A. (1988). *Conceptos de Biología.* Barcelona: Labor.

VON GLASERFELD, E. (1993). A Constructivist Approach to Teaching. En: L. P. Steffe and J. Gale (Eds.), *Constructivism in Education* (pp. 3-16). New Jersey: LEA publishers.

VON GLASERSFELD, E. (1995). *Radical constructivism : a way of knowing and learning.* London: Falmer.

GOBERT, J. D. Y BUCKLEY, B. C. (2000). Introduction to model-based teaching and learning in science education. *International Journal of Science Education, 22* (9), 891-894.

GOFFARD, M. Y WEIL-BARRAIS, A. (2005). *Enseigner et apprendre les sciences. Recherches et practiques.* Paris : Armand Colin.

GOPNIK, A., GLYMOUR, C., SOBEL, D. M., SCHULZ, L. E., KUSHNIR, T. Y DANKS, D. (2004). A theory of causal learning in children: Causal maps and Bayes nets. *Psychological Review, 111* (1), 3–32.

GRASS, A. (1976). *Sociología de la Educación*. Madrid: Narcea S.A. Greca, J. y Moreira, M. A. (1998a). Modelos mentales y aprendizaje de la física en electricidad y magnetismo. *Enseñanza de las Ciencias, 16* (2), 289-303.

GRECA, J. Y MOREIRA, M. A. (1998). Modelos mentales, modelos conceptuales y modelización. *Cuadernos catalanes de enseñanza de la física, 15* (2), 107-120.

GUBA, E. G. Y LINCOLN, Y. S. (1994). Competing Paradigms in Qualitative Research. En: N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research.* Thousand Oaks, CA: Sage.

GUTIÉRREZ, R. (1996). Modelos mentales y concepciones espontáneas. *Alambique, 7*, 73-86.

GUTIÉRREZ R. (2000). *Mental models and the fine structure of conceptual change.* Barcelona: XIII GIREP.

GUTIÉRREZ-ROMERO, M. F. (2004). *Comprensión Epistemológica e Inferencia Inductiva: Un estudio sobre la física en preescolar* [En red]. Abril 2004. Disponible en: *http://www.investigacion-psicopedagogica.org/revista/new/index.php*

HALFORD, G. S., BROWN, C. A. Y MCTHOMPSON, R. M. (1986). Children's concepts of volume and flotation. *Developmental Psychology, 22*, 218-222.

HALLDÉN, O. (1999). Conceptual Change and Contextualization. En: W. Schnotz, S. Vosniadou M. & Carretero (Eds.), *New Perspectives on Conceptual Change* (pp. 53-65). Oxford: Pergamon.

HAND, B., TREAGUST, D. F. Y VANCE, K. (1997). Student Perceptions of the Social Constructivist Classroom. *Science Education, 85* (5), 561-575.

HARLEN, W. (1998). *Enseñanza y aprendizaje de las ciencias*. Madrid: Morata.

HARLEN, W. (2000). *Teaching, Learning and Assessing Science 5-12*. London: Paul Chapman Publishers Ltd.

HARLEY, S. (1993). Situated Learning and Classroom Instruction. *Educational Technology, 33* (3), 46-51.

HARRISON, A. Y TREAGUST, D. (2001). Conceptual change using multiple interpretative perspectives: Two case studies in secondary school chemistry. *Instructional Science, 29*, 45-85.

HATANO, G. (1990). The nature of everyday science: A brief introduction. *British Journal of Developmental Psychology, 8,* 201-205.

HATANO, G. E INAGAKI, K. (1994). Young children's naive theory of biology. *Cognition, 50, pp. 171-188.*

HATANO, G. E INAGAKI, K. (1996). Cognitive and cultural factors in the acquisition

of intuitive biology. En: D. R. Olson & N. Torrance (Eds.), *Handbook of education and human development: New models of learning, teaching and schooling* (pp. 683-708). Oxford, UK: Blackwell.

HATANO, G., E INAGAKI, K. (1997). Qualitative changes in intuitive biology. *European Journal of Psychology of Education, 2* (XII), 111-130.

HATANO, G. E INAGAKI, K, (2003). When is Conceptual Change Intented? A cognitive-Sociocultural View. En: G. M. Sinatra & P. R. Pintrich (Eds.), *Intentional Conceptual Change* (pp. 407-427. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

HATANO, G., SIEGLER, R. S., INAGAKI, K. Y STAVY, R. (1993). The Development on Biological Knowledge: A Multi-National Study. *Cognitive Development, 8,* 47-62.

HAVU-NUUTINEN, S. (2000). *Changes in Children´s Conceptions through Social Interaction in Pre-school Science Education*. Tesis Doctoral. Publications in Educations No. 60. University of Joensuu.

HAVU-NUUTINEN, S. (2005). Examining young children's conceptual change process in floating and sinking from a social constructivist perspective. *International Journal of Science Education, 27* (3), 259-279.

HAVU-NUUTINEN, S. Y KEINONEN, T. (2007, Agosto). The changes in fifth graders' conceptions of structure and functions of biological systems of human body. Comunicación presentada en la Conferencia de la European Science Education Research Association, Mälmo, Suecia.

HEDGES, H. (2000) Teaching in early childhood: time to merge constructivist views of learning through play equals teaching. *Australian Journal of Early Childhood, 25*, 16-21.

HENNESSEY, M. G. (1993 Abril). Students' Ideas about Their Conceptualisation: Their Elicitation Through Instruction. *Paper presented at the Annual Meeting of the American Educational Research Association*. Atlanta, GA.

HENNESSY, S. Y MURPHY, P. (1999). The potential for collaborative problem solving in Design and Technology. *International Journal of Technology and Design Education, 9 (1),* 1-36.

HEWSON, P. W. (1982). A case study of conceptual change in special relativity: The influence of prior knowledge in learning. *European Journal of Science Education 4* (1), 61-78.

HEWSON, P. W. Y HEWSON, M. A. (1984). The role of conceptual conflict in conceptual change and the design of science instruction. *Instructional Science, 13,* 1-13.

HEWSON, P. W. Y THORLEY, N. R. (1989). The conditions of conceptual change in the classroom. *International Journal of Science Education, 11* (Special Issue), 541-553.

HICKLING, A. K. Y GELMAN, S. A. (1995). How Does Your Garden Grow? Early Conceptualization of Seeds and Their Place in the Plant Growth Cycle. *Child Development, 66,* 856-876.

HIDI, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research, 60,* 549-571.

