

Background Materials and Curriculum Resources to Encourage Females Into the Fields of Mathematics, Science and Technology: An Annotated Bibliography

Prepared for the Ontario Women's Directorate

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General References

(Distributor)

(Location(s)/Call Number(s))

Baker, Maureen.

"What will Tomorrow Bring?... "A Study of the Aspirations of Adolescent Women. Ottawa: Canadian Advisory Council on the Status of Women, 1985. 176 pgs. This research study indicates that female adolescents are not being adequately prepared for a changing world. Effective guidance and counselling services may be needed to encourage more awareness of the technological changes that will affect their career choice. Of special interest is the chapter on Education which looks at educational aspirations, course selection, extracurricular activities and the barriers faced in pursuit of educational goals. (CCSD)

(OISE/305.40971 B168W)

Baker, Maureen.

"Quand je pense à demain..." Une étude sur les aspirations des adolescentes. Ottawa: Conseil consultatif canadien de la situation de la femme, 1985.195 pgs. This is the French edition of the research study cited above. (CCSD) (OISE/Women's Resource Centre)

Berthelot, Michèle, and Nicole Coquatrix.

Au delà des mythes: les hauts et les bas des travailleuses non traditionnelles: Faits Saillants. Recherche sur les conditions de travail et de formation de jeunes femmes exerçant un emploi non traditionnel. (Diplômées de l'enseignement secondaire, collégial et universitaire.) Gouvernement du Québec, ministère de l'Éducation, coordination à la condition féminine, 1989. 39 pgs. This research report looks at women working in three levels of non-traditional occupations: these include young women with secondary diplomas employed as butchers and dental technicians; collegiate graduates working as architectural technicians and physical science engineers; and university graduates employed as mathematicians, dentists and engineers. The research analyzes working conditions, salaries, sexual harassment, sexist stereotyping, the gains and rewards of such work, and the difficulties in attaining these occupations. Major influences include parental attitudes, father's occupation and teacher encouragement and support. The authors recommend the ongoing improvement of orientating young women towards non-traditional careers and the important roles schools and teaching staff must play in helping them achieve their goals.

(GQ)

(OWD Resource Centre)

GENERAL

Blackstone, Pamela, ed.

Breaking the Barriers: Encouraging Girls in Math, Science, and Computers. Software and Information Kit. Victoria, B.C.: Victoria Status of Women Action Group in Association with Software Training Associates, 1989. This kit, intended for girls in grades 3 through 7, consists of a software disk for students and print materials for teachers. It is divided into five sections: 1) a multiple choice Herstory Quiz (on diskette) — a game focusing on Canadian women's achievements in math and science with reference materials for teachers; 2) a 73-page report which includes reviews of recent research and recommended intervention 3 strategies; 3) a 93-page listing of educational resources (software, curriculum aids, etc.); 4) activities to augment classroom lessons and enhance logic and problem-solving skills; and 5) a bibliography. Software available for IBM PC/XT, Apple II Series, Macintosh. (STA)

Cantin, Diane, and Lisette Lambert.

Perfectionnement du personnel enseignant du second cycle du primaire. Acquisition d'attitudes non sexistes dans les pratiques et activités pédagogiques. Guide d'animation. Guide de participation. Guide d'activité pour les élèves. Québec: Gouvernement du Québec, ministère de l'Éducation, Coordination à la condition féminine, 1989. The three components of this kit are designed to assist the teachers of primary schools examine the sexism in teaching practices and curriculum materials and to provide non-sexist replacement strategies. Guide d'animation (16 pgs.) supplies the necessary tools with which to organize a training workshop for teachers. The overall objectives are three-fold: to sensitize teaching and counselling personnel to the manifestations of sexism, to help them analyze educational practices and to discuss intervention techniques. In the Guide de *participation* (78 pgs.) are exercises for the participants. A workplan provides an overview of the activities and their duration. The activities focus on a wide range of issues from sexist language to the effects of stereotyping on children to sociological factors. Questionnaires and discussion topics facilitate analysis and reflection. In-class activities are included in the Guide d'activités (81 pgs.). Lessons cite grade level suitability and objectives, and provide questions, written exercises, games and puzzles that help the student explore such topics as stereotyping, sexist language, the relevance of mathematics for girls, and the differences between boys and girls. Bibliographies. (OWD Resource Centre) (GQ)

Cotera, Martha P.

(WEEA)

Checklists for Counteracting Race and Sex Bias in Education Materials. Newton, Mass.: Women's Educational Equity Act Program, 1982. 32 pgs. This handbook provides guidelines and checklists to be used in selecting and evaluating elementary curriculum materials for discrimination and sexual bias. Bibliography.

(OISE/370.19345 C514)

Davis, Barbara Gross, and Sheila Humphreys.

Evaluating Intervention Programs. Applications for Women's Programs in Math and Science. New York: Teachers College Press, 1985. 0-8077-2787-3. 228 pgs. The purpose of this handbook is to assist instructors, directors, and school administrators evaluate and strengthen existing women's programs. There is an overview and rationale of evaluations and their designs, explanations of tools used to gather and assess information (questionnaires, interviews, observations, documents and records), and evaluation strategies for conferences, workshops, speakers, internships, exhibits, and courses and curricula. Illustrated. Resources. Glossary. Index. (OISE/TCP) (OISE/500.82 D261 E)

Erickson Gaalen, Lynda Erickson, and Sharon Haggerty.

Gender and Mathematics/Science Education in Elementary and Secondary Schools. Richmond, B.C.: Province of British Columbia, Ministry of Education, 1980. 78 pgs. The inquiry focuses upon the lower level of achievement among girls as compared to boys in British Columbia schools. It discusses sex-related differences in science and mathematical achievement, programs designed to help female students such as the "Math for Girls" project, and intervention strategies. Resources. Appendix and Bibliography.

(OISE/370.19345 E68G)

Gouvernement du Québec. Ministère de l'Éducation.

Guide D'Animation. Pareille, Pas Pareils. 1985. Édition revue et augmentée. Gouvernement du Québec, ministère de l'Éducation, ministères des Affaires Sociales, consiel du statut de la femme, 1986. A comprehensive guide to facilitate workshops with preschool educators on the subject of non-sexist education. The nine modules cover the topics of sexism and stereotyping; differences between boys and girls physiological, personality traits and stereotypes; non-sexist games for equal development; advertising and its negative impact; books, television and songs; division of roles; how to change sex role models; individual and collective actions. Each module outlines the objectives, advanced preparations, materials needed, exercises and duration, worksheets, and evaluation forms. An Appendix provides additional activities. (GQ) (OWD Resource Centre)

Labatt, Mary Howarth.

"The Quest for Equity. *"Federation of Women Teachers' Association of Ontario Newsletter.* 6 (June 1988): 1-7. The author challenges the myth that racism and sexism have been eliminated by reviewing recent classroom studies which reveal many examples of bias and discrimination. She suggests that schools can play a major role in the quest for true equity - otherwise a majority of Ontario's students will be unfairly treated. References.

(FWTAO)

(BCEd)

(FWTAO/Journals)

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Labour Canada.

When I Grow Up...Career Expectations and Aspirations of Canadian

Schoolchildren. A pilot project undertaken for the Women's Bureau of Labour Canada. Illustrated by Rachel Dennis. Ottawa: Labour Canada, 1986. 77 pgs. This work provides evidence that boys and girls are becoming increasingly aware of the changes taking place in the work force where occupations formerly undertaken only by men are now being staffed by women as well. It stresses the need for young girls to be made aware of the realities they may face as adult women so that they can plan their lives for maximum benefits to themselves, their families, and society as a whole. (LC)(OISE/Ref. 305.234 W567)

Lamont, Betty et al.

Sex Equity in Elementary Education. Bridging the Gap. 1984. Reprint. North York: Board of Education, Curriculum and Staff Development Services, Women's Studies, 1989. 54 pgs. This resource document provides practical strategies for staff, students and parents to assist in the implementation of three objectives: equal educational opportunity, awareness of sex-role stereotyping, and the creation of a non-sexist learning environment. The clearly written strategies can be applied to curriculum (including math, science and computers), co-curricular activities, the community and staff concerns. (NYBEc)

(OISE/370.19345 \$5186)

Lewis, Sue, and Ann Davies.

Gender Equity in Mathematics and Science: Girls and Maths and Science Teaching Project. Canberra, Australia: A Project of National Significance, Curriculum Development Centre, 1988. 221 pgs. This book is a professional development resource and documents schoolbased activities that were developed with teachers during the Australian Girls and Mathematics and Science Teaching Project. In keeping with the objective of GAMAST of assisting elementary and secondary mathematics and science teachers develop equitable programs, the authors outline how to incorporate an action research approach in schools. These methods include in-service activities for diversifying teaching to include girls, designing programs to start from the experience of girls as well as boys, developing skills for implementing change in school programs, and strategies for developing inclusive policy for schools. Worksheets are included. Each section is referenced. (McC)

Marrett, Cora Bagley.

Teacher Goals and Race/Sex Equity in Mathematics and Science Education. Final Report. Madison, Wisconsin: Wisconsin Center for Education Research, 1985. Microfiches. 164 pgs. This study, which gives particular attention to minority and female students, sought to determine which goals secondary level mathematics and science teachers emphasized and the possible link between these goals and the student-level outcome. The findings indicate a need for further inquiry on teacher

objectives in math and science instruction and development of strategies that would prove effective for diverse students. References. (EricDoc) (OISE/Eric 275 496)

Nicholson, Heather Johnston and others.

"Equity on Purpose: In Pursuit of Excellence in Informal, Out-of-School Interventions in Math, Science and Technology." Paper presented at the Conference of Vision to Reality, Ann Arbor, MI., July 1987. 8 pgs. Microfiche. The Girls Clubs of America are committed to increasing girls' out-of-school participation in the areas of science and mathematics. Non-formal activities which sustain their interest include visits to science and technology museums and science centres; "camp-ins" where visiting girl groups sleep over at a host museum for a weekend of workshops; and television workshops for children. The authors encourage the inclusion of "intentional" math and science programs in the already existing Girl Scouts (Girl Guides), 4-H Clubs, etc., and provide strategies for implementing such programs. They stress the importance of creating an environment of "inquiry" where girls feel comfortable asking questions and of making connections with various resource centres in the community that can provide materials and educators. References. (Phcopy/OISE or EricDoc) (OISE/Eric 302 401)

Nicholson, Heather Johnston, and Ellen Wahl.

"Operation SMART: From Research to Program — And Back." Paper presented at the International Conference of Girls and Technology, July 1987. 9 pgs. Microfiche. Operation SMART was founded by the Girls Clubs of America in response to the technological revolution that is changing women's roles in the labour market and to meet the needs of young girls from low income and minority families. The paper reviews the founding of Operation SMART and briefly describes the components of the model it incorporated. The program is designed for out-of-school activities and includes scientific inquiry, scheduled learning sessions in science, mathematics and technology, career exploration, family involvement. It also outlines training of staff, staff's experiences with girls in the 6- to 11-year-old groups and adolescents, and their collaboration with schools, community organizations and professional associations. References.

(Phcopy/OISE or EricDoc)

(OISE/Eric 302 403)

North York. Board of Education.

Blueprint: Careers...the variable is you. North York: North York Board of Education. This kit is especially designed to assist teachers and female students in the middle level develop positive attitudes towards the study of mathematics, science and technology. It includes a list of resources and organizations, biographical sketches of women who work in these fields, and a section of mathematical and technological exercises providing concrete and positive experience for high school students who may lack self-confidence in these areas. Discussion questions, articles and questionnaires promote career choice awareness. (NYELC)

(Minkler/371.425 Blu)

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Robertson, Heather-jane.

The IDEA Book. A Resource for Improving the Participation and Success of Female Students in Math, Science and Technology./Les femmes et l'éducation. Cahier d'IDÉES. Un guide pour accroître la participation et la réussite des élèves de sexe féminin dans le domaine des mathématiques, des science et de la technologie Ottawa: Canadian Teachers' Federation, 1988. English 38 pgs./French 39 pgs. This bilingual resource guide outlines the situation facing female students in science, math and technological education by reviewing several Canadian studies. It provides educators with strategies and guidelines to counteract stereotypes that discourage female entry into these disciplines. The emphasis is on providing contact names and numbers of individuals active in promoting female advancement in these areas and locations of existing programs (the majority of the references are based in Ontario): career days, workshops, science, math and computer programs. (CTF)

Rogers, Pat, ed.

