Math for Learning, Math for Life:
An Annotated Bibliography

By

The Centre for Literacy of Quebec

ISBN: 0-9689593-5-0

A grant from Canada Post was used to cover the costs of publication.

CONTENTS

Preface

This bibliography has been prepared in support of The Centre for Literacy's 2002 Summer Institute: *Math for Learning, Math for Life.* The references and annotations refer to research and resources specific to topics in adult numeracy teaching and learning.

Keywords have been assigned and a keyword index prepared to help readers identify articles of interest and/or relevance.

Acknowledgments

The following individuals contributed their time and expertise to the creation of this bibliography.

The research component was undertaken by three individuals.

Two graduate students from McGill's School of Library and Information Studies, Xia Haixin and Can Jian, did a great deal of searching for numeracy-specific research and materials, as part of their volunteer activities at The Centre. Their initial leg-work laid the foundation for this bibliography, and their contributions are greatly appreciated.

Claire Elliott, librarian at The Centre for Literacy, followed up initial searches, investigating identified sources of numeracy-related information and discovering items not previously found.

Annotations were prepared by the librarian, who abridged or rewrote author abstracts or abstracts found in the ERIC online database. In instances where an abstract was not altered, the responsible party is identified in square brackets. Keywords, from *The Canadian Literacy Thesaurus*, were also assigned to each item by the librarian.

The printing of this bibliography has been funded by Canada Post.

Section 1: Annotated References with Keywords

Adams, D. & Hamm, M. (2000). Numeracy: Literacy, mathematics and technology. In D. Adams & M. Hamm. *Media and literacy: Learning in an electronic age -- issues, ideas, and teaching strategies. Second edition*. Springfield, IL: Charles C. Thomas.

Examines the "new literacies" of a technology-intensive world and challenges current educational techniques, while providing teachers, parents and other interested adults with ideas, concepts and practical methods for learning with and about new information technologies.

Educational Technology; Instructional Strategies; Media Literacy

Baker, D. (1998). Numeracy as social practice. *Literacy & Numeracy Studies* 8(1), 37-51.

Numeracy involves a set of social practices situated within a particular culture and ideology. The concept has implications for definition of math standards. A social practice approach to adult numeracy in South Africa is recommended. (SK) [ERIC]

Cultural Background; Developing Nations; Numeracy Programs; Program Planning; Social Standards

Baker, R.N. (2001). The mathematics syllabus and adult learners in community colleges: Integrating technique with content. *Community College Journal of Reasearch and Practice* 25(5-6), 391-402.

Discusses new challenges in mathematics education at the college level, and describes how a clear syllabus can be used as an educational contract that will prepare adult students for the tools, concepts and techniques they will encounter during the course.

Curriculum Development; Individualized Programs; Numeracy Programs; Portfolio Assessment; Postsecondary Education; Program Planning

Balas, A.K. (1997). *The mathematics and reading connection. ERIC Digest*. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education. (ERIC Document No. ED432439)

Describes an interdisciplinary approach to instruction based on the relationship between reading, writing, and arithmetic. Answers questions related to which language learning strategies apply to mathematics, the perspectives of the National Council of Teachers of Mathematics (NCTM) regarding this approach, the impact of reading on mathematical process and skills, and the nature of mathematical literacy. (DDR) [ERIC]

Instructional Strategies; Interdisciplinary Approach; Learning Strategies; Professional Associations; Reading Across the Curriculum

Baynham, M. & Johnston, B. (1998). "Invention within limits": Numeracy practices of young unemployed people. *Literacy & Numeracy Studies* 8(1), 51-65.

Discussions of numeracy practices with unemployed people ages 14-26 indicated that their problems with literacy and numeracy, especially in job seeking and money management, were not recognized. The complex, socially constructed functions of numeracy in their lives should be taken into account in policy and practice. (SK) [ERIC]

Literacy Job Relationships; Literacy Policy; Social Standards; Unemployment; Workplace Numeracy

Benn, R. (1997). *Adults count too: Mathematics for empowerment*. Leicester, UK: National Institute of Adult and Continuing Education (NIACE).

Examines the social, political and cultural context of mathematics education, and examines the factors that contribute to low levels of numeracy in society. Encourages the development of curricula tailored to real-life priorities, and presents alternative approaches to teaching mathematics.

Curriculum Development; Educational Philosophy; Instructional Methods; Life Skills; Social Standards

Bernard, N. (1999). Cable TV to stage literacy bid. *The Times Educational Supplement* (4350), 1-2.

Describes a government strategy, in Great Britain, to use cable television to reach adults who need help developing basic reading and mathematics skills. The agency believes that cable television programs have a better chance of reaching audiences with poor numeracy and literacy skills than upmarket television stations. They hope to use cable television to broadcast self-help programs for adults in need of assistance.

Adult Basic Education; Educational Television; National Literacy Programs; Social Services

Bond, M. & Boucher, A. (2000). Towards developing financial literacy programmes for adults. *Journal of Access and Credit Studies* 2(1), 19-32.

In the context of increased labor market flexibility and "portfolio work," adults need knowledge of financial services and their interrelationships with insurance, taxation, and welfare systems. One approach uses the radical tradition of adult education to help people develop critical awareness and control of their financial decision making. (SK) [ERIC]

Adult Basic Education; Finances; Life Skills; Program Planning; Social Services

Brover, C., Deagan, D. & Farina, S. (2000). The New York City Math Exchange Group: Helping teachers change the way they teach mathematics. *Focus on Basics* 4(B), 11-17.