HOGAN, K., NASTASI, B. K. AND PRESSLEY, M. (2000). Discourse Patterns and Collaborative Scientific Reasoning in Peer and Teacher-Guided Discussions. *Cognition and Instruction, 17* (4), 379-432.

HOWE, A. C. (1996). Development scientific concepts within a Vygotskian framework. *Science Education, 80,* 35-51.

HOWE, A. C., TOLMIE, A. Y RODGERS, C. (1990). Physics in the Primary School: Peer Interaction and the Understanding of Floating and Sinking. *European Journal of*

Psychology of Education, 4 (5), 459-475.

HOWE, A. C., TOLMIE, A., DUCHAK-TANNER, V. Y RATTRAY, C. (2000). Hypothesis testing in science: group consensus and the acquisition of conceptual and procedural knowledge. *Learning and Instruction 10,* 361–391.

HUME, D. (1957). An inquiry concerning human understanding. New York: Liberal Arts Press.

HUME, D. (1967). A treatise of nature. Oxford, UK: Clarendon Press.

INAGAKI, K. (1990). Young children's use of knowledge in everyday biology. *British Journal of Developmental Psychology, 8,* 281-288.

INAGAKI, K. Y HATANO, G. (1987). Young children's spontaneous personification as analogy. *Child Development, 58,* 1013-1020.

INAGAKI, K. Y HATANO, G. (1993). Young children's understanding of the mind-body distinction. *Child Development, 64,* 1534-1549.

INAGAKI, K. Y HATANO, G. (1996). Young Children´s Recognition of Commonalities between Animals and Plants. *Child Development, 67,* 2823-2840.

INAGAKI, K. Y HATANO, G. (1999). Children's understanding of mind-body relationships. En: M. Siegal & C. C. Peterson (Eds.), *Children´s Understanding of Biology and Health* (pp. 23-44). New York: Cambridge University Press.

INAGAKI, K. Y HATANO, G. (2002). *Young Children's Naive Thinking about the Biological World. Essays in Developmental Psychology.* New York: Psychology Press.

IZQUIERDO, M., ESPINET, M., GARCÍA, M. P., PUJOL, R. M. Y SANMARTÍ, N. (1999). Caracterización y Fundamentación de la Ciencia Escolar. *Enseñanza de las Ciencias, Número Extra.*

IZQUIERDO, M. (2000). Fundamentos epistemológicos. En: F. J. Perales Palacios & P. Cañal de León (Coord.), *Didáctica de las ciencias experimentales* (pp. 35-64). España, Alcoy: Marfil.

JACOB, E. (1987). Qualitative Research Traditions: A Review. *Review of Educarional Research, 57* (1), 1-50.

JACOB, E. (1988). Clarifying Qualitative Research: A Focus on Tradition. *Educational Researcher, 17,* 16-19.

JARDINE, J. Y KENNEDY, J. (1997). Forces and Motion. En: J. Kennedy (Ed.), *Primary Science. Kowledge and Understanding* (pp. 128-147). London/New York: Routledge.

JIMÉNEZ-ALEIXANDRE, M., RODRÍGUEZ, A. & DUSCHL, R. (2000). "Doing the lesson" or "doing science": Argument in high school genetics. *Science Education, 84* (6), 757–792.

JOHNSON, M. (1967). Definitions and models in curriculum theory. *Educational Theory, 17,* 127-140.

JOHNSTON, J. (1996). *Early Explanations in Science*. Philadelphia: Open University Press.

JOHNSTON, J. Y GRAG, A. (1999). *Enriching, Early Scientific Learning.* London: Open University Press.

KANARI, Z. Y MILLAR, R. (2003). How Children Reason From Data To Conclusions In Practical Science Investigation. En: D. Psillo, P. Kariotoglou, V. Tselfes, E. Hatziksaniotis, G. Fassoulopoulus & M. Kallery (Eds.), *Science Education Research in the Knowledge-Based Society*. London: Kluwer Academic Publishers.

KANE, B. CHILDREN´S CONCEPT OF DEATH. (1979). *Journal of Genetic Psychology, 134,* 141-153.

KARMILOFF-SMITH, A. (1988). The child is a theoretician, not an inductivist. *Mind and Language, 3* (3), 195-212.

KARMILOFF-SMITH, A. E INHELDER, B. (1974). If you want to get ahead, get a theory. *Cognition, 3* (3), 195-212.

KEIL, F. C. (1989). *Concepts, kinds and cognitive development.* Cambridge: Bradford Books, MIT Press.

KEIL, F. C. (1992). The emergence of theoretical beliefs as constraints on concepts. En: S. Carey & R. Gelman (Eds.), *The epigenesis of mind.* Hillsdale, N. J: Erlbaum.

KEIL, F.C. (1994). El nacimiento y enriquecimiento de conceptos por dominios : el origen de los conceptos de seres vivientes. En: L. A. Hirschfeld & S. Carey (Comps.), *Cartografía de la mente. La especificidad de dominio en la cognición y en la cultura. Vol I: Orígenes, procesos y conceptos* (pp. 329-357). Barcelona: Gedisa.

KEINONEN, T. (2005). Primary school teacher students' views of science education. Tesis Doctoral. Publications in education, No. 105. University of Joensuu.

KELLY, M. H. Y KEIL, F. C. (1985). The more things change....Metamorphoses and conceptual structure. *Cognitive Science, 9,* 403-416.

KHON, A. S. (1993). Preeschoolers' Reasoning about Density: Will It Float? *Child Development, 64,* 1637-1650.

KLAHR, D. (2000). *Exploring Science: The Cognition and Development of Discovery Processes,* MIT Press, Cambridge, MA.

KLAHR, D., FAY, A. Y DUNBAR, K. (1993). Heuristics for scientific experimentation: A developmental study. *Cognitive Psychology 25,* 111–146.

KOLB, D. A. (1984). *Experiential learning. Experience as the source on learning and development*. NY: Prentice-Hall.

KOLIOPOULUS, D., TANTAROS, S., PAPANDREOU, M. Y RAVANIS, K. (2004). Preschool children's ideas about floating: a qualitative approach. *Journal of Science Education, 5* (1), 21-24.

KOOCHER, G. (1973). Childhood, death, and cognitive development. *Developmental Psychology, 9*, 369-375.

KROGH, S. L. Y SLENTZ, K. L. (2001). *The early childhood curriculum*. London: LEA.

KUHN, T. S. (1972). *La estructura de las revoluciones científicas.* México: Fondo de Cultura Económica.