Proceedings of the CEMSAT Symposium. Glendon College, York University, Toronto, Ontario, May 24-26, 1989. North York, Ont.: The Coalition for Equity in Mathematics, Science and Technology, York University, 1990.106 pgs. The Coalition for Equity in Mathematics, Science and Technology held this symposium to review current theory and practices and to make recommendations for future action and strategies. The publication provides the full text of papers presented. Researchers active in the field discussed international perspectives on gender differences in mathematic achievement; secondary science education in Canada and the participation of girls; the teacher variable in the equity equation; and feminist pedagogy. Intervention strategies presented cover conferences and job site visits to encourage girls in math and science; science workshops and summer laboratory experiences to promote girls' participation in science; workshops and technical studies for females only to encourage females into technology; and the Women Inventors Project that inspires creativity and entrepreneurship. Each paper is referenced. Bibliography. (Phcopy/CEMSAT) (OWD Resource Centre)

Sanders, Jo.

"Developing Software for Gender Equity. *"A Review of Breaking the Barriers, by Pamela Blackstone. The Computing Teacher* 17 (March 1990):54-55. The author applauds the efforts of the women who created this original software package - one of the few existing programs designed for female students in the early grades. She also points out that this publication will play a valuable role in reminding teachers across North America and elsewhere that "girls' avoidance of computers, mathematics and science is itself avoidable."

(CT)

(Minkler/Journals)

Schniedewind, Nancy, and Ellen Davidson.

Open Minds to Equality: A Sourcebook for Learning Activities to Promote Race, Sex, Class, and Age Equity. Englewood Cliffs, NJ.: Prentice-Hall, Inc., 1983. 0-13-637264-3. 273 pgs. The activities in this sourcebook, suitable for grades 3 through 8, examine ways that racism, sexism, class bias, ageism and competitive individualism in school reinforce inequality. Designed as a resource that can fit into existing teaching plans, the activities include role plays, case studies, dilemma stories, co-operative group situations, and interviews. Mathematics is included as a subject focusing on graphs, ratio and proportion, percentage and fractions, statistics, calendar lessons. General References and an Annotated Bibliography. (PH)

Scott-Jones, Diane, and Maxine L. Clark.

"The School Experiences of Black Girls: The Interaction of Gender, Race, and Socioeconomic Status." Phi Delta Kappan 67 (March 1986):520-526. The authors review the findings that are available on the achievement of Black females in elementary and secondary science and mathematics. They discuss their educational expectations, aspirations and motivations and suggest that parental methods of socialization, teacher/students interactions and peer interactions correlate with academic achievement. References. (PDK) (OISE/Journals)

Shapiro, June, Sylvia Kramer, and Catherine Hunerberg.

Equal Their Chances: Children's Activities for Non-Sexist Learning. Englewood Cliffs, NJ.: Prentice-Hall, Inc., 1981. 164 pgs. This guide is written for parents and teachers who want to establish sex equity in schools. Chapter 4 covers mathematics and science providing a brief analysis of sexist stereotyping experienced by female students and concrete suggestions about what can be done to counteract sexism in mathematics and science textbooks. Includes learning activities in spatial skills and exploring the environment that can be adapted to different age levels. References and Sources. Index.

(OISE/370.19345 S29E)

Skolnick, Joan, Carol Langbort, and Lucille Day.

(o/p)

How to Encourage Girls Into Math & Science: Strategies for Parents and Educators. Englewood Cliffs, NJ.: Prentice-Hall, Inc., 1982.192 pgs. Suitable for primary, intermediate and junior high, the 69 activities in this guidebook can be applied to any in- class unit or at home. They will help develop competence in spatial visualization, working with numbers, logical reasoning, and scientific investigation. Each activity introduces skill area, grade level, strategies, concept being explored, materials needed, directions. An overview of factors prohibiting girls' confidence and interest in these subject areas introduces the book. Resource list. Index. (o/p) (OISE/507.1073 5422H; FWTA0/32727 Sko; Minkler/507.1073 Sko)

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Stage, Elizabeth, et al.

"Increasing Participation and Achievement of Girls and Women in Mathematics, Science and Engineering." In Handbook for Achieving Sex Equity Through Education, 237-268. Ed. Susan S. Klein. 0-8018-3172-5. The emphasis of this article is on educational research and program development. It reviews research in the area of sex differences in quantitative and spatial skills, socialization factors, attitudinal and affective factors, and introduces a series of intervention programs. These include special classes for women, the Math for Girls program, classes which address problems faced by female students, the SPACES project, the COMETS science modules, and EQUALS teacher education programs. Extensive references. ((HU)

(OISE/370.19345 H236)

Status of Women Canada and Manitoba Women's Directorate.

Participation of Girls and Women in Math, Science and Technology/ Participation des jeunes filles et des femme en mathématiques, en science et en technologie. Ottawa: Status of Women Canada, 1989. Microfiche. Eng. 27 pg./French 31 pg. This background paper identifies reasons for the under-representation of girls in these disciplines. One of the major factors influencing the enrolment of girls is the exclusion of women's presence from curriculum materials, the use of female-excluding language, and the failure to integrate women's experiences into math and science courses. Recommendations cited include improved educational material content to reflect female experiences; course requirement reviews to ensure that students acquire the level of math, science and technology they need to function in an evolving society; stronger access and support systems for female students; greater information, career awareness and role modelling. (CCSD)

(OISE/Microlog 89-04848)

Thomas, Gail E.

"Cultivating the Interest of Women and Minorities in High School Mathematics and Science." Science Education (January 1986): 31-43. The results of a 1982 survey among college students suggest that students' career choices and aspirations are developed at an early age. The article emphasizes the importance of family intervention in the shaping of students' interest in and attitudes towards math and science: encouraging childhood science hobbies and aspirations of being a scientist, supporting math and science choices and encouraging participation in high school math and science clubs.

(SE)

(OISE/Journals)

Tsuji, Gerry, and Suzanne Ziegler.

"What Research Says About Increasing the Numbers of Female Students Taking Math and Science in Secondary Schools." Scope 4 (February 1990). This issue of the newsletter prepared by the Research Section of the Toronto Board of Education summarizes recent research investigating ways in which female participation in math a.id science can be encouraged. These strategies include changing the beliefs about the usefulness of math thereby increasing appeal at a cognitive level, and increasing female confidence and achievement levels. On-going efforts on the part of educators can include one-day conferences, staff development and curriculum development. References. (THE/Res)

(Minkler/Journals; TBE/Journals)

Urban Affairs Department, Saint Paul Public Schools.

Minority Women in Math and Science. Saint Paul, Minnesota: Urban Affairs Department, Saint Paul Public Schools, 1982. 44 pgs. This document provides biographical information about Native American, Asian American, Black and Hispanic women working in math and science-related careers. Teaching materials introduce the history and culture of these women to grades 7 and 12 students. Discussion questions focus on barriers faced by minority women. Glossary of terms. Tables. An appendix outlines professional fields requiring high school math and science. (WEEA) (OISE/Eric 261 115)

Urban Affairs Department, Saint Paul Public School.

Minority Women in Math and Science. Teacher's Guide. Saint Paul, Minnesota: Urban Affairs Department, Saint Paul Public Schools, 1982. 34 pgs. The guide includes example lessons and activities that can be used with the student booklet above. The eight lessons are structured in a conceptual format and cover the themes of stereotyping, discrimination and careers. Each lesson identifies subject area, grade level, generalizations, behavioral objectives, teaching and evaluation procedures, and includes activities, discussion questions, and worksheets. Resources. (WEEA) (OISE/Eric 261 116)

Vigier, Rachel, Christiane Pignan-Palmer, Kathy Garnsworthy.

Autre Temps, Autre Moeurs. Guide pédagogique pour une éducation non sexiste. Toronto: OISE Press, 1981.112 pgs. Twenty-four exercises and games can be used by teachers in grades 1 to 8 to raise awareness, outline the roles women play in society, and look at both masculine and feminine stereotypes. Each exercise provides an objective, discussion questions, and grade level. Brief biographical sketches of Canadian women (Anglo- and Francophone) provide role models and a chronological history introduces the suffragette movement in Quebec. Bibliography and Resources. (o/p) (OISE/370.19345 V676A)

Whyte, Judith, Rosemary Deem, Lesley Kant, and Maureen Cruickshank, eds. Girl Friendly Schooling. London: Methuen and Co. Ltd., 1985. 0-416-40050-7. 252 pgs. This is a collection of essays presented by British educators at the Girl Friendly Schooling Conference in Sept. 1984. There are three focuses: what makes schooling unfriendly for girls - sex bias, attitudes of teachers towards technology and girls; interventions to make schooling more girl friendly - ex., girl friendly science and sex equality; and future directions. Each essay is referenced. Bibliography. Index. (MethLon) (OISE/376.941 G525)

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Yergeau, Nicole.

S.P.R.I.N.T. Stratégie pour réussir l'intégration au non-traditionnel. Guide d'animation. Guide de participation. Guide d'activités. Gouvernement du Québec, ministère de l'Éducation, la coordination à la condition féminine, 1988. This three-part kit is in looseleaf format for insertion in a binder. The 116-page Guide *d'animation* facilitates the organization of a workshop with counsellors and teachers in the secondary level. The first section gives an overview of the Quebec labour market with statistical information illustrating the professional concentration of women and their professional segregation, disparity in incomes and employment patterns between men and women. This leads into the area of career choices for adolescents and the difficulties experienced by women in some non-traditional occupations. How to set up a training session is described in the second section. The step-by-step preparation guide gives materials needed, activities and their duration, subject information, attitudes and techniques. The 59-page Guide de Participation provides discussion questions and exercises that focus on the practices and attitudes in the schools where teachers play an important role in career choices. An introductory session provides an overview of the employment situation for young women in the nontraditional workforce and looks at reasons why females don't choose these careers. The following session challenges attitudes and practices through exercises, questionnaires and cites examples that can be used to reverse non-supportive attitudes. The Guide d'activités (189 pgs.) is a workbook of exercises for teachers to conduct in class. The topics include myth and realities, orientation towards non-traditional careers, how to make female students feel welcome in a technical program, support networks for girls, employment information, and evaluations. References and bibliographies. (OWD Resource Centre) (GQ)

Mathematics Background Materials

Burton, Leone, ed.

Girls Into Math Can Go. London: Cassell Education Ltd., 1986. 0-304-31602-4. 257 pgs. A collection of essays that surveys the research work done over the last decade on the influences affecting girls in mathematics. The first section of the book discusses the problems affecting female students: rate of attainment between males and females, attitudes and sex differences, gender roles at home and school. The second section presents strategies educators and researchers have implemented in their classrooms. Each essay is referenced. An appendix provides a herstory of women in mathematics. Index. (CTY)

(Minkler/510.88042 Gir; TBE/QA27.5 G77 1986)

Cassey, Patricia Lund.

"Encouraging Young Women to Persist and Achieve In Mathematics." Children Today 12 (January-February 1983):8-12. What will keep High School female students in mathematics? Based on two major research studies and her long-term involvement in summer programs to encourage young women into mathematical-related professions, the author found that schools offering functional equivalents of first-year college courses in advanced mathematics opened the possibility of professional careers to many young students who may not have discovered their skills and interests soon enough. The teachers who taught these courses made the difference by providing much needed positive reinforcement. (Cht)

(OISE/Journals)

Chapman, Susan. F., Lorelie Brush, and Donna M. Wilson, eds.

Women and Mathematics: Balancing the Equation. Hillsdale, NJ.: Lawrence Erlbaum Associates, Publishers, 1985. 0-89859-3697. 381 pgs. Among its many purposes, this collection of twelve research articles is intended to help mathematics supervisors and teachers prepare young students for successful working lives. The articles stress women's participation in mathematics, provide summaries of research results concerning the factors that influence student participation, and informed advice about strategies educators might use to improve participation. References. Index. (OISE/510.88042 W872) (CCP)

Christensen, Rosemary and others.

American Indian Women and Mathematics: An Annotated Bibliography of Selected Sources. Minneapolis, Minn.: Minneapolis Public Schools, 1982. Microfiche. 25 pgs. This bibliography addresses the factors affecting the participation and performance of Minnesota Native girls in mathematics - socialization, educational exposure and attitudes. The forty-six entries (1967-1982) include journal articles and conference papers. Among the subjects covered are minority group achievements and performance in math, math anxiety and avoidance, academic achievement of Native

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Americans, and sex-role orientation and stereotyping. (MPS)

(OISE/Eric 234 970)

Eddowes, Muriel.