Discusses the origins and aims of the MEG, and describes its efforts to change the way mathematics is taught by providing educators with professional development opportunities and a forum for exchanging ideas and strategies for implementing math standards in the classroom.

Community Organizations; Educational Reform; Professional Development; Standardization

Brown, M., Millett, A., Biddy, T. & Johnson, D.C. (2000). Turning our attention from the what to the how: The National Numeracy Strategy. *British Educational Research Journal* 26(4), 457-471.

Examines the policy of the UK Labour Government between 1997 and 1999, and discusses various practical and political influences affecting implementation of the National Numeracy Strategy. The authors distinguish between new and old governments' philosophies, but discuss the many ways of interpreting new policies in practice.

Educational Philosophy; Educational Reform; Government Policy; National Literacy Programs; Numeracy Programs; Program Planning

Cantrell, C. (2000). Using software applications to teach math. *Focus on Basics* 4(B), 21-23.

Describes the author's experience integrating technology into mathematics instruction, and presents a number of practical activities and strategies to promote critical thinking and real-life applications.

Educational Technology; Instructional Strategies; Life Skills; Personal Experiences; Program Planning

Ciancone, T. (1996). *Numeracy in the adult ESL classroom. ERIC Digest*. Washington, DC: National Center for ESL Literacy Education. (ERIC Document No. ED392316)

Discusses the logistics of delivering numeracy instruction alongside ESL instruction, with reference to assessment strategies, the nature of adult learning, and different cultural approaches to mathematical concepts. Addresses literacy and ESL teachers' attitudes towards math instruction, and presents sample techniques and activities for integrating math concepts.

Cultural Background; English as a Second Language; Interdisciplinary Approach; Instructional Methods; Numeracy Programs

Coben, D. (1997). Paulo Freire's legacy for adults learning mathematics. In D. Coben & J. O'Donoghue (Eds.), ***Adults Learning Mathematics-4: Proceedings of ALM 4: The fourth international conference at the University of Limerick, Ireland*****. July 4-6, 1997. London, UK: Goldsmiths College.**

Discusses and pays tribute to Paulo Freire's broad contributions to adult education, placing specific emphasis on the relevance of his theories to the mathematics education of adult learners. Two practical examples of his influence are presented.

Educational Philosophy; Numeracy Programs; Political Influences

Cowles, S.K. (1998). Using Internet-based resources in math instruction. ***Adult Learning*** **9(2), 20-21, 24.**

Provides examples of how Internet-based materials are being used to teach adults number sense, data analysis, graphing and measurement as well as to provide practice in computation and estimation. [Author]

Educational Technology; Instructional Strategies; Numeracy Skills; Skill Development

Cumming, J. (1996). ***Adult numeracy policy and research in Australia: The present context and future directions*****. Melbourne, Victoria: Language Australia.**

Identifies specific areas of numeracy policy, research, and practice in Australia, that require further attention and development, following the country's 1991 adoption of a national Language and Literacy Policy. Issues identified by the author include a persistent need for nationally accepted standards and definitions, and clear policy statements describing the significance of numeracy to Australian society.

Educational Reform; Government Policy; National Literacy Programs; Numeracy Programs

Cumming, J., Gal, I. & Ginsburg, L. (1998). *Assessing mathematical knowledge of adult learners: Are we looking at what counts? NCAL Technical Report TR98 05*. [Electronic version]. Philadelphia, PA: National Center on Adult Literacy.

Offers a set of principles for evaluating the appropriateness and effectiveness of numeracy assessment instruments used with adult learners. Identifies the general inadequacy of available tools when held against these principles, and discusses alternative strategies and emerging trends in numeracy assessment.

Assessment Instruments; Evaluation Criteria; Numeracy Assessment

Curry, D., Schmitt, M.J. & Waldron, S. (1996). *A framework for adult numeracy standards: The mathematical skills and abilities adults need to be equipped for the future*. Retrieved June 9, 2002, from http://www.std.com/anpn/frame1.html.

Identifies seven numeracy themes designed to serve as the basis for any Adult Numeracy Standards developed through the National Institute for Literacy's Equipped For the Future project. The themes, developed in consultation with adult math learners, educators, and researchers, relate directly to the skills and knowledge adults need to function in today's society.

Educational Reform; National Organizations; Numeracy Assessment; Research Projects; Standardization

Department for Education and Employment. (2001). *Skills for life: The national strategy for improving adult literacy and numeracy skills.* Retrieved June 9, 2002, from http://www.dfes.gov.uk/readwriteplus/bank/ABS_Strategy_Doc_Final.pdf.

Describes England's national strategy for the funding and delivery of basic adult literacy, numeracy and ESOL instruction. Recommendations are given for the development of program infrastructure, teacher certification and standards, and national curricula.

Educational Reform; Government Policy; National Literacy Programs; Standardization

Dingwall, J. (2000). *Improving numeracy in Canada*. Retrieved June 12, 2002, from http://www.nald.ca/nls/inpub/numeracy/improve/improve.PDF.

Discusses the role and importance of numeracy concepts in today's society, and presents a comprehensive review of international numeracy practices, policies, and research. Identifies best practices, and makes recommendations for the development and delivery of programs and services in Canada.

