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ABSTRACT

This bibliography is intended to begin the process of awareness necessary to encourage young women and racial and ethnic minorities in geography classes across the nation. Women and minority racial and ethnic groups have long been seriously underrepresented in the discipline of geography both in the applied and professional world and in academic institutions. This project is the first national effort to address the issue of equity in achievement and retention in geography classes. The objective of this document is to encourage research and action on these issues by providing brief backgroud information and a bibliography of sources related to the following categories: (1) the status and participation of women and racial and ethnic groups in geography; (2) gender/ethnic-related differences in achievement; (3) possible causes of gender/ethnic-related differences in participation and/or achievement; (4) intervention strategies; (5) available resource materials; and (6) questions for future research. The bibliography includes published research papers, articles, and books. Since concern with the issue of women and minorities in geography began to appear in the literature during the 1970s, the bibliography is generally limited to publications from 1970 to 1992. (EH)

A PATHWAYS IN GEOGRAPHY
Resource Publication

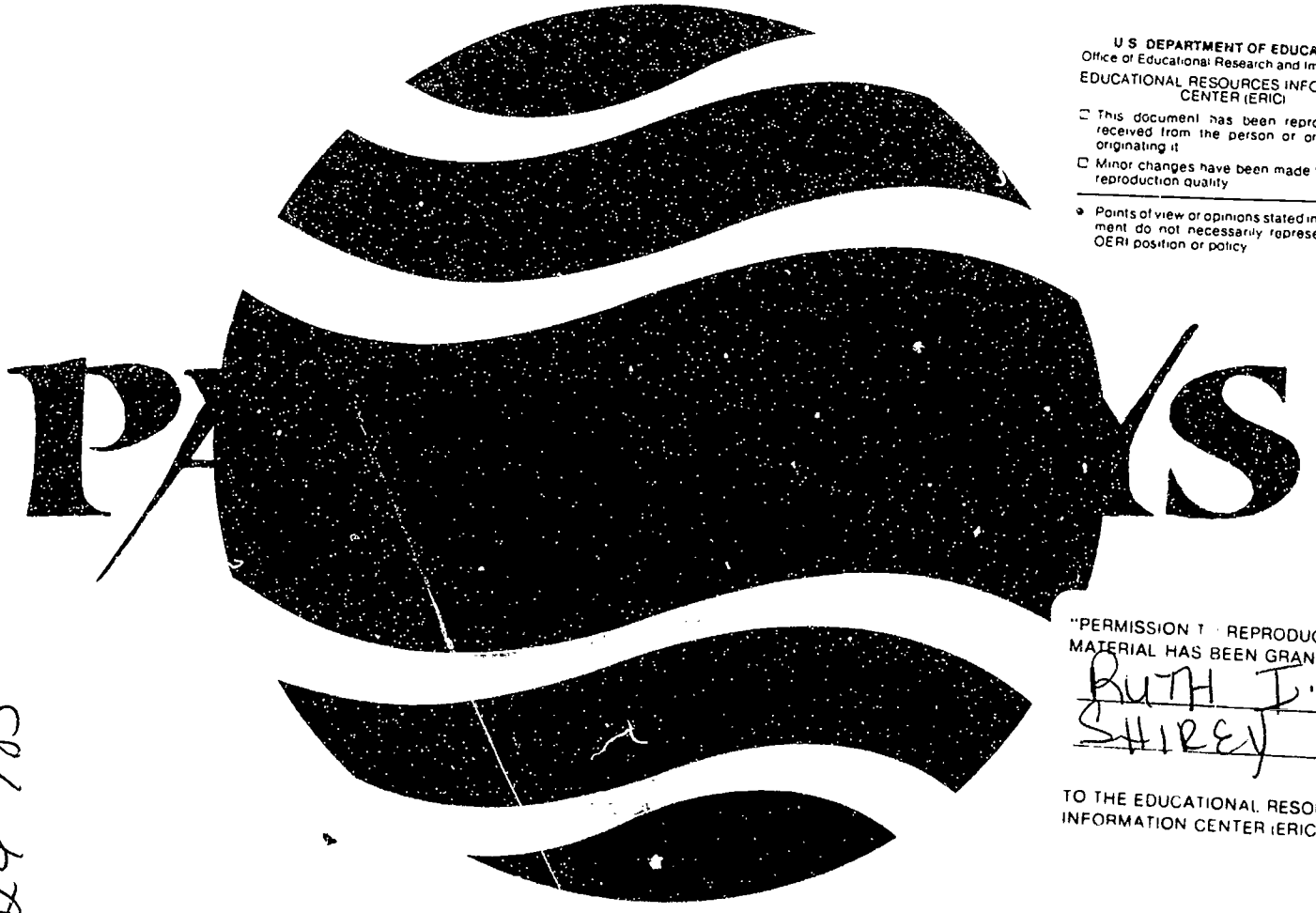
The National Council for
Geographic Education