Humble pi: The Mathematics Education of Girls. York, England: Longman for Schools Council, Longman Resource Unit, 1983. 32 pgs. Based on the poor achievement of British girls in mathematics, the booklet outlines reasons and offers practical suggestions for remedying the situation. Brief strategies draw upon the experiences of practising teachers of mathematics and include classroom approaches and teaching methods, encouragement of girls at all levels, non-sexist teaching nuaterials, school organization, options and career guidance, and extra- curricular activities. (LRU)

(OISE/C.R. 510 E21 M)

Ellis, Dormer, ed.

Math 4 Girls: Four Research-based Essays Concerning the Mathematical Education of Girls. Toronto: Ontario Educational Research Council, 1988. 28 pgs. Three of the four essays in this booklet provide a synopsis of current theoretical discussions: evidence that the proportion of girls studying mathematics can and should be increased; a challenge to the common belief that girls are innately inferior in mathematical aptitude; and the results of an international study of achievement in mathematics of boys and girls. The fourth essay describes initiatives that have been taken to motivate girls to retain mathematics — career conferences, career days, and female-oriented math programs. Each essay is referenced. (OERC) (Minkler/510.88042 Mat; TBE/QA12.M37 1988)

Jeffrey, Adele.

An Investigation Into Math Anxiety Among Elementary Teachers. North York: North York Board of Education, 1988. 39 pgs. The author reviews research which studies the reasons why female elementary teachers experience math anxiety and how this anxiety can influence students. Strategies teachers can use to remedy the anxiety among students are outlined; develop problem-solving abilities, create a supportive learning environment, encourage parental involvement, emphasize career choices, encourage conference attendance. Bibliography. An Appendix provides a Math Anxiety questionnaire for elementary teachers. (N/A)

(Minkler/371.1 0019 Jef)

Kenschaft, Patricia K.

"Black Women in Mathematics in the United States." The American Mathematical Monthly 88 (October 1981):592-604. This article is among the first to document the achievements of Black women who have earned doctorates in pure or applied mathematics. The author has researched and written brief biographical sketches of their lives with an emphasis on their academic achievements. (OISE/Journals) (AMM)

Lafortune, Louise, ed.

Femmes et mathématique. Montreal: Les Éditions du remue-ménage, 1986. 2-89091-065-2. 260 pgs. Six Quebec professors and researchers presented their papers at the 1987 conference Femmes et Mathématique. The topics, representing a variety of perspectives, include sexual stereotyping versus positive teaching methods; histories of three mathematicians; research results of a project undertaken to understand the reasons for female underrepresentation in sciences and math; aspects contributing to the mathematical mystique; the importance of family influence in career choices of female students; and reasons for mathematical blocks in female students. Resources. Bibliography. Appendix of notes on workshops. (DD)

(OISE/510.82 F329)

Macfarlane, Jim and Pat Crawford.

Effects of Sex-Segregated Mathematics Classes on Student Attitudes and Achievement in Mathematics: A.Y. Jackson Secondary School Year I. North York Board of Education Research Report, September 1985. 57 pgs. This is the first of three reports documenting the pilot project at A.Y. Jackson Secondary School, Concern over the high proportion of female high school students opting out of math prompted concerned staff members to stream all grade 10 advanced mathematics classes by sex. These students remained in sex-segregated classes until grade 12. This first report discusses the project's methodology and application, and addresses the four main issues of sex segregated classes and participation rate, students' attitudes towards mathematics, students' achievement, the reaction of students, parents and teachers. Appendices provide a literature review of the subject, questionnaires and interview materials used. (See "Sangster" below for following reports.) (NYBE/Res) (Minkler/510.712 Mac; OISE/370.780713 N867BER)

McClellan, Kathryn T.

"Math Anxiety: Cause, Impact and Challenge to Black Students." Unpublished paper. Hurst, Texas, 1984. 7 pgs. Microfiche. Math anxiety harshly affects Black students who are underrepresented in many science and engineering areas. The author looks at common causes such as low expectation and callous reaction by teachers to student questions and responses, insufficient role models, failure to be properly trained in early grades. Strategies to counteract these negative factors are outlined. (Phcopy/OISE or EricDoc) (OISE/Eric 241 270)

"Minorities and Mathematics." Special Issue. Journal for Research in Mathematics Education 15 (March 1984). 176 pgs. "A rainbow coalition of researchers" attempt to synthesize the available research on minorities and mathematics. Their papers examine learning and participation of minorities in mathematics; mathematics education for Native Americans and Asian Americans; the achievement of Black students; and the underachievement of Hispanics. A brief report of a project held in New York City provides a model to help minority students prepare for mathematics-based careers. (JRME)

(OISE/Journals)

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Mura, Roberta, et al.

"Attitudes, experiences et performances en mathématique d'etudiantes et d'etudiants de cinquieme secondaire selon leur choix scolaire." *Les Cabiers de recherche du GREMF: Group de recherche multidisciplinaire féministe* 9 (1986). 234 pgs. This study was prompted by the declining enrolment of females in secondary level math courses and the failure of existing research to address or attempt to explain this phenomenon. Among the variables looked at by the authors are subjective value of mathematics, attitudes towards success in mathematics, scholarly and professional aspirations. The document describes the project and analyzes the research data at its various stages. Extensive tables. References. (GREMF) (OISE/Women's Resource Centre)

Nicholson, Heather Johnston, and Ellen Wahl.

"Who Stole the Cookies? Out-of-school Math in Operation SMART." Paper presented at the Annual Conference of the American Association for the Advancement of Science, Boston, MA., February 1988. 7 pgs. Microfiche. The mathematical activities are designed for females between the ages of 6 and 18 years. Focus is on the principles fundamental to understanding mathematics - deduction, spatial, visualization, ratios, and variables - rather than on drill and practice. Examples are provided. The importance of staff participation in encouraging females in the study of mathematics and science is emphasized. Critical strategies include self-awareness among staff about their own issues of equity and learned incompetence and keeping records of what does and doesn't work to encourage participation among the female students. References.

(Phcopy/OISE or EricDoc)

(OISE/Eric 302 404)

Rogers, Pat.

"Real Women Don't Do Math! A Mathematics Camp for Grade 10 Girls." Ontario Mathematics Gazette 25 (December 1986):38-43. The author describes one of the three-day residential mathematics conferences (1985 and 1986) held at York University and offered to 10th grade girls from North York schools. The conferences, designed to give the girls a collaborative experience in the process of creating mathematics, are structured on four components: an orientation workshop on mathematical problemsolving skills and strategies; small group problem-solving sessions; discussion groups; and group presentations. The article focuses on the problem-solving workshop, provides sample problems and discusses one group's problem-solving result.

Sangster, Sandra, and Patricia Crawford.

Effect of Sex-Segregated Mathematics Classes on Student Attitudes, Achievement and Enrolment in Mathematics: A. Y. Jackson Secondary School, Year II. North York: North York Board of Education Research Report, November 1986. 78 pgs. This report summarizes the results of the second year of segregating advanced mathematic classes and assesses student achievement, attitude, participation and the reactions of students and parents to the program. It also discusses teaching styles and strategies and makes recommendations for changes. Appendices include questionnaires used and the analysis of findings.

(Minkler/510.712 San 1986)

Sangster, Sandra.

(NYBE/Res)

Effect of Sex-Segregated Mathematics Classes on Student Attitudes, Achievement and Enrolment in Mathematics: A. Y. Jackson Secondary School, Year III. North York: North York Board of Education Research Report, March 1988. 69 pgs. The results for the third year of the pilot project (1986-87) involving Grade 12 students, are presented in four sections: student attitudes towards mathematics, achievement in mathematics, perceptions of the impact of sex-segregated classes and future plans, and participation in mathematics. The difference in trends over the threeyear period was of borderline statistical significance providing little evidence of a strong impact of the program on the attitudes of female students. Appendices include questionnaires, longitudinal analyses, and documented student reactions. (NYBE/Res) (Minkler/510.712 San 1988)

Wiggan, Lorna.

Mathematics: The Invisible Filter. Toronto: Toronto Board of Education: Mathematics Department, 1983. The four components of this kit include a Report on Math Avoidance, Math Anxiety and Career Choices, and three booklets looking at various aspects of mathematics anxiety. The 52-page Research Report documents the results of a project examining the sex-related differences in mathematics among Toronto Board of Education students. They indicate that as females proceed through the grades, their participation in mathematics and related courses decline more sharply than males. The Appendices include "Guidelines for Planning a Career Day" and "Math Anxiety Courses and Programs." Bibliography. The booklets cover the issues of career planning for female students, suggestions for parental support, and strategies for students to overcome math anxiety. (TBEd/Math)

(OISE/370.19345M427;TBE/QA11 M371985)

Willms, J. Douglas, and Suzanne Jacobsen.

"Growth in Mathematics Skills during the Intermediate Years: Sex Differences and School Effects." International Journal of Educational Research. Forthcoming. This study examined differences in the rates at which grades 3 and 7

males and females acquired different types of mathematical skills - mathematical computation, concepts, and problem-solving. " The study is unique in that it emphasized students' rates of growth in mathematics ability, rather than their level of ability at one particular time." References. (IJER)

(OISE/Journals)

Curriculum Resources

Afflack, Ruth.

Beyond EQUALS: To Encourage the Participation of Women in Mathematics.

Oakland, California: Mills College, 1982.149 pgs. This resource document is designed for instructors with a goal of encouraging women to participate in mathematics. Emphasis is on problem solving, concrete representation, spatial and logical reasoning. Exercises include introduction to function machines, mathematical functions and application; problem solving; arithmetic and algebra; games and activities. Although it is intended for instructors of adult women, the material could be adapted to secondary level workshops and classrooms. Solutions are provided. Bibliography. (Eq) (Minkler/W.S. 510.71 Aff; OISE/C.R. 510 A257B)

Avital, Shmuel.

Fun with Mathematics. Toronto: OISE Press, 1986 227 pgs. 0-7744-5075-4. The problems in this workbook are designed for intermediate and high school students. There are eleven chapters of activities, most of which will fit easily into an existing curriculum. Included are patterns, angles, plane and space, fractions, squares, perfect numbers, number chains, division, how to explore and solve problems. Answers accompany each chapter. Glossary of terms. (OISE) (Minkler/510 Avi; OISE/510 A9595)

Chapline, Elaine B., and Claire M. Newman.

Teacher Education and Mathematics. Flushing, N.Y.: Oueen's College of the City University of New York, 1984. Microfiche. The complete package of Teacher Education and Mathematics (TEAM) modules was prepared for use in elementary courses or workshops and is designed to reduce math anxiety and develop math skills. These modules provide a new and comprehensive approach to teacher education that enables prospective teachers to reduce their own math anxiety levels, to develop solid math teaching skills, and to create a positive classroom environment. There are nine sections: Instructors' Handbook, Metric Measurement, Choice and Chance, Sex-Role Stereotyping, Women, Mathematics and Careers, Women as Mathematicians, Approximation and Estimation, Demystifying Math, and Patterns. Each come with teaching and student materials. Bibliographies. (WEEA)

(OISE/Eric 259 917-925)

Downie, Diane, Twila Slesnick, and Jean Kerr Stenmark.

Math for Girls and Other Problem Solvers. Berkeley, California: Math/Science Network, Lawrence Hall of Science, University of California, 1981. 108 pgs. A handbook of exercises for 7- to 13-year-old females introducing them to hands-on experiences in logical thinking and problem solving. Strands include logic, strategies and patterns; more difficult problems requiring a non-obvious solution; creative thinking, estimating and observing; spatial visualization. The handbook is intended to be used to set up a "math for girls class" in a school, museum, or recreation centre, but it can also be used for workshops or in the classroom as part of the mathematics

curriculum. Instructions are written simply and concisely to facilitate teacher preparation. Illustrated, photographs. Index of activities. Bibliography and list of resources.

(MC)

(OISE/510 D751M; FWTAO/372.7 Dow)

Federation of Women Teachers' Association of Ontario.

Cartes d'activités métriques: cycle moyen. Traduites et adaptées par L'Association des enseignantes et enseignants franco-ontariens, Ottawa, n.d. 28 pgs. There are sixtyone short activities in this workbook which demonstrate three aspects of metric measurement: linear, surface and volume. Each exercise includes brief instructions, materials needed and discussion questions. (CFORP) (OISE/C.R. Franco-Ontarien MAT 016)

Hardeman, Carole Hall, and Barbara T. Laquer.