Educational Reform; Educational Strategies; International Resources; Models; Program Planning; Social Policy

Durgunoglu, A.Y. & Öney, B. (2000). Numeracy needs of adult literacy participants. *Focus on Basics* 4(B), 18-20.

Reports the findings of qualitative research into the numeracy needs of adult, women learners enrolled in a Functional Adult Literacy Program (FALP) in Istanbul. Describes the importance of numeracy acquisition to these learners, and the emotional intensity of responses to interview questions.

Developing Nations; Needs Assessment; Program Evaluation; Research Projects

Falk, I. (1998). *Numeracy: Language construction of whose mathematics? CRLRA Discussion Paper Series*. Tasmania, Australia: Center for Research and Learning in Regional Australia.

Discusses the author's analysis of classroom discussion transcripts, and the embededness of numeracy concepts in language and literate practices. Identifies instructors' tendencies to reproduce failed school-based practices, and recommends training for numeracy teachers in language integration patterns.

Concept Formation; Group Discussion; Instructor Training; Language; Life Skills; Numeracy Instruction

Falk, I. & Kilpatrick, S. (1998). ***Numeracy, literacy, self-confidence and values: Chickens, eggs, and "access." CRLRA Discussion Paper Series*****. Tasmania, Australia: Center for Research and Learning in Regional Australia.**

Reports the results of a project designed to identify the relationships between "integrated" numeracy and literacy skills, self-confidence, and the place of skills, knowledge and values in the learning process of beef producers undertaking training in quality assurance. Failure to proceed with training is attributed to the high literacy and numeracy requirements, and identifies the importance, in learning, of valuing learning.

Learning Psychology; Professional Development; Research Projects; Self Confidence

Family numeracy adds up: Lessons from the Family Numeracy pilot programme. (1998). London, England: Basic Skills Agency.

Describes the objectives, methodology, and findings of a one-year pilot project, conducted in 14 local education authorities throughout the UK, and designed to identify effective strategies for raising numeracy awareness among parents, and thereby improving the numeracy skills and supports of children at risk of underattainment. Presents a formal model of effective family numeracy provision, and explains how it can be adapted to different environments.

Family Literacy; Numeracy Programs; Pilot Programs; Research Projects

Gal, I. (2002). Systemic needs in adult numeracy education. Adult Basic Education 12(1),
20-33.

Discusses the nature and future of adult numeracy education, and analyzes gaps in skill levels, reporting and assessment schemes, and professional development within the system, with implications for practice and program planning.

Numeracy Assessment; Numeracy Programs; Professional Development; Program Evaluation; Program Planning

Gal, I. & Stoudt, A. (1998). Numeracy: Becoming literate with numbers. *Adult Learning* 9(2), 13-15.

Discusses the importance of numeracy with the national focus on global competitiveness and a reemphasis on the importance of lifelong learning. Discusses several initiatives and groups dealing with adult numeracy issues. (JOW) [ERIC]

Economic Development; Lifelong Learning; National Literacy Programs

Ginsburg, L. & Gal, I. (1996). *Instructional strategies for teaching adult numeracy skills. NCAL Technical Report TR96 02*. [Electronic version]. Philadelphia, PA: National Center on Adult Literacy.

Presents 13 instructional strategies pertaining to assessment, development of numerical abilities, and problem-solving skills, based on research into adult cognitive processes. Implementation of these strategies calls for a redefinition and reevaluation of teachers' roles, and greater teacher support.

Cognitive Processes; Instructional Strategies; Instructor Training; Numeracy Skills

Ginsburg, L., Gal, I.. & Schuh, A. (1995). *What does "100% juice" mean?: Exploring adult learners' infomal knowledge of percent. NCAL Technical Report TR95-06*. [Electronic version]. Philadelphia, PA: National Center on Adult Literacy.

Reports the findings of a study that examined adult students' informal knowledge of percent and its relationship to their formal computational skills. Students' skills and comprehension were ascertained through interviews and results of computational exercises. Recommends the inclusion of more real-world tasks in mathematics assessment.

Assessment Strategies; Life Skills; Program Evaluation; Research Projects

Giordano, G. (1995). Evaluating the functional mathematical literacy of adults. *Adult Learning* 7(1), 13-14.

The National Council of Teachers of Mathematics developed standards to define mathematical literacy. The standards are that people should learn to value mathematics, reason mathematically, communicate mathematically, become confident of mathematical abilities, and become mathematical problem solvers. (JOW) [ERIC]

National Organizations; Numerical Ability; Social Standards; Standardization

Glazerman, S., Schochet, P. Z. & Burghardt, J. (2000, July). *National Job Corps study: The impacts of Job Corps on participants' literacy skills. Final report*. Retrieved January 20, 2002, from http://wdr.doleta.gov/opr/fulltext/00-jc_literacy.pdf.

Presents an overview of Job Corps, and analyzes the extent to which the program improves literacy and numeracy skills in three domains: prose, document, and quantitative literacy. The links between eduational attainment, labour market outcomes, and literacy scores are examined within a theoretical framework, and relationships are identified.

National Literacy Programs; Program Evaluation; Research Projects; Workplace Training

Haacke, F., van Duin, S., & de Laat, M. (1997). Independent learning: Numeracy developments in ABE practice. In D. Coben & J. O'Donoghue (Eds.), *Adults Learning Mathematics-4: Proceedings of ALM 4: The fourth international conference at the University of Limerick, Ireland*. July 4-6, 1997. London, UK: Goldsmiths College.