Finding A Way

Encouraging Underrepresented Groups in Geography

An Annotated Bibliography

by Michal LeVasseur



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Finding A Way

Encouraging Underrepresented Groups in Geography

An Annotated Bibliography

by Michal LeVasseur

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PREFACE

Finding A Way: Encouraging Underrepresented Groups in Geography is a project designed to enhance the achievement and motivation of young women and racial and ethnic minorities in geography classes across the nation.

The project was conceived in 1991 by the National Council for Geographic Education's Task Force on Underrepresented Groups. It will include dissemination of teaching strategies that have been found effective in related fields in encouraging all underrepresented students. The project plans to offer summer institutes and workshops and to publish a book, **Finding A Way: Looking Toward the 21st Century**, containing narrative and learning activities that support the incorporation of these instructional strategies into the geography curriculum.

Women and minority racial and ethnic groups have long been seriously underrepresented in the discipline of geography both in the applied professional world and in academic institutions. This project is the first national effort to address the issue of equity in achievement and retention in geography classes. The bibliography that follows is a first step in laying a solid foundation for this important and long overdue project.

We hope that **Finding A Way** will support both students and teachers, and that it will stimulate not only lively discussion and debate about this continuing issue, but also substantive curricular change in American education.

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Michal LeVasseur
NCGE Task Force for Underrepresented Groups in Geography

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INTRODUCTION

This document has been developed out of a project sponsored by the Committee on Women in Geographic Education of the National Council for Geographic Education. **Finding a Way: Encouraging Underrepresented Groups in Geography** is designed to motivate women and minorities and enhance their opportunities for academic success in geography.

The differential participation and achievement of women and minorities, particularly African-Americans, Hispanics and Native Americans, in geography have been well documented. Research must now focus on the reasons for this differential and on intervention strategies to enhance equity. To that end, the objective of this document is to encourage such research and action by providing brief background information and a bibliography of sources related to the following categories: (1) the status and participation of women and racial and ethnic groups in geography; (2) gender/ethnic-related differences in achievement; (3) possible causes of gender/ethnic-related differences in participation and/or achievement; (4) intervention strategies; (5) available resource materials; and (6) questions for future research.

References to research on these topics in other disciplines, notably science and mathematics, are also included because such references may suggest possible causes and intervention strategies that could be applied in geographic studies. Citations are not exhaustive but are designed to provide access to the research literature.

The bibliography includes published research papers, articles, and books. Panel discussions and workshops have been omitted since David Lee's bibliographies contain these listings. Since concern with the issue of women and minorities in geography began to appear in the literature during the 1970s, the bibliography, with few exceptions, is limited to publications from 1970 to 1992.