KUHN, D. (1992). Thinking as argument. *Harvard Educational Review, 62* (2), 155–178.

KUHN, D. (1993). Science as Argument: Implications for Teaching and Learning Scientific Thinking. *Science Education, 7* (3), 319-337.

KUHN, D., AMSEL, E. Y O'LOUGHHLIN, M. (1988). *The Development of Scientific Thinking Skills*. Orlando, FL: Academic Press.

KUHN, D., GRACIA-MILLA, M., ZOHAR, A., Y ANDERSON, C. (1995). Strategies of knowledge acquisition. *Monographs of the Society for Research in Child Development*, Serial No. 245, 60, 1–28.

KUHN, D., BLACK, J., KESELMAN, A. Y KAPLAN, D. (2000). The development of cognitive skills to support inquiry learning. *Cognition and Instruction 18*, 495–523.

KUHN, D. Y PEARSALL, S. (2000). Developmental origins of scientific thinking. *Journal of Cognition and Development 1*, 113–129**.**

KUHN, D., & DEAN, D. (2004). Connecting scientific reasoning and causal inference. *Journal of Cognition and Development, 5* (2), 261–288.

KUMPULAINEN, K. Y MUTANEN, M. (1999). The situated dynamics of peer group interaction: an introduction to an analytic framework. *Learning and Instruction, 9*, 449–473.

LAEVERS, F. (1993). Deep Level Learning: an Exemplary Application on the Area of Physical Knowledge. *European Early Childhood Education Research Journal, 1* (1), 53-68.

LAKATOS, I. (1978). The Methodology of scientific research programes. En: J. Worrall & G. Currie (Eds.), *The Methodology of scientific research programs*. Cambridge: Cambridge University Press.

LANCY, D. F. (1993). *Qualitative Research in Education: An Introduction to the Mayor Traditions*. White Planes, N. Y: Longman.

LANTOLF, J. (1993). Sociocultural theory and the second language classroom: The lesson of strategic interaction. En: J. E. Alatos (Ed.), *Strategic interaction and language acquisition: Theory, practice and research* (pp. 220-233). Washington, DC: Georgetown University Press.

LATORRE, A.**,** DEL RINCÓN, D. Y ARNAL, J. (1996). *Bases metodológicas de la investigación educativa. Barcelona*: Hurtado Mompeó.

LAUDAN, L. (1977). *Progress and its problems. Towards a theory of scientific growth.* London: Routledge & Kegan Paul.

LAURENDEAU, M. Y PINARD, A. (1962). *Causal thinking in the child: A genetic and experimental approach.* New York: International Universities Press.

LAWSON, A. E. (1994). Research on the Acquisition of Scientific Knowledge: Epistemological Foundations of Cognition. En D. Gabel (Ed.), *Handbook of Research on Science Teaching and Learning* (pp. 131-176). New York: Macmillan.

LEACH, J. Y SCOTT, P. (2000). Children's thinking, learning, teaching and constructivism. En: M. Monk & J. Osborne (Eds.), *Good Practice in Science Teaching. What research has to say*. Buckinham-Philadelphia: Open University Press.

LEHRER, R. Y SCHAUBLE, L. (2000). Developing Model-Based Reasoning in Mathematics and Science. *Journal of Applied Developmental Psychology 21* (1), 39–48.

LEMEIGNAN, G. Y WEIL-BARRAIS, A. (1993). *Construire des Concepts en Physique. L'enseignement de la mécanique*. Paris: Hachette.

LEMKE, J. (1990). *Talking Science. Science, Language, Learning and Values*. Norwood, NJ: Ablex Publishers.

LIGHT, P. LITTLETON, K., MESSER, D. Y JOINER, R. (1994). Social and communicative processes in computer-based problem solving. *European Journal of Psychology of Education, 2,* 93-109.

LIMÓN, M. (2003). The role of Domain-Specific Knowledge in Intentional Conceptual Change . En: G. M. Sinatra, y P. R. Pintrich (Eds.), *Intentional Conceptual Change,* (pp. 133-170). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

LIMÓN, M. Y CARRETERO, M. (2002). Las ideas previas de los alumnos. ¿Qué aporta este enfoque a la enseñanza de las ciencias? En: M. Carretero, M. Bailló & M. Limón (Eds.), *Construir y enseñar las ciencias experimentales* (pp. 19-46). Argentina: Aique Grupo Editor, S. A.

LOOFT, W. R. (1974). Animistic thought in children: Understanding of "living" across its associated attributes. *Journal of Genetic Psychology, 124,* 235-240.

LÓPEZ, A. Y RODRÍGUEZ, M. (Eds.), *Construir y enseñar. Las Ciencias Experimentales* (pp. 19-45). Buenos Aires: Aique.

LORSBACH, A. W. Y TOBIN, K. (1995). Toward a critical approach to the study of learning environments in science classrooms. *Research in Science Education, 25* (1), 19-32.

LUCKIN, R. (1999). Assisting Child-Computer Collaboration in the Zone of Proximal Development (The Vygotskian inspired System (VIS). En: J. Bliss, R. Säljo & P. Light (Eds.), *Learning Sites. Social and Technological Resources for Learning* (pp. 194-209). Oxford: Pergamon**.**

LURIA, S. E. (1975). *Lectures in Biology*. The Massachusetts Institute of Technology.

MAGENDZO, A. (1991). *Curriculum, educación para la democracia en la modernidad.* Bogota: PIEE

MARÍN MARTÍNEZ, N., SOLANO MARTÍNEZ, I Y JIMÉNEZ GÓMEZ, E. (1999). Tirando del hilo de la madeja constructivista. *Enseñanza de las Ciencias 17* (3), 479-492.

MARÍN, M. M. (1999). Delimitando el campo de aplicación del cambio conceptual. *Enseñanza de las Ciencias, 17* (1), 80-92.

MARTINAND, J. L. (1986). *Connaître et transformer la matière.* Berta : Peter Lang.

MARTINAND, J. L. (1989). Des objectifs-capacités aux objectifs-obstacles. En: N. Bednarz y C. Garnier (Eds.), *Construction des savoirs, obstacles et conflits*, pp: 217-227. Ottawa: Agence d´ARC.

MASNICK, A. M., Y KLAHR, D. (2003). Error matters: An initial exploration of elementary school children's understanding of experimental error. *Journal of Cognition and Cognitive Development, 4* (1), 67 –98.

MASSEY. C. M. Y GELMAN, R. (1988). Preschooler's ability to decide whether a photographed unifamiliar object can move itself. *Developmental Psychology, 24,* 307-317.