Presents information on open learning environments in Adult Basic Education in The Netherlands. Describes and nature, elements, and responsibilities of independent learning, and the different roles played by students and teachers in the independent learning process.

Educational Experiences; Learner Instructor Relationships; Numeracy Instruction; Program Planning; Self Directed Learning

***International numeracy survey. A comparison of the basic numeracy skills of adults 16-60 in seven countries*. (1997). London, England: Basic Skills Agency.**

Compares the numeracy skills of adults in seven countries - the United Kingdom, France, The Netherlands, Sweden, Japan, Australia, and Denmark - based on subjects' responses to a questionnaire comprising 12 numeracy tasks. Includes full analyses and tabulated results.

Numerical Ability; Research Projects; Surveys

Johnston, B., Baynham, M., Delly, S., Barlow, K. & Marks, G. (1997). *Numeracy in practice: Effective pedagogy in numeracy for unemployed young people.* Melbourne, Victoria: Language Australia.

Reports the results of a multifaceted qualitative study into the effectiveness of different pedagogical techniques when used with unemployed youths learning numeracy skills. Investigates social and cultural influences on numeracy practice and learning, and offers recommendations for teachers and program designers.

Instructional Strategies; Program Planning; Research Projects; Unemployment; Young Adults

Kenyon, R. (2000). Accommodating math students with learning disabilities. *Focus on Basics* 4(B), 24-27.

Discusses the challenges that learning disabilities pose to the learning process, presents ways of identifying a learning disability, and offers different strategies for meeting the specific needs of learning disabled students.

Diagnosis; Dyscalculia; Instructional Strategies; Learner Centred Instruction; Learning Disabilities

Kerka, S. (1995). *Not just a number: Critical numeracy for adults. ERIC Digest No. 163*. Retrieved June 21, 2002, from http://www.ed.gov/databases/ERIC_Digests/ed385780.html.

Examines emerging perspectives on the economic, social, cultural and political roles and construction of numerical ability, and discusses the implications for adult numeracy instruction. Stresses the importance of real life contexts, and identifies opportunities for systemic change and the critical examination of economic, social and political realities.

Critical Thinking; Cultural Background; Numerical Ability; Program Planning; Social Structure

Kirk, E.P. & Ashcraft, M.H. (2001). Telling stories: The perils and promise of using verbal reports to study math strategies. *Journal of Experimental Psychology: Learning, Memory & Cognition* 27(1), 157-175.

Reports the findings of a study that investigated the cognitive strategies employed by adults when performing simple mathematical tasks. Identifies potential faults in the research method, arising from the structure of research questions and instructions.

Cognitive Processes; Numerical Ability; Research Methods; Research Reports

Leonelli, E.D. (1999). Teaching to the math standards with adult learners. *Focus on Basics* 3(C), 19-22.

Relates the author's experiences with different instructional approaches in various adult learning environments, and describes her success with standards-based teaching as presenting a valuable framework within which to develop individual learners' critical thinking and numerical abilities.

Instructional Strategies; Personal Experiences; Program Evaluation; Standardization

Lloyd, P. & Mikulecky, L. (1998). *Numeracy in the workplace: A comparison of skill demands and skill levels and numeracy skills for workplace needs*. Indiana: National Center for Education Statistics.

Discusses, over two papers, changing workplace numeracy standards, and identifies gaps between workers' skills and skill levels required to perform many standard tasks. Describes challenges to adult educators entering workplace programs, and identifies priorities in instructor training and program planning, including negotiations with management and program funders.

Instructor Training; International Adult Literacy Survey (IALS); Workplace Numeracy; Workplace Training

Markus, N.L. (1994). Annotated bibliography of mathematics resources. [Electronic version]. Kent, Ohio: Ohio Literacy Resource Center.

Reviews 18 books and resource materials that adult educators can use in adult numeracy classes. Titles draw largely on strategies recommended by the NCTM, and detailed summaries and ordering information are provided for each.

Annotated Bibliographies; Learning Resources; Numeracy Materials

Markus, N.L. (2001). Geometry in the adult education classroom. [Electronic version]. *Math Literacy News* 10, 1-3.

Identifies adult learners' general comfort level with geometric concepts, and describes ways of capitalizing on this strength to further develop learners' numerical abilities and relate them to real life contexts. Implications for classroom practice and sample activities are presented.

Instructional Strategies; Life Skills; Numeracy Instruction; Numerical Ability

Marr, B. (1999). ANAMOL: A creative experience using communications technology. *ARIS Resources Bulletin* 10(4), 1-3.

Describes the technological development of Adult Numeracy and Mathematics On-Line (ANAMOL), an online forum for professional discussion, networking, and collaboration among a small group of isolated practitioners in Australia. Discusses the forum's popularity, its resource offerings, and the advantages of online sharing and communication.

Access to Information; Educational Technology; Professional Development; Numeracy Materials

Marr, B. (2000). Talking volumes: Enhancing talk, language and conceptual development in adult mathematics and numeracy classes. *Literacy & Numeracy Studies* 10(1-2), 55-69.

Focuses on the acquisition of mathematical language. Through asking how one can reflect on things one cannot name, examines students' opportunities to practice mathematical language in two classrooms. (Author/VWL) [ERIC]

Critical Thinking; Language Skills; Numerical Ability; Research Reports

Marr, B. & Helme, S. (1991). *Breaking the maths barrier*. Canberra, Australia: Department of Employment, Education and Training.