MATHCO Kit. Newton, Mass.: Women's Educational Equity Act Program, 1982. MATHCO is a unique attempt to reach young people at the age when math breakdown occurs - at the junior high/middle school level. The material is arranged in five modules: math and careers, patterns, sequences and equations, math in your world, close encounters with everyday math, math and science. A Teachers' Guide accompanies each module and provides a complete package of all MATHCO materials for the planning and implementation of coursework in conjunction with regular math curriculum. Each module includes a motivational filmstrip presentation with audio cassette, teacher guides and activity sheets (providing an overview of the activity, a listing of math skills used, time needed, objectives, a list of materials needed), and student activity sheets (overview of activity, listing of math skills needed, materials, directions for completing activity). An Inservice Manual is included providing instructions for a teachers' workshop to familiarize them with MATHCO contents. (WEEA)

Kaseberg, Alice, Nancy Kreinberg, and Diane Downie.

Use EQUALS to Promote the Participation of Women in Mathematics. Berkeley, California: Lawrence Hall of Science, University of California, 1983. 134 pgs. The purpose of this manual is to train educators through workshops providing them with the tools to teach students in classroom settings. The emphasis is on math avoidance among females in the elementary and secondary levels. Strategies and materials are designed to encourage female students to continue in mathematics courses throughout their schooling, increase students' confidence and competence in doing mathematics, and relate the usefulness of mathematics to future career choices. The Appendices provide sample workshops, problem-solving activities, career activities and bibliographies.

(Eq)

(Minkler/W.S. 510.71 Kas; OISE/C.R. 510 K192u)

Krause, Marina C.

Multicultural Mathematics Materials. Reston, Virginia: The National Council of

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Teachers of Mathematics, Inc., 1983. 76 pgs. This illustrated workbook introduces games from Africa, Asia, Oceania, Europe, and the Middle East, with a special section devoted to the Hopi Indians of North America. Many activities cross grade levels ranging from grades 1 to 8. Each activity, designed for immediate use with only simple materials required, is introduced with an historical background, materials needed, object of game, how to play, number of players, and references. They include Egyptian numeration, Ko-no (a Korean line game), Origami cup, petroglyph, dreidel, Quipu (Inca record keeping), Aztec calendar, Hopi Rain Cloud (circles and half circles), Hopi Bird (study of geometric shapes). (NCTM)

(OISE/C.R. 510 K91 M)

Massialas, Byron, G. Project Director.

Fair Play: Developing Self-Concept and Decision-Making Skills In the Middle School. Decisions About Mathematics. Student Guide. Newton, Mass.: Women's Educational Equity Act Program, 1983. 120 pages. The eighteen lessons in this book explore female and male attitudes towards mathematics and look at factors that discourage female students from math studies. Suitable for grades 6 to 9, the exercises and questions demonstrate how math is a part of daily life and illustrate female occupations that incorporate mathematical skills. Concepts such as collecting and analyzing data, frequency tables, mean, mode and median, ratios and percentages, and line and circle graphs are demonstrated. There is a strong emphasis on women in the workforce and career planning in mathematical professions for female students. Illustrated. Clear language. (WEEA)

(OISE/C.R. 305.3 M417F V.4)

Massialas, Byron G. Project Director.

Fair Play: Developing Self-Concept and Decision-Making Skills In the Middle School. Decisions About Mathematics Teacher's Guide. Newton, Mass.: Women's Educational Equity Act Program, 1983. 133 pgs. The guide provides an overview for each lesson which includes duration of class, student objective, teaching suggestions, purpose, vocabulary learned, background information and special preparations if necessary. It also gives answers to in-class activities, and suggests points for in-class discussion with an emphasis on roles women play in the home and in the work force, social differences between men and women, pay inequity. Print and audio-visual resources.

(WEEA)

(OISE/C.R. 305.3 M417F V.4 T.G.)

Percevault, John B. and Gordon Orlick.

Teaching Mathematics in the Early Childhood Classroom, Edmonton, Alberta: The Alberta Teachers' Association, 1987, 0-920696-43-0, 106 pgs. This document combines theory and practical application. Twenty-four articles explore learning strategies for pre-kindergarten, kindergarten and primary students emphasising curriculum development and mathematics as creativity. The activities focus on problem solving, pre-number concepts, pattern and rhythm, winter mathematic activities,

manipulative games, primary geometry, arithmetic, and graphing. References. (ATA) (Minkler/372.72044 Tea)

Perl, Teri Hoch, and Joan M. Manning.

Women, Numbers and Dreams. Biographical Sketches and Math Activities. Graphic Design: Analee Nunan. Santa Rosa, California: National Women's History Project, 1982. 0-938625-07-1. 191 pgs. This book provides role models for young women and introduces a variety of mathematical concepts suitable for grades 3 to 8. The sketches of thirteen women - both contemporary and historical - are graphs incorporating number theories such as multiples, prime numbers, triangulars, abstract algebra, and fibonacci numbers. Additional mathematical activities explain the concepts while the biographical sketches portray women who applied them in their daily work lives: computer programmer Ada Lovelace, mathematician Mary Boole, linguist Mary Somerville, Native American and statistician Edna Lee Paisano. "The reader is permitted and encouraged to make photocopies of the math activities." (NWHP) (FWTAO/372.7 Per)

Perl, Teri Hoch, and Joan M. Manning.

Women, Numbers and Dreams. Biographical Sketches and Math Activities. Teacher's Manual. Santa Rosa, California: National Women's History Project, 1982. 25 pgs. This manual suggests ways of integrating Women, Numbers and Dreams into a teaching program. Math activities have been included with the biographical sketches to show that mathematics is far more than the arithmetic learned in elementary school. Shade-in exercises introduce a wide range of concepts: "shade all multiples of 9" to "shade all regions containing decimal numbers that are symmetric when translated into binary form." Additional exercises extend explanation; role playing and discussion questions for each biography integrate real life applications. Two lesson plans are included providing models for developing projects, activities, and discussions around the various stories in the book. (NWHP)

(FWTAO/372.7 Per)

Saunders, Hal

"When are we ever gonna have to use this?" The Mathematics Teacher 73

(January 1980):7-16. In order to answer this question asked by many high school students, the author interviewed 100 people from a variety of occupations to determine what kind of mathematics they actually use in their work. Typical mathematical problems encountered in these occupations were collected during the interviews and, along with strategies and recommendations for teaching, eighteen are included in this article. The occupations include pharmacist, air traffic controller, electronics engineer, meteorologist, environmental biologist, auto mechanic, and farmer. (MT) (OISE/Journals)

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Toronto Board of Education. Mathematics Department.

Calendar Math. Mathematics Activities for Adults and Children to do together in the home. Toronto: Mathematics Department, Toronto Board of Education, 1988. This twelve-month calendar, reissued yearly, is an opportunity for parents and teachers to work together with their children to help them enjoy mathematics. The collection of activities relates to monthly themes and centres around Grades 3 and 4, but many can be simplified for students in earlier grades or extended to Grades 5 and 6. Each month has about five ideas for projects that include recipes, constructions, experiments, puzzles or problems, and outdoor activities.

(LP)

Wiggan, Lorna, et al.

Everyday Math 1. Toronto: Learnxs Press, 1980. 0-920020-12-7. 156 pgs. A variety of exercises for students in grades 7 to 10. Mathematical concepts are applied to everyday life situations and activities such as reading the newspaper, shopping, employment, and eating. The activities cover non-computational use of numbers, fractions, decimals, percents, and ratio and rate. Illustrated. Graphs and tables. (LP)

(OISE/C1 4140 E93; FWTA0/372.7; Wig/ TBE/QA39.2 E93 1980)

Wiggan, Lorna, et al.

(LP)

Everyday Math 2. Toronto: Learnxs Press, 1980. 0-920020-13-5. 116 pgs. More exercises for students in grades 7 to 10 which cover the mathematical concepts of linear measurement, area, temperature, time, volume-capacity, mass, and measurement review. Illustrated.

(OISE/C14140E93; FWTA0/372.7 Wig; TBE/QA39.2 E932 1980)

Science Background Materials

Beauchamp, Rachelle Sender.

"Women inventors project." Federation of Women Teachers' Association of Ontario Newsletter 6 (June 1988):21-24. The Canadian Women Inventors Project in Waterloo, Ontario, is an educational program with the objective of breaking the cycle of women's exclusion from technical creativity. This article provides a background of the Project, describes a video about women inventors and a one-day pilot workshop held in Sept. 1987. "Women's inventions and the whole subject of inventing itself were excellent tools for turning girls on to the excitement and creativity of science, technology and entrepreneurship and interesting them in non-traditional occupations." (FWTAO) (FWTAO/lournals)

Bournival, Marie-Thérèse.

"Profession? Femme de sciences!" La Gazette des Femme, Conseil du Statut de la femme 8 (Novembre-décembre 1986):8-15. This article profiles women ranging from high school and college students actively pursuing careers in science to women working in the field. Interviews are conducted with high school students in Montreal pursuing medicine, an award-winning university chemistry major, a statistician college major, a geneticist and an anthropologist. The women talk about gender differences, their future ambitions, experiences at school, and their determination to make it in a changing world. References. (GF)

(OISE/Women's Resource Ctr.)

Chauvin, Marny.

"Women in Science - What Schools Can Do." Comment on Education 17 (April 1987):19-25. Despite the optimistic observations of the late 1970s indicating that more Canadian women were entering careers in science, engineering and technology, current statistics show that women remain anomalies in these fields. The author looks at reasons why female students don't enter science courses and what schools can do to affect change. Strategies include emphasis on parental support of science studies, discussion in high school classes focusing on the difficulties women face of balancing a career and family, and introducing science courses earlier in the elementary level. References.

(OISE/Journals; Minkler/Journals)

Ching Hilda Lei, ed.

(COE)

Proceedings of the First National Conference for Women in Science, Engineering and Technology/Actes de la Premier Conference Nationale des Femmes dans les Sciences, le genie et la technologie. Vancouver, B.C. May 20-22,

1983. Sponsored by the Society for Canadian Women in Science and Technology. The published proceedings of this groundbreaking conference are intended to provide the basis for future ideas, discussions, and strategies for change. The three sections consist

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of major addresses and papers, panel discussions, and workshop summaries. Participants discussed intervention programs, science education, expanding female students' horizons, girls and women in math and science. Workshops surveyed current strategies such as EQUALS. List of participants. (SCWIST)

(OISE/Women's Resource Centre)

"Femmes et Science/Women and Science." Resources for Feminist

Research/Documentation sur la recherche féministe 15 (November 1986). 87 pgs. This issue presents the many ways that women engage in scientific endeavours - not all of them recognized by official Science. The five sections reflect this diversity: the status of women scientists in Canada; barriers facing women in scientific professions; women and scientific knowledge; women's scientific practices in nutrition, food production, home economics; and the search for a new approach to science. Extensive references. (RFR) (OISE/Journals)

Ferguson, Janet.

Who Turns the Wheel? Proceedings of a Workshop on the Science Education of Women in Canada. Ottawa: Science Council of Canada, 1981. 136 pgs. The papers presented at the workshop held in 1981 addressed important issues affecting girls in Canadian science classes: their enrolment and achievement in high school science, sex differences in intellectual ability, the roles of educators and teachers, assessment and recommendations of intervention techniques. Endnotes provide references. (SCC) (TBE/Q130.W67; OISE/305.435 W926W)

Government of Ontario. Ministry of Education.

Inventory of Ontario Women in Scientific and Technical Fields./Répertoire des femmes dans les domaines des sciences et de la technologie en Ontario. Toronto: Government of Ontario, Ministry of Education, 1988. Eng. 53 pgs./French 55 pgs. The inventory can assist secondary school science teachers in finding resource people within their own geographical areas in order to provide female students with role models in non-traditional scientific and technical careers. The occupations cover related professions and trades in life science, earth and space science, and physical science. The speakers are drawn from all regions of Ontario. The directory includes the professional's name, phone number, occupation, region, and grade level suitability. (ONMe) (OWD Resource Centre)

Gouvernement du Québec. Ministère de l'Éducation.

Pour me brancher sur l'avenir, je choisis la science et la technologie.

Gouvernement du Québec, ministère de l'Éducation, coordination à la condition féminine, 1987. A comprehensive information kit for educators and students informing them about non-traditional career options. A 62-page booklet, A Chacune son métier, contains interviews with twenty-five women in non-traditional work. An informative 114-page guide for adolescents, Explorons de nouveaux espaces, discusses nontraditional work for women in a technological age. It also provides a bird's-eye view of female students participating in a wide range of non-traditional programs. The students speak candidly about their experiences revealing the prejudices and barriers as well as their personal methods of combatting them. Finally it outlines secondary level studies needed to prepare for non-traditional occupations and looks at available postsecondary courses. Other items included in the kit are a poster promoting women's non-traditional careers, audio visual resources, and a compilation of articles on the subject. References and bibliographies are cited in the two publications. (GQ) (OWD Resource Centre)

Harding, Jan.