UNDERREPRESENTED GROUPS IN GEOGRAPHY

Despite the gains that women and racial and ethnic groups have made in Western society in the last 25 years, they are still underrepresented in selected professions, notably mathematics, engineering, science, and geography. Concern for "the lot of the female geographers" issue was expressed in the early 1970s by the president of the Association of American Geographers (AAG), Wilbur Zelinsky (Zelinsky, 1973a:101).

Since Zelinsky's article, several studies have reported on the status of women in geography. Some have also addressed the issue of racial and ethnic groups in the field. All scholars have reported that enrollment in geography at the graduate level and representation in the profession is dismal for both women and minorities (AAG, 1988; DeLoughry, 1988; Deskins, 1969; Deskins and Speil, 1971; Garcia-Ramon et. al., 1988; Golledge and Halperin, 1983; Horvath et. al., 1969; Larimore et. al., 1969; Lee, 1990; Momsen, 1980a, 1980b; Richason and Mitchell, 1972; Shrestha and Davis, 1989; Zelinsky, 1973b).

As national attention focused on the academic performance of American students in the mid-1980s, several national surveys indicated that many high school and college students suffered from "geographic illiteracy." Further, the results of a survey conducted by the National Assessment of Educational Progress (NAEP) revealed that minorities and females scored significantly lower on geography tests than other high school students (NAEP, 1990:58). Annual statistics published in the AAG newsletters since 1972 document a slow increase in the professional employment of women and minorities especially in academic geography.

Clearly the needs of women and minorities are not being met. They are not being encouraged to excel at the K-12 level and are not being attracted to and retained in the collegiate classroom or profession. Not only is this issue a matter of concern to the profession but, because of

demographic trends, it is also one of national need. Women and minority groups will increasingly dominate the labor pool and the classroom in the 1990s as the demographic changes in the United States add diversity to the overall population (Cetron and Gayle 1990).

Geography must address the special needs of students whose participation and achievement levels are consistently below that of white males. As Janice Monk (1987:145) admonished: "We cannot successfully fulfill our mission as geographic educators unless we address the challenges posed by learners in the late twentieth century."

From concern through action to achievement of goals, geography can find a way to enhance the achievement and participation of women and minorities in geography (Figure 1). Research suggests three broad areas of concern: (1) individual factors, such as innate ability, personal history, and prior experience; (2) sociocultural factors, such as sex role stereotyping and social attitudes toward women and minorities and academics; and (3) school factors, such as classroom environment, teacher-student interactions, textbook and curriculum materials, and instructional strategies.

Within these three broad domains, specific factors emerge as barriers to full participation and achievement for women and racial and ethnic groups, and serve as a focus for further research:

1. Gender differences in spatial ability.

2. Gender differences in age of development of formal reasoning.

3. Failure to receive encouragement to excel academically or to pursue non-traditional careers from parents, teachers, counselors, peers, and the mass media.

4. Stereotyped perceptions of appropriate career roles.

5. Less positive attitudes toward specific disciplines.

6. Stereotyped perceptions of specific disciplines as masculine domains.

7. Perception of the usefulness of the subject matter for future life, education, and/or careers.

8. Differential experiences in the classroom which are biased against females and minorities.

9. Different perceptions of supportive teacher behaviors.

10. Different perceptions of student roles in the classroom.

11. Less self-confidence in ability to excel in an academic role.

12. Lack of appropriate female and minority role models.

13. Different interest in academic topics which may be not be addressed in the curriculum.

14. Different interest in instructional activities which may not be addressed in the classroom.

15. Instructional strategies which are not conducive to promoting achievement by females and minorities.

16. Lack of appropriate representation of females and minorities in textbooks and curriculum materials.

17. Lack of inclusion of gender or minority studies in the curriculum.

The bibliography addresses these issues and provides a frame of reference for future research to address the questions of inequity of participation and achievement.