Presents a participatory workshop approach to the professional development of trained mathematics teachers in Australia. Contains detailed theoretical and background information, as well as structured activities and guidelines for program development and overcoming barriers to learning.

Instructional Strategies; Instructor Training; Integrated Instruction; Professional Development; Program Planning

***Massachusetts adult basic education curriculum frameworks for mathematics and numeracy. October, 2001 Draft*. (2001). Malden, MA: Adult and Community Learning Services. Massachusetts Department of Education.**

Describes the core concepts, guiding principles, content strands and learning outcomes of the proposed Massachussetts adult basic education curriculum framework. Includes suggested readings for instructors in all core areas.

Adult Basic Education; Assessment; Curriculum Guides; Learning Outcomes

McGee, L. (1995). Widening the circle: Poetry, math and beginning adult students. *Quarterly of National Writing Project and the Center for the Study of Writing and Literacy* 17(4), 20-223.

Discusses how adults in the Brooklyn Public Library Adult Literacy Program use writing (particularly poetry) to deepen their knowledge of spatial reasoning, fractions, and percentages. (RS) [ERIC]

Community Programs; Creative Writing; Language; Numeracy Instruction; Poetry

McNamara, O. & Corbin, B. (2001). Warranting practices: Teachers embedding the national numeracy strategy. *British Journal of Educational Studies* 49(3), 260-284.

Explores, during a one-year pilot study, the notion of the 'evidence-based practitioner' and 'warranting' in relation to standards established by the National Numeracy Strategy. Examines the many ways instructors legitimize teaching strategies in the face of evidence-based practice, and describes the multiplicity of available meanings and justifications representing both constraints and possibilities.

Instructional Strategies; National Literacy Programs; Numeracy Programs; Standardization

Meader, P. (2000). The effects of continuing goal-setting on persistence in a math classroom. *Focus on Basics* 4(A), 7-10.

Describes a practitioner research project that tested the effect of goal-setting techniques on learners' participation and success rates in an adult math class. The techniques under investigation were drawn from a prior study, and research was conducted within a larger, ten-project framework. Goal-setting was seen to have a positive impact on rates of continued participation.

Learner Centred Instruction; Objectives; Research Projects; Success Rates

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Retrieved June 9, 2002, from http://standards.nctm.org/document/index.htm.

Presents the NCTM's recommendations for the mathematics education of students from pre-K through grade 12. Contains valuable guidelines and information for teachers, material developers, program directors, professional development leaders, researchers, and policymakers.

Curriculum Guides; National Organizations; Program Planning; Professional Associations; Standardization

Nesbit, T. (1995). Teaching mathematics to adults. In Partnerships for a New America in a Global Community. April, 1995. San Francisco, CA: American Educational Research Association.

Discusses the objectives and findings of a qualitative study into the teaching processes used with adult math students, and the subsequent ways in which learners are influenced by social and institutional forces. Identifies a passivity in learners, and an ultimate submission to the authority of the teacher and textbooks.

Educational Experiences; Instructional Strategies; Learner Instructor Relationships; Learning Environment; Research Projects

Nesbit, T. (1996). What counts? Mathematics education for adults. *Adult Basic Education* 6(2), 69-83.

Surveys of the math attitudes of adult basic education teachers and learners, interviews with 8 teachers and 15 learners, and 85 hours of ethnographic observations led to these findings: teaching decisions are minimally influenced by learners; teacher-centered approaches prevail; math instruction is similar to inculcation; teachers and textbooks are ultimate authorities; and the notion of one solution and one method of reaching it is prevalent. (SK) [ERIC]

Educational Experiences; Instructional Strategies; Learner Instructor Relationships; Learning Environment; Research Projects

Nicol, M.M. & Anderson, A. (2000). Computer-assisted vs. teacher-directed instruction of numeracy in adults. *Journal of Computer Assisted Learning* 16(3), 184-192.

Reports the findings of an experiment that compared the results of computer-assisted versus teacher-implemented numeracy instruction, when tested with adults suffering from a mild learning disability. Identifies improvements in numeracy skills of both the two test groups and a control group, and addresses issues of technical support.

Educational Technology; Learning Disabilities; Numeracy Instruction; Research Projects

***Numerous connections*. (1996). Blacktown, N.S.W.: Foundation Studies Training Division TAFE NSW.**

Presents several work units, developed by different practitioners, designed to integrate the teaching of literacy with the teaching of numeracy in adult basic education. Each unit contains learning outcomes, topics, resources, future directions, handouts and teacher notes. Unit topics are: water, gardens, reasonable force, aboriginal language, work, women in Australia, tourist spots, juggling pool, and banking.

Curriculum Guides; Instructional Materials; Lesson Plans; Numeracy Instruction

O'Rourke, U. & O'Donoghue, J. (1998). Guidelines for the development of adult numeracy materials. In D. Coben & J. O'Donoghue (Eds.), ***Adults Learning Mathematics-4: Proceedings of ALM 4: The fourth international conference at the University of Limerick, Ireland*****. July 4-6, 1997. London, UK: Goldsmiths College.**

Examines the nature and scope of numeracy and the characteristics of adult learners, identifying factors that hinder and those that help the learning process. Presents guidelines for developing numeracy materials based on evaluative research, and identifies sample materials that adhere to the author's recommendations.