Switched Off: The Science Education of Girls. York, England: Longman for Schools Council, Longman Resources Unit, 1983. 56 pgs. Focusing on the British school system, the author discusses ways in which stereotyping operates, how out-of-school experiences influence boys and girls differently, types of science courses offered, and roles that guidance and counselling play in course selection and career options. She presents a range of strategies that schools can draw on to extend and promote girls' opportunities in science. References and further readings. (LRU) (OISE/C.R. 507 H263S)

Humphreys, Sheila M.

Women and Minorities In Science: Strategies for Increasing Participation. Boulder, Colorado: Westview Press, Inc., 1982. 0-86531-317-2. 218 pgs. The twelve authors of this book assess what can be done to change attitudes of both students and educators so that women and minorities can achieve full participation in scientific and mathematics-related professions. Throughout the emphasis is on intervention strategies from teacher training to high school career paths for women in physics. References. (WV) (OISE/305.435 W872)

Kahle, Jane Butler, ed.

Women In Science. A Report from the Field. Philadelphia Press, 1985. 1-85000-020-4. 251 pgs. The focus of the nine essays in this collection is on women in the biological sciences. Topics discuss entrance patterns and retention and reward systems, differential pay scales, the double bias of racism and sexism facing minority women, the underemployment and underutilization of women in science. Of particular interest are two essays: "Retention of Girls in Science: Case Studies of Secondary Teachers" and "Factors Affecting Female Achievement and Interest in Science and in Scientific Careers." Each essay is referenced. Author and Subject Index. (FP) (THE/Q130.W658 1985; OISE/305.435 W8722)

Klainin, Sunee, Peter J. Fensham, and Leo H.T. West.

"The Superior Achievement of Girls In Chemistry and Physics In Upper Secondary Schools In Thailand." *Research In Science & Technological Education* 7 (1989):5-14. Grades 10, 11 and 12 female students in Bangkok, Thailand outperform boys in upper secondary school chemistry and physics. The authors

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suggest that influences come from the structure of the curricula (those who opt for the science stream must do biology, chemistry, and physics for three years), and the fact that physical sciences are not male dominated. These explanations may provide a framework to apply to investigations in western countries where gender imbalances are being addressed. Tables. References. (RSTE)

(OISE/Journals)

Malcom, Shirley A.

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"Who will do Science In the next century?" Scientific American (February 1990):112. The author gives a synopsis of the critical situation in the United States in the field of scientific occupations. She warns that there will be a serious shortage of scientists in the coming years unless the students now entering or wanting to enter scientific studies, the majority of whom are minority and female students, are welcomed into and encouraged to succeed in the scientific community. (SA) (Minkler Journals)

Manthorpe, Catherine A.

"Men's Science, Women's Science or Science? Some Issues Related to the study of Girls' Science Education." Studies In Science Education 9 (1982):65-80. The author introduces a critical analysis of "equality of opportunity" stating that it is not enough to "attract" girls into science. She agrees that facilities for girls in science must be improved, and argues that in addition the structure of science, the social relations upon which science is built, must be altered in order to remove the greater barriers preventing girls from attaining successful scientific professions. References. (SSE) (OISE/Journals)

Mura, Roberta.

À la recherche de la subjectivité dans le monde des sciences: point de vue *feministes.* Ottawa: Institut Canadien de recherches sur les femmes, 1989. 47 pgs. How would a feminist perspective affect scientific study? How would women's involvement affect reproductive technology, for example? Is the female concern with life-giving rather than life-destroying forces any reason to deny women access to scientific work? These are just some of the challenging questions the author raises in this critical analysis of the scientific world. Taking into consideration the works of critical thinkers such as Evelyn Fox Keller, Luce Iragaray and Sandra Harding, she demonstrates how and why women have been underrepresented in scientific endeavour, and argues against the notion that objectivity is a more superior approach than subjectivity. The women active in the field today are introducing new and innovative paradigms to the physical, applied, pure and natural sciences which incorporate women's concerns and demonstrate that even though women approach scientific study differently than men their work is of no lesser value. References. (CRIAW) (OISE/305.40971 C928) Mura, Roberta, Meredith Kimball, and Renée Cloutier.

"Girls and Science Programs: Two Steps Forward, One Step Back." In Women and Education: A Canadian Perspective. eds. Jane Gaskell and Arlene McLaren, 133-149. Calgary: Detselig Enterprises Limited, 1987. A study of students in the last year of secondary schools revealed that it is not necessarily anxiety or lack of ability that keeps female students from mathematics, rather it is that careers in math and science are made to seem incongruous with female roles - especially motherhood. In order to encourage greater participation of women, it is important that women's concerns be reflected and that the system be changed to meet women's as well as men's needs. References.

(DET)

(OISE/376.971 W872)

Ogilvie, Marilyn Bailey.

Women In Science — Antiquity through the Nineteenth Century: A Biographical Dictionary with Annotated Bibliography. Cambridge, Mass.: The MIT Press, 1986. 0-262-15031-X. 254 pgs. This very well designed dictionary documents the contributions women have made to science throughout history. The introductory essay provides an historical context with brief overviews of major chronological periods from Antiquity to the 20th century. The biographical accounts, arranged alphabetically, include vital statistics, an overview of the women's scientific work, and coded references to the Annotated Bibliography for further reading. The dictionary is a valuable learning tool as well as a resource for further research. (MIT) (OISE/509.2 034W)

Raat, Jan H., Jan Harding, and Ilja Mottier.

"Proceedings: GASAT Conference 1981. Reports on the Conference Girls and Science and Technology." Vol. 1. Eindhoven, The Netherlands: Eindhoven University of Technology, 1981. Microfiche. 37 pgs. This report provides a succinct overview of the strategies formulated at the conference reflecting the objective of increased participation of girls and women in science and technology. These include teacher education, on-going research, support for women outside the classroom, intervention strategies, development of curriculum and teaching materials, teaching methods, and classroom management. There are two other volumes of published materials from the conference. Volume 2 documents the twenty-one papers presented, and volume 3 outlines initiatives taken by the participating countries. (EricDoc)

(OISE/Eric 262 995-997)

Rand, Donna, and Lydia H. Gibb.

"A Model Program for Gifted Girls In Science." Journal for the Education of the Gifted 12 (Winter 1989):142-155. This article discusses background information and related research concerning the "girls only" program. Basic components of the program include parental involvement, female role models, hands-on investigations, and enjoyment of science activities. Brief descriptions of two sample activities are provided. The model can be adapted in the public or private school or by a community group

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and is applicable to the general population of girls as well as gifted girls. Bibliography and References. (IEG)

(OISE/Journals)

Rosser, Sue V.

Female-Friendly Science: Applying Women's Studies Methods and Theories to Attract Students. Elmsford, N.Y.: Pergamon Press, Inc., 1990. 176 pgs. 0-08- 037470-0. A severe shortage of trained scientists is predicted for the 1990s, and it is indicated that among those most qualified and eligible to alleviate this shortage are women and minorities. The issue of how to attract and keep women and people from diverse backgrounds in the fields of science is the focus of this recently published work. The suggestions, based on feminist pedagogical methods and theories of women's studies, will be useful to science and health educators at the secondary and college levels who are interested in opening up their science classrooms to women and people of colour. The contents include a review of the crisis in higher education, feminist theories and methods that can make course content less alienating for women, approaches in teaching science that connect to students, research by women scientists reflecting women's ways of knowing, sexism in textbooks, and warming up the classroom climate for women. Bibliography of feminism in science, feminist pedagogy, feminist theory, and women and science. Index. (PERG)

(OISE/Women's Resource Centre; OISE/CIRC-507.11/R828F)

"Science and Technology/Science et technologie." Edited by Ursula Franklin and Jeanne Maranada. Canadian Woman Studies/Les Cabiers de la femme 5 (Summer 1984). 95 pgs. This issue provides a broad range of background reading on women in science and technology from the impact of microtechnology on society and the technological effects on the workplace to the attitude of females towards mathematical studies and pursuit of professions in science and technology. While some articles provide analysis others suggest ways to encourage young females into these professions. Interviews with women scientists and mathematicians, biochemists and electricians discuss the achievements and concerns of women working and studying in these areas. References. (CWS)

(OISE/Journals)

Terlon, Claire.

"Filles et garçons devant l'enseignement scientifique et technique. Recherches anglo-saxonnes." Revue Française de Pédagogie 72 (Juillet-août-septembre 1285):51-59. The author provides a brief review of the existing English literature (1963-1980) that focuses on cognitive differences between males and females and socialization of the sexes. This research brings to the public's attention the problems contributing to the gender gap and the diverse strategies that are providing direction for students, parents, guides and administrators, promising more equal involvement of females in scientific and technological professions. References. (RFP) (OISE/Journals)

Women Inventors Project.

Daughters of Invention: An Invention Workshop for Girls. Handbook for Planners. Waterloo, Ontario: The Women Inventors Project, 1988. 85 pgs. Three-hole punched for binder. This manual is designed to help teachers and workshop facilitators create a one-day event for female students. The contents can be applied to grade K through 12. The handbook is divided into two sections. The first provides an overview of the Women's Inventors Project and its pilot invention workshop for girls held in the fall of 1987. The second section and the accompanying 14 appendices provide the nuts and bolts of workshop organizing. Tasks outlined include: identifying objectives and goals, age groups and numbers of participants, assembling a management team, financial budgets, resources, and time lines. Among the items illustrated in the appendices are: tips on learning styles for girls and how to encourage group learning, a glossary of inventors' terms, sample patent drawings and abstracts, a bibliography, a herstory of inventing, examples of workshop activities from self-development to creative and inventing activities, and a list of women's inventions available for display. (OISE C.R.608.7/W191D) (WIP)

Whyte, Judith.

Girls Into Science and Technology: the Story of a Project. London: Routledge and Kegan Paul, 1986. 0-7102-0364-0. 290 pgs. This book is an account of the Girls Into Science and Technology Project undertaken at the Manchester (UK) Polytechnic, 1979-1984. Designed as an action research program, GIST had the twin aims of investigating the causes of female underachievement and simultaneously trying to change the situation. The author describes the need for GIST and the research design, looks at the ways girls are "edged out" of classes, discusses the program's intervention strategies, identifies components of girl-friendly science, looks at the pros and cons of single-sex and mixed-sex schooling, analyzes teachers' responses to GIST, and describes the effect of the five-year program. Tables. Bibliography. Appendix. Index. (OISE/507.1041 W629G; TBE/Q183.4 G7 W48; FWTAO/372.3 Why) (RCH)

Curriculum Resources

Adams, Richard C.

Science with Computers New York: An Experimental Science Series Book, Franklin Watts, 1987. 0-531-10324-2. 128 pgs. The author, a science and computer science teacher and a columnist with The Computing Teacher, has written a very clear, accessible book for secondary-level students. The objective is to show how computers can be used in conjunction with science projects making data easier to handle, mathematics a whiz, the results more valid and easier to interpret. Programs are designed for Apple II series of computers with BASIC computer language. Ideas for science projects without computers are also included. Lessons cover number crunching, statistics, sorts and data bases, simulations, computer as a laboratory tool, and word processing. Glossary. Appendices. Selected Readings. Index. (FRK)

(TBE/Q183.9 A33 1987)

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Baeckler, Virginia.

Storytime Science. Illustrated by Vera Johns. Hopewell, New Jersey: Sources, 1986. 0-9603232-28. 102 pgs. This book offers a unique approach to introducing science to nursery and elementary level children. The author's premise is that story hour is a time of magic and wonder when children "transcend the practical limits of everyday thinking and plunge into the world of make believe." After telling them a fanciful story, the time is right for exploring the world of the unknown. Power is the theme of the twenty-seven storytime experiments: power of air, liquid, heat, battery, light, vibration, growth, and decay, and self-power. Each experiment provides a list of suggested stories that can be used in conjunction with the experiments. Additional notations provide a brief introduction to the activity and list the needed materials. Discussion is encouraged and homework provides a follow-up to the lesson. Appendices. (Sou) (TBE/TJ163.95 B29 1986)

Brooks, Phyllis, and Jane Fletcher.