MASON, L. (1996). An analysis of children's constructions of new knowledge through their use of reasoning and arguing in classrooms discussions. *Qualitative Studies in Education, 9* (4), 411-433.

MASON, L. (1998). Sharing cognition to construct scientific knowledge in school context: The role of oral and written discourse. *Instructional Science, 26,* 359-389.

MASON, L. Y SANTI, M. (1994, April). *Argumentation structure and metacognition in constructing shared knowledge at school*. Comunicación presentada en la reunión de la American Educational Research Association, New Orleans, LA. (Documento reproducido por ERIC No. ED 371 041).

MASON, L. Y SANTI, M. (1995, Agosto). *"They made me change my mind" or when classroom discourse-reasoning contributes to conceptual change.* Comunicación presentada en la 6a. European Conference for Research on Learning and Instruction, Nijmengen, The Netherlands.

MATTHEWS, M. R. (1998). *Constructivism in Science Education. A Philosophical Examination.* London: Kluwer Academic Publishers.

MATTHEWS, M. R. (2000). 'Editorial' of the Monographic Issue on Constructivism, Epistemology and the Learning of Science. *Science and Education, 9,* 491-505.

MATTHEWS, M. R. (2002). Constructivism and Science Education: A Further Appraisal. *Journal of Science Education and Technology, 11* (2), 121-134.

MAURI, T., SOLÉ, I., DEL CARMEN, LUIS Y ZABALA, A. (1998). *El currículum en el centro educativo.* Barcelona: ICE-Horsi.

MAYR, E. (1997). This is Biology. The Science of the Living World. London: The Belknap Press of Harvard University Press.

MERCER, N. (1993). The quality of talk in children's joint activity at the computer. *Journal of Computer Assisted Learning, 10,* 24-32.

MERCER, N. (1996). The Quality of Talk in Children Collaborative Activity in the Classroom. *Learning and Instruction, 4* (6), 359-377.

MERCER, N., WEGERIF, R., Y DAWES, L. (1999). Children's talk and the development of reasoning in the classroom. *British Educational Research Journal, 25* (1), 95-111.

MERCER, N., DAWES, L., WEGERIF, R. Y SAMS, C. (2004). Reasoning as a scientist: ways of helping children to use language to learn science. *British Educational Research Journal, 3* (30), 359-377.

MERRIAN, S. R. (1998). *Qualitative Research and Case Study Applications in Education. Second Edition.* San Francisco: Jossey-Bass Publishers.

METZ, K. E. (1993). Preschoolers' developing knowledge of the pan balance: From new representation to transformed problem solving. *Cognition and Instruction, 11* (1), 31-93.

METZ, K. E. (1995). Reassessment of Developmental Constrainsts on Children's Science Instruction. *Review of Educational Research, 65* (2), 93-127.

METZ, K. E. (1997). On the Complex Relation Between Cognitive Developmental Research and Children´s Science Curricula. *Review of Educational Research, 67* (1), *151-163.*

METZ, K. E. (1998). Scientific Inquiry Within Reach of Young Children. En: B. Fraser & K. G. Tobin (Eds.), *International Handbook of Science Education. Part One* (pp.81-96). London: Kluwer Academic Publishers.

METZ, K. (2000). Young children's inquiry in Biology: Building the knowledge bases to empower independent inquiry. En: J. Minstrell & E. H. van Zee (Eds.), *Inquiry into Inquiry. Learning and Teaching Science* (pp. 371-404). Washington, D.C: American Association for the Advancement of Science.

METZ, K. E. (2004). Children's understanding of scientific inquiry: Their conceptualization of uncertainty in investigations of their own design. *Cognition & Instruction, 22* (2), 219 – 290.

MEYER, K. Y WOODRUFF, E. (1995). A framework for inquiry discourse and consensus-building in science teaching. *Paper presented at the annual meeting of the American Educational Research Association*, San Francisco, CA.

MILES, M. B. Y HUBERMAN, A. M. (1994). *An Expanded Sourcebook. Qualitative Data Analysis*. London: SAGE Publications. Thousands Oaks.

MILLAR, R. Y OSBORNE, J. (1998). Beyond 2000: *Science education for the future. London*: Kings College, London.

MINTZES, J. J., TROWBRIDGE, J. E., ARNAUDIN, M. W. Y WANDERSEE, J. H. (1991). Children's biology: Studies on conceptual development in the life sciences. En: S. M. Glynn, R. H. Yeany & B. K. Britton (Eds.), *The pshychology of learning science* (pp. 179-202). Hillsdale, NJ: Erlbaum.

MOLL, L. C. (1990). *Vygotsky and Education: Instructional implications and applications of sociohistorical psychology*. New York: Cambridge University Press.

MOLL, L. C. Y WHITMORE, K. F. (1993). Vygotsky in classroom practice: Moving from individual transmission to social transaction. En: E. A. Forman, N. Nimick, & C. A. Stone (Eds.), *Contexts for Learning: Sociocultural dynamics in children's development* (pp. 19-42). Oxford: Oxford University Press.

NATIONAL RESEARCH COUNCIL. (2004). Learning and Instruction: A SERP Research Agenda. Panel on Learning and Instruction. En: M.S. Donovan & J. W. Pellegrino (Eds.), *Division of Behavioral and Social Science and Education.* Whasington, DC: The National Academic Press.

NAYLOR, S. KEOGH, B., Y DOWNING, B. (2007). Argumentation and Primary Science. *Research in Science Education 37*, 17-39.

NEWMAN, D., GIFFIN, P. Y COLE, M. (1989). *The construction zone: Working for cognitive change in school.* Cambridge: Cambridge University Press.

NORMAN, D. (1983). Some observations on mental models. In: Genter, D. and Stevens, A. L. (Eds.), *Mental Models* (pp. 7-17). New Jersey: Lawrence Earlbaun Associates.

NOVAK, J. D. Y GOWIN, D. B. (1988). *Aprendiendo a aprender.* Barcelona: Martínez Roca.

NOVAK, J. D. (2002) Meaningful learning: the essential factor for conceptual change in limited or inappropriate propositional hierarchies leading to empowerment of learners. *Science Education, 86*, 548-571.

NÚÑEZ J. (1999). *La Ciencia y la Tecnología como procesos sociales. Lo que la educación científica no debería olvidar*. La Habana: Félix Varela.

NUTTALL, J. (2003). Influences on the co-construction of the Teacher Role in Early Childhood Curriculum: Some examples from New Zealand childcare center. *International Journal of Early Years Education*, *11* (1), 23-31.