Materials Production; Numeracy Instruction; Numeracy Materials; Student Profiles

Parsons, S. & Bynner, J. (1999). Lack of employment: The threat to numeracy. ***Education & Training*** **41(8), 359-365.**

A British longitudinal study measured adult numeracy at ages 16 and 37. The longer the absence from paid employment, the greater the negative impact on numeracy. This effect was strongest for men who had poor math scores at 16. (SK) [ERIC]

Numeracy Skills; Research Projects; Unemployment; Young Adults

Phillips, J. (1997). A foundation for learning math. ***Focus on Basics*** **1(C), 14-15.**

Discusses the author's experiences teaching adult numeracy students in a multilevel classroom, and describes a flexible structure through which students are engaged in learning and applying concepts to real life tasks and challenges.

Bridging Activities; Instructional Strategies; Learner Centred Instruction; Learning Environment; Multilevel Groups

Pisaneschi, P.Y. (2001). Using tic-tac-toe math: A case study. *PAACE Journal of Adult Learning* 10, 63-69.

A teacher's work with one adult student illustrated how the Tic-Tac-Toe Math method is effective for some students and not others. (SK) [ERIC]

Instructional Strategies; Learner Centred Instruction; Numeracy Instruction

Safford, K. (2000). Making peace in the math wars. *Focus on Basics* 4(B), 6-10.

Describes the controversy of current debates in mathematics, and summarizes the central issues and theories that have influenced mathematics instruction in the last 50 years. Suggests a tentative compromise between factions by identifying ideas and theories that support good practice, and offers selected strategies for effective math teaching.

Educational Experiences; Educational Philosophy; Educational Reform; Instructional Strategies; Numeracy Instruction

Sanguinetti, J. & Hartley, R. (Eds.). (2000). *Building literacy and numeracy into training: A synthesis of recent research into the effects of integrating literacy and numeracy into training packages*. Victoria, Australia: Language Australia.

Reports the findings of an investigation on the effects of integrating literacy and numeracy standards into Australia's national, industry training packages. Reveals progress to be uneven across sites and industries, and offers recommendations for further development of training packages.

National Literacy Programs; Program Evaluation; Program Planning; Research Reports; Standardization

Schmitt, M.J. (2000). Developing adults' numerate thinking: Getting out from under the workbooks. *Focus on Basics* 4(B), 1, 3-5.

Argues the remoteness to lived experience of the prevalent, workbook approach to adult numeracy instruction. Reviews seven key research and policy documents from which a new educational framework, centred on real life applications and known elements of mathematical development, is set to emerge.

Educational Philosophy; Educational Reform; Life Skills; Numeracy Instruction; Policy Formation

Schmitt, M.J. (2002). *Seeking interventions to improve adult numeracy instruction in the United States: Hybrids only need apply.* Unpublished Article.

Discusses current policies, practices, and research in adult numeracy education, and expresses concern over the gap between the real and potential instructional realities. Proposes a new model, combining best policies and practices, and depicts three multi-dimensional interventions that present opportunities for change.

Numeracy Instruction; Policy Formation; Program Planning

TAFE NSW Access Division. (2001). Adult literacy and numeracy practices 2001: A national snapshot. Retrieved January 20, 2002 from http://www.staff.vu.edu.au/alnarc/publications/nswfinalreport.pdf.

Presents the methodology and findings of a project aimed at developing a comprehensive overview of adult literacy and numeracy provision in Australia. Describes two surveys distributed to teachers and administrators, and organizes findings under four categories: staff and programs; aspects of teaching literacy and numeracy; aspects of managing literacy and numeracy programs; and issues and challenges.

Literacy Research; Numeracy Instruction; Program Evaluation; Surveys

Tout, D. (2000). Numeracy up front: Behind the International Life Skils Survey. *ARIS Resources Bulletin* 11(1), 1-5.

Describes the Numeracy Working Group's development of a conceptual framework for measuring the practical numeracy skills of adults aged 16-65. The framework, to be included in the 2002 International Life Skills Survey, relates to five facets of numerate behaviour, includes a scale for measuring the complexity of numeracy tasks and concepts, and carries implications for the wider educational sector.

Numeracy Assessment; Numerical Ability; Research Instruments; Surveys

Tout, D. & Schmitt, M.J. (2002). The inclusion of numeracy in adult basic education. In J. Comings, B. Garner & C. Smith (Eds.). *Annual review of adult learning and literacy: Volume III* (pp. 152-202). San Francisco, CA: Jossey-Bass.

Offers an extensive exploration of "numeracy" concepts, policies, practices, and research in the US and abroad. Argues for the recognition, by policymakers, of numeracy as a core basic skill, and for the widespread incorporation of numeracy concepts into adult basic education curricula and programs.

Adult Basic Education; Core Curriculum; Numeracy Instruction; Policy Formation

van Groenstijn, M. (1997). Constructive numeracy teaching as a gateway to independent learning. In D. Coben & J. O'Donoghue (Eds.), *Adults Learning Mathematics-4: Proceedings of ALM 4: The fourth international conference at the University of Limerick, Ireland*. July 4-6, 1997. London, UK: Goldsmiths College.

Describes Dutch practitioners' attempts to incorporate Constructivist and Realistic Mathematic Education (RME) theories into a flexible framework for adult numeracy provision. Identifies the overarching theme of indepent learning, as the means of tailoring adult education to individual learning needs, styles and pace.