Careers for Girls in Science. Toronto: Toronto Board of Education, Science Department, n.d. 60 pgs. Provides biographical profiles of twelve contemporary Canadian female scientists. In clearly written language the women discuss their work these include an aeronautical engineer, obstetrician, registered nurse, forestry technical assistant, laboratory technician, and chemical engineer. (TBE/Sc) (Minkler/507.088042 Bro)

Brown, Ken, and Don Plumb.

Keeping Your Options Open. North York: North York Board of Education, n.d. This kit of sixteen transparencies is designed to facilitate an in-class presentation to grade 10 female science students to educate them about the evolving job market and present career options in the fields of high-technology. The transparencies focus on statistical information about female enrolments in maths and sciences, careers requiring a science background, inequality in the workforce, women who do science, and a summary. Follow-up activities, audio-visual resources and a list of speakers complete the kit. (NYEcc) (Minkler/507.088042 Brow)

Connors, Wayne T. et al.

Science fare: A Practical Guide for Parents and Students. Markham, Ont.: Sciencefare Press, Inc., 1988. 0-201-50043-4. 63 pgs. A colourful guidebook written for students in grades 4 to 10 who want to explore science by creating a science project. Instructions help them to research, organize, measure, design, problem-solve, troubleshoot, analyze, report and present. Step-by-step instructions include the getting-started phase of creating flow charts and timelines, choosing and researching a topic, planning experimental or non-experimental topics, doing an experiment and keeping records, wrap up and summary, building the exhibit for the fair, evaluation and judging procedures. Checklists throughout assist the student. Illustrations depict active female and male learners. Clearly written. References. (A-W)

Fraser, Sherry.

S.P.A.C.E.S. Solving Problems of Access to Careers in Engineering and Science. Illustrated by W. S. Wells. Palo Alto, California: Dale Seymour Publications, 1982. 0-86651-147-4.141 pgs. Spiral bound. A collection of math and career activities for students in grades 4 through 10. The exercises are designed to stimulate students' thinking about scientific careers, develop problem-solving skills, promote positive attitudes towards the study of math, increase interest and knowledge about scientific work, strengthen spatial visualization skills, and introduce language and familiarity with mechanical tools. Women's participation in science is emphasized (a women-scientist card game is included). Introductions for each activity define the skill, time needed, participants (groups or individuals), materials needed, preparation and directions. Extensions and work sheets are supplied. (Eq) (Minkler/W.S. 371.42 Spa; OISE/C.R. 371.42 S732)

Hargrave, Enid, and Janet Brooks.

Science Through Infant Topics. Teachers' Book A. General editor Brenda Prestt. London: Longman Scienceworld Series, Longman Group Limited, 1987. 0-58218-610-2. 150 pgs. The scientific exercises in this guidebook are designed for the 5- to 8-year-old student. The key skills learned are observing, communicating, measuring, recording, classifying, predicting, controlling variables, investigating. There are twelve activities to cover a full year. Each one takes place in a specific setting: a fall market, a gymnasium, around a Christmas tree, in a workshop. Discussions about the people and their occupations and activities enable science and related activities to be seen as an essential part of people's lives. Topics include seeds and growth seasons; forces and energy in physical exercise; observation, combinations, sorting, textures and colours; nails and screws, wood and metal. Diagrams set out the main objectives of each scientific experiment, list materials needed, and describe the presentation of the activity. The participation of the children is integral to the exercises themselves. Lavishly illustrated; female and male children are portrayed as active learners. Resources. Index.

(CCP)

(OISE/C.R. 500 H279LT.b.a.)

Hargrave, Enid, and Janet Brooks.

Science Through Infant Topics. Starter Book A. (To be used with Teachers' Book A.) General editor Brenda Prestt. London: Longman Scienceworld Series, Longman Group Limited, 1986. 0-582 18-819-9. 32 pgs. This oversized display book functions as a tabletop flipchart and accompanies lessons in Teachers' Book A above. The colourful illustrations depict the people involved in the twelve different activities and provides a focal point for each lesson. Discussion points are located on the reverse side of the illustration that assist the teacher in initiating an exploration of occupations and starting the scientific experiments.

(CCP)

(OISE/C.R. 500 H279L S.b.a.)

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Heller, M., M.-E. Campbell, F. Pelletier, and A. Tremblay.

L'accès des élèves franco-ontariens à la formation postsecondaire et aux carrières non traditionelles. Toronto: Centre de recherches en éducation francoontarienne, 1987. This is an 8-volume publication addressing the issue of Franco-Ontarian students in science and technology. The work is designed as intervention material to influence career choices and educate students about the technological and scientific transformation of Canadian society. It is useful to career counsellors in the intermediate and secondary levels, and can be used by teachers. Vol. 1: focuses on orientation toward non-traditional work and how youth can be influenced. Extensive bibliographies and resource materials. Vol. 2 through 7 are activities: creating a fantasy about living in the future and the type of work the student might be doing; exploring job categories and writing profiles of careers in the fields of biology, chemistry, mathematics, physics, technology; preparing and conducting interviews with professionals; researching and organizing a debate about technological evolution and its impact; comparative studies of male and female representation in the work force and of the underrepresentation of Franco-Ontarians; examining the role sexual stereotyping plays in career choices. Each activity is outlined, provides goals, instructions, resources and worksheets, and lesson organisation. The final volume summarizes the activities and their purpose. (see below)

(OISE/Ref, 370.19342 A169)

Heller, Monica, and Mary-Ellen Campbell.

L'accèss aux études postsecondaires et aux carrières nontraditionnelles. Trousse d'orientation pour les niveaux intermédiaire et supérieur. Ottawa: Centre franco-ontarien des resources pédagogiques, 1988. 258 pg. This resource kit is a new edition of the one cited above. The focus and contents remain the same. Additions include film and video resources, a bibliography, and personnel resources. The activities are presented separately from the instructions and overviews. The entire kit is in a binder.

(CFORP)

Massialas, Byron G. Project Director.

Fair Play: Developing Self-Concept and Decision-Making in the Middle School Decisions About Science. Student Guide. Newton, Mass.: Women's Educational Equity Act Program, 183. 130 pgs. The seventeen lessons in this workbook are designed for students in grades 6 to 9. The students explore their attitudes and beliefs about science, especially why males are more likely to pursue and succeed in this area than females. Through clearly written lessons they come to understand how genetic factors and natural and social environments have shaped these attitudes. Female role models demonstrate the work of electricians, astronauts, medical researchers, etc., and how technology and science affect individual life styles and life choices. Encourages constructive and co-operative decision-making skills. Illustrated. (WEEA) (OISE/C.R. 305.3 M417F V.5)

Massialas, Byron, G. Project Director.

Fair Play: Developing Self-Concept and Decision-Making Skills in the Middle School: Decisions About Science. Teacher's Guide. Newton, Mass.: Women's Educational Equity Act, 1983. 139 pgs. The guide provides an overview for each lesson which includes duration of class, purpose, student objective, teaching suggestions, vocabulary learned, background information, and special preparations if necessary. Answers to the questions are included in each exercise and activities are suggested for students, especially female students, that challenge the belief that science is a male domain. Print and audio-visual resources. Illustrated. (OISE/C.R. 305.3 M417F V.5 T.G.) (WEEA)

31

McClintock Collective.

Getting Into Gear. Gender Inclusive Teaching Strategies in Science. Canberra, Australia: Developed by the McClintock Collective, Curriculum Development Centre, 1988. 274 pgs. This book is a practical teacher resource containing curriculum materials and perspectives for upper elementary and secondary school science. The first of two major sections outlines the rationale for inclusive science teaching and explains many teaching strategies, classroom ideas and hints to develop inclusive science curriculum and assessment practices. The second section translates these strategies into practice providing many examples of creative and activity-based units. Units include Tinkering and Machines, Metal Magic and Women of Steel. Some activities look at the media while others use drama to teach electricity and chemistry. Each theory section contains references. Extensive resource guide. (McC)

(OWD Resource Centre)

McIntyre, Margaret.

Early Childhood and Science. Washington, D.C.: National Science Teachers Association, 1984. 0-87355-029-3. 136 pgs. A teacher's guidebook drawn from a series of the author's articles published in Science and Children. Topics cover colour awareness, sounds, spatial concepts, discovery and exploration, seasonal science activities, water and air, machines, and geology. Treats males and females equally and emphasizes needs of disabled children. Illustrated. (NSTA) (Minkler/372.35044 Mcl)

Menard, Sharon L.

How High the Sky? How Far the Moon? Women Scientists Today. An

Educational Program for Girls and Women in Math and Science. Washington, D.C.: Women's Educational Equity Act Program, 1980. 148 pgs. Microfiche. This packet of resource materials contains four sections: curriculum activities, a career guide for women, a role models list, and an annotated bibliography. The focus is women in science and mathematics. There are twenty-two activities for use at K-12 levels which cover mathematical procedures, classification of data and graphing methods, logic and procedures, spatial relationships, and mechanical aptitude. Self-awareness and jobhunting skills are emphasized. The Career Guide describes careers in selected areas of

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science and math. Role models include Nobel Prize winners, prominent Black women scientists, and inventors. (WEEA)

(OISE/Eric 191 669)

Metropolitan Toronto School Boards.

Resource Documents for Science. Toronto: The Metropolitan Toronto School Board, 1986-1988. 5 vols. These curriculum materials were especially designed to have Toronto-wide applicability and have been written to the specifications of the Ministry of Education. There are five separate volumes of documents covering science coursework for grades 7, 8, 9, 10 general, and 10 advanced. Each unit constitutes fourfifths of the coursework with the compulsory optional units included. The grade 7 and 8 units begin with an overview giving information about preparation, key idea, objectives, applications, societal implications, materials, teacher preparation, background information, student activities, integration/extension. Appendices of student activity worksheets that can be copied. Grades 9 and both 10 levels begin with a Unit Planning Summary - suggested sequence of topics, objectives, evaluation, suggested evaluation breakdown, materials list; each topic includes key idea, objectives, applications, societal implications, safety, materials, resources, notes to the teacher, suggested evaluation, student activities. Appendices contain student-ready materials that can be copied, teacher answers, and bibliography. The material has been reviewed for bias and stereotyping. (PH)

(Minkler/507.1 09713 541)

Noyce, Ruth, ed.

Comets Profiles. Career Oriented Modules to Explore Topics in Science. Vol. 1. Illustrated by Jeannot Seymour, Washington, D.C.: National Science Teachers Association, 1984. 273 pgs. Spiral bound. This book of profiles accompanies the instructional modules of Comets Science (see "Smith, Walter" below) and provides biographies of contemporary women active in related scientific professions. Its two-fold purpose is to demonstrate to early adolescent females that learning math and science concepts can have a payoff in a wide variety of careers, and to encourage them to consider science-related careers. The biographies are set up as interviews so that the women in profile - a basketball coach, chemical engineer, physician, zoo administrator — actively speak about their profession. Each biography includes a content quiz, words to know, ideas for writing, and ideas for projects. Bios and/or activities may be copied for classroom activities. (NTSA) (OISE/C.R. 507 C732 v.l)

Richards, Roy, Margaret Collis, and Doug Kincaid.

An Early Start to Science. London: Macdonald and Company (Publishers) Ltd., 1987. 0-356-115550. 80 pgs. A beautifully illustrated, easy-to-use book that offers a comprehensive collection of scientific experiences for 5- to 8-year-old children. The exercises encourage exploring, observing, manipulating, comparing, organizing, questioning, testing, and looking for patterns. All experiments are illustrated with

straightforward directions listing materials needed. Topics explore the outlines of the body, shapes of noses and ears, feet and hands, music and other sounds, gardens and gardening, colour, time, shadows, balancing, water, and electrical things. Male and female children are active learners. (MacLon) (OISE/C.R. 507 R517E)

Scholastic Early Childhood Program: Science. New York: Scholastic Book Services, 1981. This multi-component boxed kit is designed to provide the foundation for a comprehensive kindergarten curriculum. The Science module contains a teaching guide, worksheets, assessment materials, a parent component, games, puzzles, learning posters (ocean and land), activity cards, sequence cards, colour/shape cards, baby/adult animal cards. The activities encourage the 5 year old to grasp ideas and learn a variety of tasks. Four themes cover thirty-two weeks of instruction: Same and Different, Needs and Feelings, Work and Play, Growth and Change. The 346-page teacher's guide is organized into weeks and lessons are organized by theme. Each lesson includes an objective, an overview of the week, and teaching activities which incorporate the program materials - worksheets, games and puzzles, etc. An appendix provides a resource list of books for children and teacher, audio-visual resources, and sources of information about children with special needs. (o/p)

Smith, Walter S. et al.