OGDEN, L. (2000). Collaborative Tasks, Collaborative Children: an analysis of reciprocity during peer interaction at Key Stage 1. *British Educational Research Journal, (26)* 2, 211-226).

OPFER, J. E. Y SIEGLER, R. S. (2004). Revisiting preschoolers living things concept: A microgenetic analysis of conceptual change in basic biology. *Cognitive Psychology, 49,* 301–332

OSBORNE, J. F. (1996). Beyond Constructivism. *Science Education, 80,* 53-82.

OSBORNE, J. F. (2001). Promoting argument in the science classroom: A rhetorical perspective. *Canadian Journal of Science, Mathematics and Technology Education, 1*, 271–290.

OSBORNE, J. F. Y FREYBERG, P. (1985). *Learning in science: The implications of children's science.* Birkenhead, Aucklnad: Heinemann.

OSBORNE, J. F., ERDURAN, S. Y SIMON, S. (2004). Enhancing the Quality of Argumentation in School Science, *Journal of Research in Science Teaching, 41* (10), 994-1020**.**

OSBORNE, R. (1980). *Some aspects of the students´ views of the world.* Research in Science Education, *10,* 11-18.

OSBORNE, R. Y GILBERT, J. K. (1980). A technique for exploring students' views of the world. *European Journal of Science Education, 2* (3), 311-321.

OSBORNE, R.. Y FREYBERG, P. (1991). La ciencia de los alumnos. En: J. Osborne & P. Freyberg (Coords.), *El aprendizaje de las Ciencias. Implicaciones de la ciencia de los alumnos* (pp. 20-34). Madrid: Narcea.

PACTE NACIONAL PER A L'EDUCACIÓ. DEBAT CURRICULAR. REFLEXIONS I PROPOSTES. (2005). (pp.76-111). Generalitat de Catalunya. Departament de Ensenyament.

PANSZA, M. (1993) *Pedagogía y currículo.* México, D.F.: Gernika.

PATTON, M. Q. (1990). *Qualitative Evaluation and Research Methods*. Newbury Park, Calif.: Sage.

PAUEN, S. (1999). The Development of Ontological Categories: Stable Dimensions and Changing Concepts. En: W. Schnotz, S. Vosniadou, & M. Carretero (Eds.), *New Perspectives on Conceptual Change* (pp. 15-31). Oxford: Pergamon.

PEASLEY, K. L., ROSAEN, C. L. Y ROTH, K. J. (1993). The role of oral and written discourse in constructing understanding in an elementary science class. *Paper presented at the annual meeting of the American Educational Research Association,* Atlanta, GA.

PELL, T. Y JARVIS, T. (2001). Developing attitudes to science: scales for use with children ages from five to eleven years. *International Journal of Science Education, 23* (8), 847-862.

PFUNDT, H. Y DUIT, R. (1994). *Bibliography: Students' alternative frameworks and science education*. Kiel: Institute of Science Education at the University of Kiel.

PHILLIPS, T. (1992). Why? The neglected question in planning small group activity. En: K. Norman (Ed.), *Thinking voices: The work of the National Oracy Project* (pp. 148-155). London: Hodder and Stoughton.

PHILLIPS, D. C. (1995). The good, the bad and the ugly: the many faces of constructivism. *Educational Researcher, 24* (7), 5-12.

PIAGET, J. (1929). *The child's conception of the world*. London: Routledge & Kegan Paul Ltd.

PIAGET, J. (1930). *The child's conception of physical causality.*. London: Routledge & Kegan Paul Ltd.

PIAGET, J. (1970). *Genetic Epistemology*. New York, NY: Columbia Press.

PIAGET, J. (1974). *Understanding causality*. London: Routledge & Kegan Paul Ltd.

PIAGET, J. E INHELDER, B. (1974). *Psicología del niño.* Argentina: Buenos Aires Editor.

PINTRICH, P. R. (1999). Motivational beliefs as resources for and constraints on conceptual change. En: W. Schnotz, S. Vosniadou & M. Carretero (Eds.), *New perspectives on conceptual change* (pp. 33-50).Mew York: Pergamon.

PINES, A. L. Y WEST, L. H. T. (1986). Conceptual understanding and science learning: An interpretation of research within sources of knowledge framework. *Science Education, 70,* 583-604.

PINTRICH, P. R. Y SINATRA, G. M. (2003). Future Directions for Theory and Research on Intentional Conceptual Change. En: G. M. Sinatra y P. R. Pintrich (Eds.), *Intentional Conceptual Change* (pp. 429-441). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

PINTRICH, P. R., MARX, R.W. Y BOYLE, R. A. (1993). Beyond cold conceptual change: The role of motivation beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research, 63*, 167-199.

PONTECORVO, C. (1990). Social context, semiotic mediation, and forms of discourse in constructing knowledge at school. En: H. Manddl, E. De Corte, S. N. Benett & H. F. Friedrich (Eds.), *Learning and Instruction. European Research in an International Context. Vol. 2* (pp. 1-26). Oxford, England: Pergamon Press.

PONTECORVO, C. Y PIRCHIO, S. (2000). A Developmental View on Children's Arguing: The Need of the Other. *Human Development, 4* (6), 361-363.

Popper, K. (1976). *The logic scientific discovery.* New York: Science Editions.

POSNER, G. J. (1998). *Análisis del Currículo*. Colombia: McGraw-Hill.

POSNER, G. J., STRIKE, K. A., HEWSON, P. W. Y GERTOZ, W. A. (1982). Accomodation of a scientific conception: Toward a theory of conceptual change. *Science Education, 66,* 211-227.

POZO, J. I. (1989). *Teorías Cognitivas del Aprendizaje.* Madrid: Morata.

Pozo, J. I. y Gómez-Crespo, M. A. (1998). *Aprender y Enseñar Ciencia*. *Madrid: Morata*.

POZO, J. I. (1999). Sobre las relaciones entre el conocimiento cotidiano de los alumnos y el conocimiento científico: Del cambio conceptual a la integración jerárquica. *Enseñanza de las Ciencias,* número extra, 15-29.

PROPUESTA PEDAGÓGICA DE EDUCACIÓN PREESCOLAR. (2001). Secretaría de Educación del Estado de Colima (SEEC), Colima, México.

PROGRAMA DE EDUCACIÓN PREESCOLAR 2004. (2004). Secretaría de Educación Pública (SEP), México.