Educational Philosophy; Program Planning; Self Directed Learning

Webber, V. (1998). Dismantling the altar of mathematics: A case study of the change from victim to actor in mathematics learning. Literacy *& Numeracy Studies* 8(1), 9-22.

Conversations with an adult female student in a math anxiety course uncovered parallels between growing up Catholic and being taught math. The study highlighted the importance of considering total life experience in dealing with math anxiety. Crucial to achieving change are group processes, questioning of self-concept, and questioning of social practices. (SK) [ERIC]

Attitude Change; Case Studies; Life Experiences; Math Anxiety

Wedege, T. (1997). Could there be a specific problematique for research in adult mathematics education? In D. Coben & J. O'Donoghue (Eds.), ***Adults Learning Mathematics-4: Proceedings of ALM 4: The fourth international conference at the University of Limerick, Ireland*****. July 4-6, 1997. London, UK: Goldsmiths College.**

This paper attempts to locate a leitmotif for the mathematics education of adults, and discusses whether there exists a specific problematique for research into this area. The term 'problematique' is described and discussed. A problematique within didactics of mathematics is presented, and a conceptual framework for the construction of a systemically linked problem field is explicated. Contains 10 references. (ASK) [ERIC]

Educational Research; Numeracy Instruction

Wignall, L. (1999). ***Built in, not bolted on. Information kit for language, literacy and numeracy coordinators on incorporating communication skills into training packages*****. Queensland, Australia: Australian National Training Authority.**

Explores Australia's National Training Framework, training packages, industry standards and assessment strategies, and discusses the implications of these changes for language, literacy, and numeracy provision. Part 1 responds to questions frequently asked by practitioners, and Part 2 provides activities and advice to help educators work through the issues.

Instructor Training; National Literacy Programs; Program Planning; Standardization; Workplace Training

Wyse, L. & Brewer, K. (2001, April). *The place of literacy and numeracy in the assessment of industry standards*. Retrieved January 20, 2002, from http://www.staff.vu.edu.au/alnarc/reports/viclyndawysereport2000.html

Explores the impact, on the assessment of industry standards, of incorporating literacy and numeracy standards into industry training packages. Issues include: the consistency with which literacy and numeracy are addressed; how language, literacy and numeracy are addressed in industry assessments; supports provided to workers through assessment processes; and the extent to which trainers and assessors are prepared to engage literacy and numeracy issues.

Assessment; National Literacy Programs; Numeracy Instruction; Standardization; Workplace Training

Zevenbergen, R. (2000). Identifying literacy demands of adult numeracy. *Literacy & Numeracy Studies* 10(1-2), 39-53.

Analysis of teacher and student conversations in an adult numeracy class demonstrates how cultural assumptions implicit in numeracy teaching are not made explicit to students. Situated in an English-as-a-Second-Language context, analysis demonstrates how these assumptions are embedded in linguistic choices that present particular kinds of hurdles for those from other linguistic and cultural backgrounds. (Author/VWL) [ERIC]

Cultural Background; English as a Second Language; Numeracy Instruction; Research Reports

Section 2: Readings Recommended by Participants

Bingman, B. & Stein, S. (2001). *Results that matter: An approach to program quality using Equipped for the Future*. Retrieved June 18, 2002, from http://www.nifl.gov/lincs/collections/eff/results_that_matter.pdf.

Boomer, G. (1986). From catechism to communication: Language, learning and mathematics. *Australian Language Matters* 42(1), 2-7.

Breakthrough to math series. Syracuse, NY: New Readers Press.

Brown, J.S., et. al. (1989). Situated cognition and the culture of learning. *Educational Researcher* 18(1), 32-42.

Cobb, B. & Bauersfield, H. (Eds.). (1995). *The emergence of mathematical meaning: Interaction in classroom cultures*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Cromley, J. (2000). *Learning to think, learning to learn: What the science of thinking and learning has to offer adult education. NIFL Literacy Leadership Fellowship Program Reports, v. 4, no. 1*. Washington, D.C.: National Institute for Literacy.

Dondertman, B. & Ciancone, T. (1991). *Numbers in our lives: Numeracy methods and materials*. Toronto, ON: Board of Education for the City of Toronto, Adult Basic Education Unit.

Field, J. (Ed.). (1997). *Electronic pathways: Adult learning and the new communication technologies*. Leicester, UK: National Institute of Adult Continuing Education (NIACE).

Gal, I. (Ed.). (2000). *Adult numeracy development: Theory, research, practice*. Cresskill, NJ: Hampton Press.

Goddard, R., Marr, B. & Martin, J. (1996). *Strength in numbers: A resource book for teaching adult numeracy*. Victoria, Australia: Language Australia.

Hagedorn, L., Hatt, P. & Bond, J. (Eds.). (2001). *Numeracy: Best practice and innovations*. Toronto, ON: Ontario Literacy Coalition.

Hoyles, C., Morgan, C. & Woodhouse, G. (Eds.). (1999). *Rethinking the mathematics curriculum*. Philadelphia, PA: Falmer Press.

Hynes, M.E. & Belsky, N. (1997). *Mission mathematics: Linking aerospace and the NCTM Standards*. Reston, VA: National Council of Teachers of Mathematics (NCTM).

Johnson, C.V. (1995). *In the air (real-world mathematics through science)*. Menlo Park, California: Innovative Learning Publications.