Comets Science. Career Oriented Modules to Explore Topics in Science. Vol. 2. Graphic designs and Illustrations by Michael G. Braa. Washington, D.C.: National Science Teachers Association, 1984. 447 pgs. Spiral bound. There are twenty-four sets of supplemental lesson plans for grades 5 to 9 in this module. It is designed to enable teachers to bring into their science or math class community resource people to (1) teach a captivating science lesson, (2) tell students how the science concept being demonstrated is used in their career, and (3) talk with students and answer questions about their career. The action provides an example of a "living" science that is aimed to encourage students to keep the doors open to their future careers. Although Comets is designed to assist the resource visitors, the activities can be led by the teachers. The lessons, divided into Physical Science and Engineering, Life Science and Health, Math, Calculating and Computers, identify the topic and suggest resource people and where to find them; outline the activities in the lesson; identify related modules; describe science contributions made by women in the field; include an extension activity, career information, and a bibliography of related activities, biographies and readings. (NTSA) (OISE/C.R. 507 C732 V2)

Sprung, Barbara, Merle Froschl, and Patricia B. Campbell.

What Will Happen If...Young Children and the Scientific Method. New York: Women's Educational Equity Act, 1985. 0-931-62909-0. 128 pgs. With the help of this guide teachers are able to ensure that all children, regardless of sex, race or disability, develop essential math and science skills. Emphasis is placed on visual-spatial and

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problem-solving activities. There are four areas of exploration: water and sand, blocks, bottles and liquids, and machines. Each chapter includes an overview, step-by- step activities, materials needed and equity issues to be aware of while children perform the exercises. Designed for children between the ages of 4 and 6. Resources. References. Illustrated with photographs. (WEEA)

(FWTAO/372.7 Spr)

Computers and Technology Background Materials

Brooks, Wilson et al.

Equitable Learning with Computers Now. Toronto: Board of Education for the City of Toronto, March 1987. 15 pgs. This document recommends numerous strategies designed to close economic, racial and gender-related gaps in computer use and to promote equality of computer access and learning. The strategies, directed towards classroom teachers and administrative staff, highlight equal access, software selection, and classroom management. Each strategy suggests concrete, immediate and practical actions and refers to specific publications that can facilitate its implementation. (Phcopy/THE) (Minkler/004.07 09713541 Lea Suppl; TBE/LB1 028.43 .E654 1987)

Chiarelli, Diana L

"Sex and Computers: Equity vs Inequity." *Comment on Education* February 1988):12-19. This article discusses the implication for girls in the use of computers and computer equity. In an effort to determine when sex typing of technology first occurs, the author reviews and critiques an American study which surveys computer- related attitudes, and compares it with a Canadian master's thesis "Gender Equity and Computer Use in the Classroom" by Betsy McKelvey. While the American study bases its research on the assumption that technology is a male world, McKelvey's study creates a framework for studying sex inequity and use of computers and suggests that teachers can be responsible for creating sex equity in the classroom. References.

Collis, Betty.

(DET)

"Adolescent Females and Computers: Real and Perceived Barriers." *In Women and Education. A Canadian Perspective.* ed. Jane Gaskell and Arlene McLaren, 117-131. Calgary: Detselig Enterprises Limited, 1987. The authors document the difference between male and female computer usage and access by looking at such factors as gender differences in school participation (in B.C., Alberta and Ontario) and computer science at the secondary level, extracurricular usage and attitudes. They present a conceptual model that describes some of the barriers, both external and self-generated that underlie the situation: school-related policies and practices, social expectations, personal factors. References.

(OISE/376.971 W872)

Craig, Arlene Fong, et al.

"Debugging the Program": Computer Equity Strategies for the Classroom

Teacher. Washington, D.C: Project on Equal Education Rights, NOW Legal Defense Fund, 1986. The major component of this kit is "Debugging the Program," a 29-page guide designed for the teacher. It includes a variety of strategies and activities which have been excerpted from other works. The strategies provide hands-on, effective pragmatic ways for the teacher to "debug" their computer education program and ensure equity for girls and young women, including women and girls of colour, and women and girls with disabilities. The strategies cover Teacher/Parent, Teacher/Community, and Curriculum/Special Events, and outlines the Minority Computer Resource Opportunity program which focuses on encouraging girls through personal counselling, encouraging computer equitability during class time and free time, and encouraging parental support. The activities are exercises in co-operative logic: co-operative effort among members of the student group is necessary since each students' clue is essential to the eventual solution of the problem. In conclusion, a discussion about Pathways, an applications- based software package which introduces computer education to children in grades 4 through 7. The second component of the kit is the Spring 1986 PEER Computer Equity Report "Beyond the Star Trek Syndrome: To an Egalitarian Future" which discusses the importance of equity and access in the schools to prepare women for the future. (PEER)

(OISE/C.R. 004.07 D289)

"Computer Equity." Special Issue. Edited by Sharon Franklin. The Computing Teacher: The Journal of the International Council for Computers in Education

11 (April 1984). 72 pgs. The emphasis of this issue is on promoting and achieving computer equity throughout the educational system. Articles by researchers and educators in the field include topics such as inequities in opportunities for computer literacy that affect adolescent and teenage females, minority and low-income students; strategies for achieving sex equity and practical solutions for teachers to help increase females' use of computers; identifying equitable software and encouraging females into computer programming; a report of a pilot project that helped grade 7 to 9 students improve their computer skills in an equitable learning environment; and ways to increase female students' access to technology. Each article is referenced. (CT) (OISE/Journals)

Fancher, Evelyn.

"Educational Technology. A Black Perspective." Unpublished paper. (1983)10 pgs. Microfiche. The author argues that the learning of new technology cannot be left up to students to learn at their own pace. Negative self- image of Black youth obstructs their learning progress and if teachers hold stereotyped beliefs that Black youth are "lazy and unproductive," the student may be seen as "uninterested" when in fact she is in need of assistance. Technological instruction must be equally applied and encourage teacher-student interaction. Black youth need the application of educational technology deliberately developed to counteract the negative racial images that permeate mass media and influence their self-image. References. (Phcopy/OISE or EricDoc)

(OISE/Eric 240 213)

Franklin, Ursula Martius.

Will Women Change Technology or will Technology Change Women?/Les femmes changeront-elles la technologie ou la technologie changera-t-elle les femmes? Ottawa: Canadian Research Institute for the Advancement of Women, 1985. 46 pgs. It is important that women understand the dynamics and functionings of the technological systems we live in today in order to "fashion a web of life that is intrinsically human." The author compares the values and attributes of the technological system with those of the world of women — rigidity vs flexibility, efficiency vs spontaneity — and questions how women will adapt their technological literacy to a still male-dominated world. She urges women to understand the technological structure, to work in community with one another and to undertake research projects that will promote a constructive technological evolution. (CRIAW)

37 (OISE/305.40971 C928)

James, Carol, and Jane Young.

"Case Study: Equal Opportunities through the Hertfordshire TVEI Project." In Changing Perspectives on Gender: New Initiatives in Secondary Education, ed. Helen Burchell and Val Millman. Milton Keyes, England: Open University Press, 1989, 14-32. The Technical and Vocational Education Initiative project in Hertfordshire, England, is an on-going program designed to support the development of full-time, general and vocational education for 14- to 18-year-old students. Course options include manufactory technology, computer studies, modular technology, electronic instrumentation, information technology, office technology and communications. The authors report on the progress, plans and activities of the program to meet an equal opportunities mandate, they describe the difficulties of attracting girls and implementing equal opportunity strategies, the organisation and effect of workshops, and staff and curriculum development. (OpenU) (OISE/370.19345 C456)

Moore, Barbara G.

Equity in Education. Gender Issues in the Use of Computers. A Review and Bibliography. Toronto: Queen's Printer for Ontario, 1986. 68 pgs. This is a review of research done in Canada which tends to reach similar finding to that done in the U.S., Australia and England: there are differences between males and females in access to, attitudes towards, and use of computers at the intermediate and high school levels. The author documents research that looks at the reasons why males are getting more computer time than females; the belief by females that computers involve use of mathematical concepts; why a high percentage of programming courses are generally avoided by females; the social context of classrooms; software; influence of parents; influence of role models. She provides suggestions to counter these patterns. Annotated bibliography and current research inventory. (ONME) (TBE/LB5.R4 V.6 no. 1; OISE/370.9713 R454 V.6 no. 1)

Pelletier, Jacqueline, ed.

The Future is Now": Women and the impact of Microtechnology << L'avenir se décide maintenant >> Les femmes et l'impact de la microélectronique. Report on the Conference held in Ottawa, June 1982. Ottawa: Women and Technology Committee, 1983. 148 pgs. Eng./150 pgs. French. This bilingual edition documents the

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groundbreaking conference sponsored by four national women's organizations to discuss women's roles in Canada's future technological society. The conference was structured around five themes — changing employment patterns, health and safety, education, training and retraining, and information access and control. Of special interest is the Education section. The keynote speaker, Mary Beth Dolin, MLA Manitoba, addresses affirmative action for girls in science and especially computer science education, discusses microcomputer pilot projects in two of Manitoba's elementary and secondary level schools, and provides an overview of Canadian women's place in a technological society. Seven workshops are outlined and conclude with specific actions that can be taken. (CRIAW)

(OISE/303.4834 R425 and Women's Resource Centre)

Project on Equal Education Rights.

Black Women in a High Tech World: A New Frontier. PEER Report No. 3, 1982. Washington, D.C.: Project on Equal Education Rights, 1982. 5 pgs. How can Black women prepare to take advantage of the future technological opportunities and protect themselves from obsolescence? Statistical information from the early 1980s indicates that a very small percentage of Black women are in the occupations which will be in demand in the future. The report looks at educational barriers and advises the necessity of encouraging Black female high school students to study mathematics and science. One step in this direction is the provision of sound career counselling to prepare students for technical jobs. (PEER or Phcopy/OISE)

(OISE/Eric 263 262)

Project on Equal Education Rights.

Programming Equity into Computer Education. Today's Guide to the Schools of the Future. A PEER Computer Equity Action Kit. Washington, D.C.: The National Centre for Computer Equity of the Project on Equal Education, 1985. This kit contains three components: a Teacher's Guide, a PEER Computer Equity Report, and an information pamphlet about the Project on Equal Education Rights. The 36-page Teacher's Guide provides an assessment for teachers, parents, administrators and students who want to find out which "schools support and encourage girls, minority students, students with disabilities, and low-income students to participate in computer education." Included are interview questions. Concrete and achievable strategies to direct change are outlined. The PEER Computer Equity Report discusses basic aspects of computer inequity: unequal access to programming classes, unequal distribution of computer resources, lack of confidence and skills, and the role of teachers in closing the gender gap.

(PEER)

(OISE/C.R. 004 P964 and Eric 260 014)

Schubert, Jane G. and others.

Ideas for Equitable Computer Learning. Palo Alto, California: American Institute for Research in the Behavioral Sciences, 1984, 76 pgs, Microfiche, This packet of information focuses on the twelve major barriers which obstruct equitable instruction. Among those identified are the lack of encouragement for females and minority students to use computers, potential value of computer learning is more apparent to males than females; underrepresentation of females and minorities in computer clubs; underrepresentation of females and minorities in leadership roles. Each barrier is addressed through an activity which describes a problem situation that constructs a barrier, illustrates an actual situation, provides awareness activities and ideas for interventions, and concludes with an assessment of the actions for interventions. Additional documents in the kit include a student survey, an educator's self-assessment, early childhood computer readiness strategies directed to teachers of grades K-3, and an out-of-school computer access resource that offers practical ways for schools to foster equity in students' non-school computer experience. Problems and strategies may have more practical use in primary and junior high school settings but some suggestions may be useful for K-3 class activities. (AIR) (OISE/Eric 272 138)

Tashner, John H., ed.

Computer Literacy for Teachers: Issues, Ouestions, and Concerns. Phoenix, Arizona: The Oryx Press, 1984. 0-89774-196-X. 150 pgs. The primary goal of this guidebook is to assist professional educators in gaining a clear understanding of the impact that computer technology is having in the schools and the skills children need in order to function in the Information Society. There are three main sections: the relationship between the developing information society and the K-12 school curriculum; what teachers should teach students about computers in order to prepare them for the Information Age; and how other schools have designed programs to meet this challenge. Each section consists of articles selected from a comprehensive study and analysis of literature dealing with computer literacy programs in education and includes an annotated bibliography of recommended readings. (Oryx)

(OISE/371.39445 C7389; Minkler/371.39445 Comm Lit)

Wahl, Ellen.