RAFAL, T. C. (1996). From co-construction to takeovers: Science talk in a group of four girls. *The Journal of the Learning Sciences, 5* (3), 279-293.

RAPER, G. Y STRINGER, J. (1987). *Encouraging primary science*. London: Cassell.

RAVANIS, K. (1996). Stratégies d'interventions didactiques pour l'initiation des enfants de l'école maternelle en sciencies physiques. *Spirale-Revue de Recherches en Éducation, 17,* 161-176.

RAVANIS, K. (1999). Représentations des élèves de l'ecole maternelle: le concept de lumière. *International Journal of Early Childhood, 31* (1), 48-53.

RAVANIS, K. (2000). La construction de la connaissance physique à l'age préscolaire:

recherches sur les interventions et les interactions didactiques. *Aster, 31*, 71-94.

RAVANIS, K. Y BAGAKIS, G. (1998). Science Education in Kindergarten: Sociocognitive perspective. *International Journal of Early Years Education, 6* (3), 315-327**.**

RAVANIS, K., KOLIOPOULUS, D. Y HADZIGEORGIOU, Y. (2004). What factors does friction depend on? A socio-cognitive teaching intervention with young children. *International Journal of Science Education, 26* (8), 997-1007.

RESNICK, L.V. (1989). Introduction. En: L.B. Resnick (Ed.), *Knowing, Learning and Instruction. Essays in Honor of Robert Glasser* (pp. 1-24). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

RICHARDS, D. D. Y SIEGLER, R. S. (1986). Children's understandings of the attributes of life. *Journal of Experimental Child Psychology, 42,* 1-22.

ROBBINS, J. (2005). 'Brown Papers Packages'? A Sociocultural Perspective on Young Children's Ideas in Science. *Research in Science Education, 35,* 151-172.

RODRÍGUEZ, D. (1980). Notions of physical laws in childhood. *Science Education, 64,* 59-84.

ROGOFF, B. (1990). Apprenticeship in thinking: *Cognitive development in social context. New York*: Oxford University Press.

ROJAS-DRUMMOND, S. Y MERCER, W. (2003a). Scaffolding the development of effective collaboration and learning. *International Journal of Educational Research, 39* (1-2), 99-111.

ROJAS-DRUMMOND, S., PÉREZ, V., VÉLEZ, M., GÓMEZ, L. Y MENDOZA, A. (2003b). Talking for reasoning among Mexican primary school children. *Learning and Instruction, 13,* 653-670.

ROSENGREN, K. S. GELMAN, S. A., KALISH, C. Y MCCORMICK, M. (1991). As time goes by: Children's early understanding of growth in animals. *Child Development, 62,* 1302-1320.

ROSENSHINE, B. R. Y MEISTER, C. (1994). Reciprocal teaching: A review of research. *Review of Educational Research, 64,* 479-530.

ROTH, W. M. (1995). *Authentic School Science. Knowing and Learning in Open-Inquiry Science Laboratories.* Dordrecht: Kluwer Academics Publishers.

RUIZ, J. I. (1996). *Metodología de la investigación cualitativa*. Bilbao:Universidad de Deusto.

RUFFMAN, T., PERNER, J., OLSON, D. R. Y DOHERTY, M. (1993). Reflecting on scientific thinking: Children's understanding of the hypothesis-evidence relation. *Child Development 64,* 1617–1636.

SÁ, J. Y CARVALHO, G. S. (1997). *Encino Experimental das Ciencias: Definir uma Estratégia para o 1º Ciclo*. Braga: Becerra Editora.

SAMARAPUNGAVAN, A. (1992). Children's judgments in theory choice tasks: Scientific rationality in childhood. *Cognition, 45* (1): 1-32.

SAMARAPUNGAVAN, A., MANTZICOPOULOS, P. Y PATRICK H. (2008) Learning Science Through Inquiri in Kindergarten. *Science Education, 92* (5), 868-908.

SANMARTÍ, N. (1995). Aprenen Ciències els més petits? *Revista Infància, 85*, 8-11.

SANMARTÍ, N. (2000). El diseño de Unidades Didácticas. En: Perales Palacios, F. J. Y Cañal, de León, P. (Coord.), *Didáctica de las ciencias experimentales* (pp. 239-266). España, Alcoy: Marfil.

SANMARTÍ, N. (2001). Un repte: millorar l'ensenyament de les ciències. *Guix, 275*, 11-21.

SANMARTÍ, N. (2002). *Didáctica de las ciencias en la educación secundaria.* Madrid: Síntesis.

SANMARTÍ, N. (2005). Aprendre Ciències : Connectar l'experiencia, el pensament i la parla a través de models. En: *Curs per a l'actualització de l'ensenyament/aprenentatge de les ciències naturals. Curs 2004-2005* (pp. 48-69). Generalitat de Catalunya. Departament de Educació. Serveis de Publicacions.

SCHAUBLE, L. (1990). Belief revision in children: The role of prior knowledge and strategies for generating knowledge. *Journal of Experimental Psychology, 49,* 31-57.

SCHAUBLE, L. (1996). The Development of Scientific Reasoning in Knowledge-Rich Contexts. *Developmental Psychology, 32* (1), 102-119.

SCHAUBLE, L. Y GLASER, R. (1990). Scientific thinking in children and adults. *Human Development, 21,* 9-27.

SCHNOTZ, W. Y PREUSS, A. (1997). Task-dependent construction of mental models as a basic for conceptual change. *European Journal of Psychology Education, 12* (2), 185-211.

SCOTT, P. H. Y DRIVER, R. H. (1998). Learning About Science Teaching: Perspectives From an Action Research Project. En: B. Fraser & K. G. Tobin (Eds.), *International Handbook of Science Education. Part One* (pp. 67-80). London: Kluwer Academic Publishers.

SHEPARDSON, D. P. (1999). Learning Science in a First Grade Science Activity: A Vygotskian Perspective. *Science Education, 83* (5), 621-638.

SHEPARDSON, D. P. (2002). Bugs, butterflies, and spiders: children's understandings about insects. *International Journal of Science Education, 24* (6), 627-643.

SIEGAL, M. Y PETERSON, C. C. (1999). Becoming mindful of biology and health: an introduction. In: M. Siegal & C. C. Peterson (Eds.), *Children's Understanding of Biology and Health* (pp. 1-19). New York: Cambridge Univ. Press.

SIEGLER, R. J. (1995). How does change occur: A microgenetic study on number conservation. *Cognitive Psychology, 28*, 225-273.