Johnston, B. & Tout, D. (1995). *Adult numeracy teaching: Making meaning in mathematics*. Melbourne, Australia: National Staff Development Committee for Vocational Education and Training.

Kimball, D.B. (1990). *Math for the real world series*. Syracuse, NJ: New Readers Press.

Lampert, M. & Ball, D.L. (1998). *Teaching, multimedia, and mathematics: Investigations of real practice*. New York: Teachers College Press.

Lave, J., Murtaugh, M. & de la Rocha, O. (1984). The dialectic of arithmetic in grocery shopping. In B. Rogoff & J. Lave (Eds.), *Everyday Cognition* (pp. 9-40). Cambridge, MA: Harvard University Press.

Marr, B. & Helme, S. (1987). *Mathematics: A new beginning*. Victoria, Australia: State Training Board Melbourne.

National Council of Teachers of Mathematics. Commission on Standards for School Mathematics. (1989). *Curriculum and evaluation standards school mathematics*. Reston, VA: National Council of Teachers of Mathematics (NCTM).

Numeracy at work. (2002). Burnaby, BC: SkillPlan, BC Construction Industry Skills Improvement Council.

Nunes, T., Carraher, D.W. & Schliemann, A.D. (1993). *Street mathematics and school mathematics*. Cambridge, England: Cambridge University Press.

Paholek, E. (1996). *Canadian mathematics 7, 8, 9*. Edmonton, AB: Rational Publications.

Pimm, D. (1987). *Speaking mathematically*. New York, NY: Routledge & K. Paul.

Population Connection. (2002). *Multiplying people, dividing resources: Global math activities*. Washington, D.C.: Population Connection.

Stein, S. (2001). *Equipped for the future content standards: What adults need to know and be able to do in the 21st century*. Washington, D.C.: National Institute for Literacy (NIFL).

Stenmark, J.K., Cossey, R., Hill, M. & Thompson, V.H. (1988). *Family math.* Washington: Jenson Publications.

Taylor, M. (2002). *Action research in workplace education: A handbook for literacy instructors*. Ottawa, ON: National Literacy Secretariat.

Tomlin, A. (Ed.). (1985). *The numbers game: Issues in adult numeracy work*. London, England: Hammersmith and Fulham Council for Racial Equality.

Using mathematics: From the seas to the stars: From your backyard to the great wall. (1993). Evanston, Illinois: Everyday Learning Corporation.

Veel, R. (1999). Language, knowledge and authority in school mathematics. In F. Christie (Ed.). *Pedagogy and the shaping of consciousness.* London: Cassell.

Wearne, C. (1997). *Car costs: Six units of maths around the theme of car owndership*. Melbourne, Victoria: Language Australia.

Section 3: Annotated Web Sites

Adult Literacy and Numeracy Research Consortium (ALNARC)
http://www.staff.vu.edu.au/alnarc/index.html

Promotes research activity in adult literacy and numeracy in Australia. the Consortium represents anoational collaboration between five university-based research centres and it offers a model of innovative research management based on collaborative research and responsiveness to state-based needs. Details of previous research programs can be found through the Publications link of this web site.

Adult Numeracy Network (ANN)
http://www.std.com/anpn/

Formed by adult education practitioners, at the first national Conference on Adult Mathematical Literacy in 1994, the network joins researchers, program administrators, government officials and others to discuss the status of adult numeracy education and decide future directions. Since its creation, the Network has: held annual meetings; published a quarterly newsletter; sponsored an electronic discussion forum; secured funding to support system reform; and drafted A Framework for Adult Numeracy Standards.

ANAMOL: The Adult Numeracy and Maths On-Line project
http://sunsite.anu.edu.au/language-australia/numeracy/anamol/menu.htm

An on-line communication system created to support numeracy practitioners across Australia. Contains teaching ideas and materials, developed around four real-life themes, and hosts a discussion forum.

Figure This: Math Challenges for Families
http://www.figurethis.org/

Contains a large collection of fun math problems and activities for parents and children to do together. A good source of family numeracy exercises.

Math Forum @ Drexel
http://mathforum.org/

Provides links to an extensive and organized collection of math-related resources, activities, research and discussion groups of value to teachers, students, researchers, parents, educators, and members of the community. The site is a project of Drexel University in Philadelphia.

Mrs. Glosser's Math Goodies
http://www.mathgoodies.com/

Organizes and provides access to interactive math lessons, homework help, worksheets, and discussion fora. Contains over 400 pages of activities for students, teachers, and parents.

National Council of Teachers of Mathematics (NCTM)
http://www.nctm.org/

Provide full-text access to the Principles and Standards for School Mathematics, the NCTM's four professional journals, and links to student and teacher resources and discussions. The NCTM is the leading professional organization for teachers of mathematics in the US and Canada.

National Skill Standards Board (NSSB)
http://www.nssb.org/

Provides access to information, research, and publications that discuss national skill, assessment and certification standards developed through the NSSB: a voluntary national network of business, labor, employee, education, community and civil rights organizations.

NIFL Special Collections: Science & Numeracy
http://literacynet.org/sciencelincs/

Provides annotated links to Internet sites that are useful for teaching and learning about science and numeracy. The topics have been arranged according to national education standards in science and in numeracy, and materials emphasize the ways in which science and math skills are important to understanding the world around us. [Homepage Text]

Keyword Index