UNDERREPRESENTED GROUPS IN GEOGRAPHY

Women and Minorities

DIFFERENTIAL PARTICIPATION IN CAREERS AND CLASSES

DIFFERENTIAL ACHIEVEMENT IN KNOWLEDGE AND SKILLS

FINDING A WAY

INDIVIDUAL
- Personal History
- Innate Abilities
- Attitudes
- Prior Experience

SOCIOCULTURAL
- Attitudes
- Stereotyping
- Perception of Discipline

SCHOOL

CLASSROOM ENVIRONMENT
- Teacher interaction
- Teacher behavior
- Reduce stereotyping
- Role model

INSTRUCTIONAL STRATEGIES
- Methods
- Activities of interest
- Programs

PORTRAYAL IN TEXTBOOKS AND MATERIALS
- Equity

CURRICULUM
- Inclusion of gender and minority issues
- Topics of interest

GOALS

ELIMINATE SEXISM/RACISM

DEVELOP COGNITIVE ABILITIES

COMPENSATE FOR PRIOR EXPERIENCES

ENHANCE POSITIVE PERCEPTIONS OF GEOGRAPHY

CREATE POSITIVE CLASSROOM ENVIRONMENT

IMPROVE QUALITY OF TEACHER-STUDENT INTERACTIONS

PROVIDE APPROPRIATE ROLE MODELS

ENHANCE INSTRUCTION

EQUITY OF PORTRAYAL IN TEXTBOOKS AND MATERIALS

INCLUSION OF GENDER/MINORITY ISSUES IN CURRICULUM

EQUITY OF PARTICIPATION **EQUITY OF ACHIEVEMENT**

Figure 1

RESEARCH QUESTIONS FOR GEOGRAPHY

By its nature, the compilation of a bibliography on the equity of participation and achievement of underrepresented groups in geography identifies directions for research. These suggestions are provided as a departure point for geographers, educators, and others interested in formulating specific research questions. The larger goal of conducting such research is to formulate ways in which all students can fully participate in the learning process, achieve their full potential, and be encouraged to continue with geographic studies and careers in the field.

Participation, Status and Retention in the Classroom and in the Profession

Several studies have provided an essential record of the representation, role, and status of women and minorities in geography. In order to monitor the participation and status of underrepresented groups in the discipline, research may focus on the following:

1. What is the current representation, role, and status of women and minorities in:
   a. professional geographic organizations?
   b. geography departments as faculty?
   c. geography related careers?
   d. geography graduate programs?
   e. geography undergraduate programs?
   f. K-12 teaching of geography?
   g. K-12 inservice programs for geography teachers?
   h. K-12 geography student body?

2. What programs exist to recruit and retain women and minorities in geography departments, undergraduate and graduate? How successful have they been?

3. What are the characteristics of geography departments noted for recruitment and retention of women and minorities as students and/or faculty?

4. What factors influence the selection of geography as a major course of study by women and minorities?

Achievement

The geographic research concerning gender differences in achievement has focused primarily on mapping skills. Suggested variables that may account for the gender differences noted in achievement are spatial abilities and prior experiences within the environment. Although the preliminary NAEP assessment reveals that differences in achievement exist among ethnic groups, few research studies have addressed this issue.

In order to address issues of cause and effect and to monitor the effects of intervention strategies, achievement levels by gender and ethnic group must be documented continuously. Answers to the following questions serve as a starting point:

1. Are there differences in achievement in specific geographic content areas?

2. Are there differences in achievement of specific geographic skills?

3. Are there differences in achievement in specific domains and/or levels of knowledge assessment?

4. Are there differences in achievement by age, grade level, ability level and/or cognitive developmental level?

5. Are there differences in achievement by geographic region in the United States?

6. Are there differences in achievement by school location within a region?

7. Are there differences in achievement among public, private, and religious schools?

8. Are there differences in achievement between coeducational and non-coeducational schools?

Cognitive Abilities

One of the most pervasive themes in educational literature is the question of male superiority on tests of spatial ability. An inferior ability to think spatially has often been cited as one of the reasons women avoid geography, science and math courses, and careers. While research has questioned the validity of these findings of male superiority and their relevance to performance in the sciences, further research on spatial ability as a cognitive function needs to be addressed in geography, not only by gender but by ethnicity:

1. What types of specific spatial abilities exist? How are they assessed and measured?

2. Do specific spatial abilities differ by gender, ethnic group, age, grade level, ability level and/or general cognitive ability?