SINATRA, G. M. Y PINTRICH, P. R. (2003). *Intentional Conceptual Change.* Mahwah, N. J: Lawrence Erlbaum Associates Inc.

SLAUGTHER, V. Y LYONS, M. (2003). Learning about life and death in early childhood. *Cognitive Psychology. 46,* 1-30.

SLAUGHTER, V., JAAKKOLA, R., Y CAREY, S. (1999). Constructing a coherent theory: children's biological understanding of life and death. En: M. Siegal & C. C. Peterson (Eds.), *Children's Understanding of Biology and Health* (pp. 71-96). New York: Cambridge Univ. Press.

SMEETS, P. M. (1973). The animism controversy revisited: A probability analysis. *Journal of Genetic Psychology, 123*, 219-225.

SMITH, L. M. (1978). An Evolving Logic of Participation Observation, Educational Etnography, and other Case Studies. En: L. Shulman (Ed.), *Review of Research in Education.* Itasca III: Peacock.

SMITH, C., CAREY, S. Y WISER M. (1985). On differentiation: A case study of the development of the concept of size, weight, and density. *Cognition, 21*, 177-237.

SMITH, C. L., MACLIN, B., HOUGHTON, C. Y HENNESSEY, M. G. (2000). Sixth-Grade Students' Epistemologies of Science: The Impact of School Science Experiences on Epistemological Development. *Cognition and Instruction, 18* (3), 349–422.

SODIAN, B., ZAITCHIK, D., Y CAREY, S. (1991). Young Children's Differentiation of Hypotetical Beliefs from Evidence. *Child Development, 62,* 53-766.

SOLOMON, J. (1994). The Rise and Fall of Constructivism. *Studies in Science Education, 23,* 1-19.

SOLOMON, J. (1998). About argument and discussion. *School Science Review, 80* (291), 57-62.

SPEECE, M. Y BRENT, S. (1992). Children´s understanding of death: A review of three components of a death component. *Child Development, 55,* 1671-1686.

SPENCE, J. (1998). Action Learning for Individual and Organizational Development. Practice Application Brief. (Documento reproducido por ERIC No. ED 424450).

SPRINGER, K. (1999). How a naïve theory of biology is acquired. En: M. Siegal & C. C. Petersen (Eds.), *Children's understanding of biology and health.* Cambridge, UK: Cambridge University Press.

SPRINGER, K. Y KEIL, F. C. (1989). On the Development of Biologically Specific Beliefs: The Case of Inheritance. *Child Development, 60,* 637-648.

SPRINGER, K. Y KEIL, F. C. (1991)**.** Early Diferentation of Causal Mechanisms Appropriate to Biological and Nonbiological kinds. *Child Development, 62,* 767-781.

STAKE, R. E. (1994). *The Art of case study research.* Thousand Oaks: Sage.

STAVY, R. Y WAX, N. (1989). Children's conceptions of plants as living things. *Human Development, 32,* 88-94.

STENHOUSE, L. (1984). *Investigación y desarrollo del currículo*. Madrid: Morata.

STEWART, R. Y HAFNER, R. (1991). Extending the conception of 'problem' in problem solving research. *Science Education, 75* (1), 105-120.

STRAUS, A. Y CORBIN, J. (1990). *Basics of qualitative research. Grounded theory procedures and techniques.* Newbery Park: Sage.

STRIKE, K. A. Y POSNER, G. J. (1985). A Conceptual Change View of Learning and Understanding. En: L. H. West H. & A. L. Pines (Eds.), *Cognitive Structure and Conceptual Change* (pp. 211-231). London: Academic Press, Inc.

STRIKE, K. A Y POSNER, G. J. (1992). A Revisionist Theory of Conceptual Change. En: R. A. Duschl & R. J. Hamilton (Eds.), *Philosophy of Science, Cognitive Psychology and Educational Theory and Practice* (pp. 147-176. New York: State University of New York Press.

SUTTON, C. R. (1992). *Words, Science and Learning*. Buckingham: Open University Press.

TAYLOR, S. J. Y BOGAN, R. (1986). *Introducción a los métodos cualitativos de investigación. Barcelona*: Paidós.

TEASLEY, S. (1995). The role of talk in children's peer collaborations. *Development Psychology, 31,* 207-220.

TENENBAUM, H., RAPPOLT-SCHLICHTMANN, G. Y VOGEL ZANGER, G. (2004). Children's learning about water in a museum and in the classroom. *Early Childhood Research Quarterly, 19* (1), 40-58.

TESCH, R. (1990). *Qualitative Research: Analysis Types and Software Tools*. London: Falmer Press.

THAGARD, P. (1992). *Conceptual revolutions*. Princeton, NJ: Princeton University Press.

THARP, R. G. Y GALLIMORE, R. (1992). Rousing Minds to Life. Teaching, learning, and schooling in social context. New York: Cambridge University Press.

THORLEY, N. R. (1991, Abril). *A framework for the analysis of science classroom discourse based on the conceptual change model.* Comunicación presentada en la reunión anual de la National Association for Research in Science Teaching, Fontana, WI.

TOBIN, K. (1993). *The Practice of Constructivism in Science Education.* New Jersey: Lawrence Erlbaum Associates, Inc.

TOBIN, K. Y TIPPINS, D. J. (1993). Constructivism as a referent for teaching and learning. En: K. Tobin (Ed.), *The practice of Constructivism in Science Education* (pp. 3-21). Whasington: AAAS.

TOMASINI, N. G., GANDOLFI, E. Y BALANDI, B. P. (1990 Abril). Teaching Strategies and Conceptual Change: Sinking and floating at elementary School Level. Comunicación presentada en la reunión anual de la American Educational Research Association. Boston, MA. ERIC ED 326428.

TOULMIN, S. (1972). *Human Understanding: Vol. I.* Oxford: Oxford University Press.

TREAGUST, D. F., HARRISON, A. G., VENVILLE, G. J. Y DAGHER, Z. (1996). Using an analogical teaching approach to engender conceptual change. *International Journal of Science Education, 18,* 213-229.

TUDGE, J. (1990). Vygotsky, the zone of proximal development and peer collaboration: Implications for classroom practice. En: L.C. Moll (Ed.), *Vygotsky and education* (pp. 155-172). Cambridge, England: Cambridge University Press.

TYLER, R. (1949). Basic principles of curriculum and instruction. Chicago: University of Chicago Press.