"Girls and Technology: Stories of Tools and Power." Paper presented at the Annual Meeting of the American Educational Research Association symposium on "Women and Technology: New Perspectives on Design and Use." New Orleans, La., April 8, 1988. 11 pgs. Microfiche. "Given the opportunity to explore machines, use tools, take things apart, get their hands dirty and their minds engaged, girls transform technology from a male domain into one over which they can have control." The Operation SMART program for out-of-school technology activities provides girls with hands-on experience at using power tools, screw drivers, computers, and video equipment. In addition, they discuss connections between gender stereotyping and scientific pursuit and demystify the workings of a machine. The paper outlines methods of learning through sharing and collaboration which encourage self- confidence and self-reliance. (Phcopy/OISE or EricDoc) (OISE/Eric 302 402)

"Women, Girls and Computers." Special Issue. Marlaine E. Lockheed, ed. Sex Roles: A Journal of Research 13 (August 1985). The eleven articles in this issue "present the first empirical evidence regarding the determinants and cognitive consequences of sex-related differences in computer use by adults and children." Topics include teachers as role models and leaders, computers and girls, software programs and the organization of learning in the classroom, male and female enrolment in computer camps and classes, and fostering equitable consequences from computer learning environments. Each article is referenced. (SR)

(OISE/Journals)

Curriculum Resources

Bitter, Gary, and Donna Craighead.

Teaching Computer Literacy. Lesson Plans and Activities for Your Classroom (K-4) Austin, Texas: Sterling Swift Publications, 1984. 0-88408-325-X. 317 pgs. Published in a looseleaf binder, this workbook offers thirty-four topics for kindergarten to grade 4 students. Lessons are planned for progressive learning. Basic concepts are introduced to kindergarten children who use the computer following directions, programming devices and using the turtle graphics to make simple shapes. Keyboarding and turtle graphics are main components of first grade learners. Second grade lessons introduce students to the effect computers have on their lives, continued explorations of turtle graphics and an introduction to LOGO procedures. The logic of computers and continued work with Logo are 3rd grade subjects, and 4th grade students are introduced to hardware and software, binary numbers, flow charts, and storyboarding. There are five extensive lesson plans for each introductory activity. Each lesson plan identifies the topic, objective, curriculum area(s), time required, materials required, activity, and whether or not a computer is needed. Vocabulary accompanies each chapter of lessons. References. (SSP)

(OISE/C.R. 004 B624T)

Clements, Douglas H.

Computers in Early and Primary Education. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1985. 0-13-164013-5. 322 pgs. A practical book of guidelines for educators of young children in preschool, kindergarten, and Grades I through 3. Demonstrates how computers can be used with young learners and describes programs for young children. Each chapter includes an annotated bibliography. Glossary. References. Appendix of educational software, organizations and print resources. Index.

(PH)

(OISE/372.139445 C626C; TBE/LB1028.5 .C5254 1985; FWTAO/001.64 CLE)

Collis, Betty.

Computers, Curriculum and Whole-Class Instruction. Issues and Ideas.

Belmont, California: Wadsworth Publishing Co., 1988. 0-534-08460-5. 412 pgs. with an Activities Disk. The author is a contributing editor to The Computing Teacher. This book is for educators interested in teaching with computers and is organized by lesson plans which are categorized by subject area and grade level. Each lesson plan relates to specific curricular objectives and can be utilized in a whole-class setting when only one computer is available. The Activities Disk includes twenty programs providing immediate hands-on experience. Science is covered in two of the chapters with activities for grades 2 to 12. They present simulations, graphing, manipulation of data, using peripherals to collect data, using a data base. Mathematics is covered in three chapters and presents lessons for grades 1 through 11. Elementary arithmetic, and secondary mathematics - parallelograms, polygons, linear inequalities, problem-solving skills. Each lesson specifies equipment requirements, lesson description and includes follow-up activities. References. Appendices describe programs supplied on the disk and provide two detailed lesson plans with several worksheet samples. (NEL)

Douziech, Richard et al. Ed. Anita Best.

Computer Literacy Activities for Elementary and Middle School Students. International Council for Computers in Education, 1983. 0-924667-02-8. 56 pgs. The emphasis of this book is the building of sound computer literacy among teachers and students. Computer literacy is more than the basic operation of a computer. It is knowing how to use computer-aided methods in problem solving, exploring music and mathematics, art and geometry, and understanding algorithmic processes, general capabilities and applications. The twelve activities address computer literacy, mathematics and science applications. Each activity outlines the subject covered, skills taught, group size, facilities, materials, and objectives. Glossary. (ICCE)

Girard, Suzanne, and Kathlene Willing.

The Primary Computer Dictionary. 50 Useful Words and Definitions toIntroduce Young Children to Computers.Illustrated by Melanie Hayes. Cobalt,Ont.: Highway Bookshop, 1983. 55 pgs. An animated computer introduces fifty wordsto children from kindergarten to Grade 3. The words are selected from six generalcategories: general concepts, hardware, commands, programs, keys and language. Oneconcept per page, clearly written, with a glossary of new words.(HBS);(OISE/C.R. 001.6403 G518P)

Hunter, Beverly.

My Students Use Computers. Computer Literacy in the K-8 Curriculum. 1983. Reprint. Reston, Virginia: Reston Publishing Co., Inc., 1984. 376 pgs. Specifically designed to help any person who is concerned about the use of computers in the education of children in school in grades K through 8. The first three chapters address what the children need to learn about computers and information handling, how these new objectives fit into the curriculum in mathematics, science, and how to use computers in the classroom, what resources are needed. The balance of the book provides sample activities in the strands of mathematics and science. Each activity states the objective, prerequisite, materials needed, instructions for the teacher, related activity, and recommended readings. (RPC)

Milone, Michael N. Jr.

Every Teacher's Guide to Word Processing. 101 Classroom Activities for Early Grades. Englewood Cliffs, N.Y.: Prentice-Hall, Inc., 1985. 013-292830-2. 260 pgs. Spiral bound. The twelve chapters of exercises cover all subject areas as well as some administrative tasks such as the keeping of class records. This book is for both the teacher just learning about computers and the more advanced instructor. The introduction outlines how to begin a word processing program, setting up files and provides a glossary of terms; the classroom exercises, which range from primary, elementary and secondary levels, include reading, writing and spelling, mathematics and science applications, and computer literacy. (PH)

(OISE/C.R. 371.39445 M661E)

Schenk, Christopher.

Hands On. Hands Off. A Computer Activity Book for Schools. London: A. & C. Black, 1986. 0-7136-2707-7. 120 pgs. Spiral bound. Most of the activities in this book are aimed at primary levels. Some can be adapted for kindergarten classes and others for older pupils in secondary schools. Hands-on activities, usually suitable for small groups of children working together at computers, and hands-off activities, things to do away from the computer, accompany each of the three sections. Topics include the computer as a versatile resource --- calculator, teaching machines, wordprocessor; an introduction to Turtle Geometry and LOGO; and information retrieval and data processing. Illustrations of male and female children as active learners. Index. (CMC) (OISE/C.R. 371.39445 S324H)

Sanders, Jo Shuchat and Antonia Stone.

The Neuter Computer: Computers for Girls and Boys. New York City: Neal-Schuman Publishers, Inc., 1986.1-55570-006-3, 279 pgs. This book is suitable for teachers working in middle and junior high schools, as well as elementary schools. The introduction provides an overview of the computer gender gap, guidelines for planning and evaluating a computer, equity programs in schools, and resources. The main three sections of the book are devoted to activities, strategies and evaluations. There are 56 computer activities specifically chosen for their appeal to girls and include subject areas in which computer application can be used. Topics include graphics, wordprocessing, database programs, spreadsheets, telecommunications. The 96 equity strategies are appropriate for teachers, staff, administrators and parents who want to increase girls' computer involvement from classroom to community. The third section suggests ways of planning and evaluating computer and equity programs - questionnaires and forms are included in the Appendix. Bibliography. Extensive resources. (N-S) (TBE/QA76.27 .526 1986)

Wayne, Rudy, Joe Vayda, and Marta Legrady.

Computer Literacy. An Introductory Unit for the Intermediate Division. Toronto: Learnxs Press, 1982. 86 pgs. Spiral bound. The information in this guidebook is to be integrated with existing curricula. There are two sections, each having activity units. Computer awareness and the complexity of our computerized society is the theme of the first section with exercises focusing on computer applications, digital computers, historical overview, and social implications. The second section provides students with activities designed to develop skills in microcomputer use and programming with BASIC. Hands-on activities include programming, calculating, and enrichment studies. Written in clear language. References.

(LP)

(OISE/C.R. 001.64 W134C)

Willing, Kathleen, and Suzanne Girard.

The Junior Computer Dictionary: 101 Useful Words and Definitions to

Introduce Students to Computer Technology. Illustrated by Melanie Hayes. Cobalt, Ont.: Highway Bookshop, 1984. 0-88954-302-X. 68 pgs. The 101 illustrated entries are drawn from eight categories: general concepts, hardware, inner workings, commands, programs, keys, language and communications. An animated computer introduces the word and demonstrates its usage. The definition is clearly written in language suitable for grades 4 to 7. The dictionary encourages students to investigate terminology, is useful for parents at home and teachers in the classroom to introduce computer vocabulary. Glossary of new words. (HBS) (FWTAO/001.64 Wil)

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CT The Computing Teacher University of Oregon 1787 Agate St. Eugene, Oregon 97403

CTF Canadian Teachers' Federation 110 Argyle Ave. Ottawa, Ontario K2P 1B4 (613) 232-1505

CTY Cassell Tycooly Inc. P.O. Box C-166 Riverton, New York 08077 (201) 939-6064

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FRK Franklin Watts of Canada 20 Torbay Rd. Markham, Ontario L3R 1G6 (416) 474-0333 *FWTAO* Federation of Women Teachers' Associations of Ontario 1260 Bay Street Toronto, Ontario M5R 2B8 (416) 964-1232

Gf La Gazette des femmes 8, rue Cook, 3e étage, bureau 300 Québec, Québec G1R 5J7 (418) 643-4326 (800) 463-2851

GREMF Group de recherche multidisciplinaire féministe a/s de Huguette Dagenais Département d'anthropologie Faculté des science sociales Pavillon Charles-De Koninck Université Laval Québec, Québec G1K 7P4

GQ Gouvernement du Québec La Coordination à la condition féminine Ministère de l'Éducation 1035, rue De La Chevrotière - 24e étage Québec, Québec G1R 5A5 (418) 643-3241

HBS The Highway Book Shop Cobalt, Ontario P0J 1C0 (705) 679-8375

ICCE International Council for Computers in Education University of Oregon 1787 Agate Street Eugene, Oregon 97403 (503) 686-4414

IJE International Journal of Educational Research Pergamon Press Journals Division Maxwell House, Fairview House Elmford, New York 10523

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JEG Journal for the Education of the Gifted The University of North Carolina Press 116 South Boundary Street P.O. Box 2288 Chapel Hill, North Carolina 27515-2288 JHU The Johns Hopkins University Press 701 W 40th St. Suite 275 Baltimore, Maryland 21211 (301) 338-6956 JRME Journal for Research in Mathematics Education 1906 Association Drive Reston, Virginia 22091 **LC** Labour Canada Ottawa, Ontario K1A 0J2 (819) 994-0543 LP Learnxs Press 155 College Street Toronto, Ontario M5T 1P6 (416) 591-8178/9 **LRU** Longman Resources Unit c/o ABC-CLIO, Inc. 2040 Alameda Padre Serra P.O. Box 4397 Santa Barbara, California 93140-4397 (805) 963-4221 MacLon Macdonald & Co. (Publishers) Ltd. Greater London House Hampstead Road London, United Kingdom NW1 72X **MC** Math/ScienceNetwork c/o Mills College Oakland, California 94613 (415) 430-2230

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MPS Minneapolis Public Schools Equal Education: Student Achievement 807 NE Broadway Minneapolis, Minnesota 55413 (612) 627-2143

MT Mathematics Teacher 1906 Association Drive Reston, Virginia 22091

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RPC Reston Publishing Co. Inc. 1906 Association Drive Reston, Virginia 22091 **RSTE** Research in Science & Technological Education Carfax Publishing Company P.O. Box 25 Abingdon, Oxfordshire United Kingdom OX14 3UE

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SCC Science Council of Canada The Publications Office 100 Metcalfe St. Ottawa, Ontario K1P 5M1

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