3. Are the sources of differences in spatial ability the same for ethnic groups as for gender?

4. Do measurements on spatial tests correlate to achievement levels in geography content or skills?

Research in other disciplines suggests that the transition from a concrete cognitive developmental level to a formal cognitive level begins during early adolescence and is attained by males at an earlier age than females. Geography is often a required course of study during these middle school years and the divergence of abilities and achievement by gender may be rooted in the differential attainment of formal reasoning abilities.

5. Are there differences in the age of attainment of formal reasoning abilities by gender or ethnic group?

6. Is formal reasoning ability correlated to achievement in specific geographic content or skills? Does this vary by gender or ethnic group?

Prior Experiences

Prior experiences of students outside the classroom may affect achievement and/or attitudes. It has been suggested that achievement in mapping and spatial skills may be affected by gender differences in spatial behavior and home range of children. These differences in moving through the environment may also explain why fewer girls are attracted to geography.

Other experiences which may enhance or inhibit interest and achievement in geography exist and need to be explored, such as:

1. What specific experiences outside the classroom impact interest and achievement in geography? Do these experiences differ by gender or ethnic group?

2. Are there patterns of early experiences and movements within the environment that differ by gender or ethnic group?

3. Do differences in environmental experience correlate with specific achievement levels in content or skills areas of geography?

4. What intervention strategies can schools implement to compensate for early disadvantages in environmental experiences?

Current research examines the role of preconceptions and/or misconceptions held by students that may inhibit academic achievement. By virtue of their prior experiences, students bring conceptions of the world, the way it exists and the way it functions to the classroom. These preconceptions and, in many cases, misconceptions, are difficult to change. They influence the ways in which a student acquires or rejects new knowledge. In order to replace misconceptions, it is essential to be aware of students' views of the world as they apply to geographic content and skills.

5. Are there patterns of misconceptions held by students with regard to specific geographic content or skills? Do these patterns differ by gender or ethnic group?

6. What successful intervention strategies can replace misconceptions? Do these differ by gender or ethnic group?

Attitudes and Perceptions

Research in science education indicates that a positive attitude toward the subject and a sense of its usefulness correlate positively to achievement levels. As Carswell noted, the likelihood that students will use their knowledge of geography is influenced by their attitudes toward the subject (1970).

The prevailing stereotyped perceptions of appropriate career roles for women and minorities coupled with an image of science as masculine limits interest and career opportunities for women and minorities. Data which reveal geography to be dominated by a white male population reinforce these perceptions.

Attitudes, images, and perceptions of geography nurtured and developed primarily in elementary and secondary school may affect the quality and extent of subsequent participation. It is imperative that studies in geography concerning attitudes be expanded at all levels and especially at the K-12 level.

1. What are the public perceptions and images of geography? Do these differ by gender or ethnic group?

2. What are the perceptions and images of geography held by students at all educational levels? Do these differ by educational level? Do these differ by gender or ethnic group?

3. What current knowledge about careers in geography is available to students? Does this knowledge differ by gender or ethnic group?

4. What current knowledge is available about careers in geography to K-12 faculty?

5. Does a positive attitude and interest in geography correlate by gender or ethnic group to:
   a. higher achievement levels in content or skills?
   b. retention in geography classes?
   c. selection of geography as a college major?
   d. consideration of a geography-related career?

6. Does difference in gender or ethnic group correlate with:
   a. interest in specific geographic content?
   b. interest in specific geographic skills?
   c. interest in specific learning activities?