TYSON, L., VENVILLE, G. J., HARRISON, A. G. Y TREAGUST, D. (1997). A Multidimensional Framework for Interpreting Conceptual Change Events in the Classroom. *Science Education, 81* (4), 387-404

TYTLER, R. Y PETERSON, S. (2004). From ‘‘Try It and See’’ to Strategic Exploration: Characterizing Young Children’s Scientific Reasoning. *Journal of Research in Science Teaching, 41* (1), 94–118.

VAN OERS, B. (1996). The dynamics of School Learning. En: J. Valsiner & H.G. Voss (Ed.), *The structure of learning processes*. New York: Ablex.

VENVILLE, G. (2004). Young Children Learning about Living Things: A Case Study of Conceptual Change from Ontological and Social Perspectives. *Journal of Research in Science Teaching, 41* (5), 449-480.

VON GLASERFELD, E. (1993). Questions and answers about radical constructivism. En: K. Tobin, (Ed.), *The practice of constructivism in science education* (pp 23-38). Washington, DC: AAAS Press.

VOSNIADOU, S. (1994). Capturing and Modeling the Process of Conceptual Change. *Learning and Instruction, 4*, 27-34.

VOSNIADOU, S. (1997). On the development of the understanding of abstract ideas. En: K. Härnqvist & A. Burgen (Eds.), *Growing up with science. Developing early understanding of science.* London, UK: Athenaeum Press.

VOSNIADOU, S. (1999). Conceptual Change Research: State of the Art and Future Directions. En: W. Schnotz, S. Vosniadou & M. Carretero (Eds.), *New Perspectives on Conceptual Change* (pp. 3-13). Oxford: Pergamon.

VOSNIADOU, S. (2002). On the nature of naïve physics. En: M. Limón L. & L. Mason (Eds.), *Reconsidering conceptual change: Issues in theory and practice* (61-76). Dordrecht, The Netherlands: Kluver.

VOSNIADOU, S. (2003). Exploring the relationships between conceptual change and intentional learning. En: G.M. Sinatra & P.R. Pintrich (Eds.), *Intentional conceptual change*. Mahwah, NJ: Erlbaum.

VOSNIADOU, S. Y BREWER, W. F. (1987). Theories of knowledge restructuring in development. *Review of Educational Research, 57,* 51-67.

VOSNIADOU, S. Y BREWER, W. F. (1992a). Mental Models of the Earth: A Study of Conceptual Change in Childhood. *Cognitive Psychology, 24,* 535-585.

VOSNIADOU, S. Y BREWER, W. F. (1992b). Mental models of the day/night cycle. *Cognitive Science, 18,* 123-183.

VYGOTSKY, L. S. (1978). Mind in society: The development of higher psychological processes. En: M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Cambridge, MA: Harvard University Press.

VYGOTSKY, L. S. (1986). *Thought and language*. Massachusetts: The M.I.T. Press.

WEGERIF, R., MERCER, N. Y DAWES, L. (1999a). From social interaction to individual reasoning: an empirical investigation of a possible socio-cultural model of cognitive development. *Learning and Instruction, 9* (6), 493-516.

WEGERIF, R., MERCER, N. Y ROJAS-DRUMMOND. (1999b). Language for the social construction of knowledge. *Language and Education, 13* (2), 134-150.

WEIL-BARAIS, A. (1997). De la recherche sur la modélisation physique á la formation des professeurs de physique: comment s'opère la transition? *Skole, 7,* 141-155.

WEIL-BARAIS, A. (2001). Los constructivismos y la Didáctica de las Ciencias. *Perspectivas, XXXI* (2), 197-207.

WELLS, G. Y CHANG-WELLS, G. L. (1992). *Constructing knowledge together: classrooms as centers of inquiry and literacy.* Portsmouth, NH: Heinemann.

WELLMAN, H. Y GELMAN, S. A. (1992). Cognitive development: Foundational theories or core domains. *Annual Review of Psychology, 43,* 337-375.

WENHAM, M. (1995). *Understanding Primary Science. Ideas, Concepts and Explanations.* London: Paul Chapman Publishing Ltd.

WERTSCH, J. V. (1985). *Vygotsky and the social formation of mind*. Cambridge, MA: Harvard University Press.

WERTSCH, J. V. (1990). The voice of rationality in a sociocultural approach to mind. In: L. C. Moll (Ed.), *Vygotsky and Education: Instructional implications of sociohistorial psychology* (pp. 111-126). New York: Cambridge University Press.

WERTSCH, J. V. Y STONE, A. C. (1985). The concept of internalization in Vygotsky's account of the genesis of higher mental functions. En: J. V. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives* (pp. 162-182). New York: Cambridge University Press.

WERTSCH, J. V. Y TOMA, C. (1995). Discourse and learning in the classroom: A sociocultural approach. En: L. P. Steffe & J. Gale. (Eds.), *Constructivism in education* (pp. 159-184). Hillsdale, NJ: Lawrence Erlbaum.

WERTSCH, J. V., DEL RIO, P., Y ALVAREZ, A. (1995). *Sociocultural Studies of Mind.* Cambridge: Cambridge University Press.

WILKENING, F. Y HUBER, S. (2002). Children's Intuitive Physics. En: U. Goswami (Ed.), *Blackwell Handbook of Childhood Cognitive Development* (pp. 349-370). Oxford, UK: Blackwell Publishing.

WHITE, E., ELSOM, B. Y PRAWAT, R. (1978). Children's conceptions of death. *Child Development, 49,* 307-310.

WILLIAMS, J. M. Y TOLMIE, A. (2000). Conceptual change in biology: Group interaction and the understanding of inheritance. *British Journal of Developmental Psychology, 18,* 625-649.

WILSON, S. (1979). Explorations of the Usefulness of Case Studies Evaluations. *Evaluation Quarterly, 3,* 446-459.

WOLCOTT, H. F. (1992). *Writing up qualitative research.* Newbury Park. CA: Sage.

WOOD, D., BRUNER, J. S. Y ROSS, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry, 17,* 89-100.

YIN, R. K. (1994). *Case Study Research. Design and Methods.* London: SAGE Publications. Thousands Oaks.

ZIMMERMANN, E. (2000). The Structure and Development of Science Teachers' Pedagogical Models: Implications for Teacher Education. En: J. K. Gilbert & C. J. Boulter (Eds.), *Developing Models in Science Education* (pp. 325-341). London: Kluwer Academic Publishers.

ZOGZA, V. Y PAPAMICHAEL, Y. (2000). The development of the concept of alive by preschoolers through a cognitive conflict teaching intervention. *European Journal of Psychology of Education, 15* (2), 191-205**.**