Positive Classroom Environment, Teacher-Student Interactions, Role Models

Modifying the classroom environment and interaction patterns between teachers and students may be the key to reducing the gap in participation and achievement between white males and females and minorities in geography. Research studies, especially in science and math, as well as national reports, reveal that male, female and minority students receive differential treatment from teachers in favor of white males and students of higher ability.

Positive teacher-student interaction patterns have been shown to be associated with positive attitudes and higher student achievement. These patterns include number of interactions, recognition by teacher, level of questioning, wait-time, sustained feedback, type of teacher praise and criticism, teacher expectations, and encouragement. Teachers need to know how these factors function in geography classrooms.

1. Are there differential patterns by gender or ethnic group with respect to:
   a. which students become target students; i.e. those who dominate teacher interactions?
   b. zone of interaction by seating pattern?
   c. which students are called upon or recognized more frequently by the teacher?

d. methods of acceptable interaction with the teacher?
e. level of teacher questioning?
f. length of wait-time by teacher?
g. length and nature of feedback?
h. assignment of classroom tasks by teacher?
i. type of praise given to students by teacher?
j. type of criticism given to students by teacher?
k. teacher expectations and encouragement to excel?

Survey research indicates that students of different gender, ethnic group, and ability level have differing views of ideal student behavior and their own behavior as a student. Research at the secondary and college levels reveals that gender, racial and ethnic groups correlate with students' perceptions of what constitute ideal and supportive teacher behaviors. Knowledge of these views can be used by teachers to modify their own behavior and to encourage students to act in a positive and productive manner.

2. At different educational levels, does gender, ethnic group or ability level correlate with patterns of students' view of:
   a. behaviors and attitudes of an ideal geography student?
   b. their own behaviors and attitudes as a geography student?
   c. what constitutes ideal and supportive teacher behaviors and attitudes?

One of the potentially most powerful niches a teacher can fill is that of a positive role model for young women and minorities.

3. In what ways are geography teachers currently serving as role models for young women and minorities?

4. In what ways can geography teachers become positive role models for young women and minorities?

5. Are there programs available to train teachers to become positive role models? Have these programs been successful?

Instructional Strategies and Curriculum

Instructional strategies can be structured so as to foster maximum interaction and achievement of all students within the learning process. Attention must be given to students' cognitive reasoning level, learning style, interests, and needs in particular learning activities. Recent studies indicate that children, especially girls, learn more readily in cooperative situations. Specific content and topics of interest to female and minority students need to be assessed and incorporated into the existing curriculum as well.

1. Does interest in specific geographic content differ by gender or ethnic group?

2. Does achievement in specific geographic content differ by gender or ethnic group? Is this difference addressed in the curriculum?

3. Does interest in specific geographic skills differ by gender or ethnic group?

4. Does achievement in specific geographic skills differ by gender or ethnic group? Is this difference addressed in the curriculum?

5. Does interest in specific learning activities differ by gender or ethnic group? Is this difference addressed in the curriculum?

6. Are there topics of specific interest to female or minority students that could be incorporated into the curriculum?

7. Are women's issues incorporated into the curriculum?

8. Are minority issues incorporated into the curriculum?

9. Does the use of concrete or formal reasoning enhance instruction of students by gender or ethnic group?

10. Are there patterns of different learning styles by gender or ethnic group? Are these styles addressed in current geography curricula and classrooms?

11. What instructional strategies are utilized in current geography curricula and classrooms?

12. Are there instructional strategies that are more compatible with the learning styles of female or minority students?

13. Are cooperative learning strategies being utilized in geography classrooms? Which strategies and in what way?

14. Do cooperative learning strategies enhance interest and achievement of female or minority students? Of all students?

15. What training is necessary for teachers to enhance instruction for female and minority students?

Portrayal in Textbooks and Curriculum Materials

As the most basic, accessible literature available to students, the textbook plays a crucial role in presenting the content, skills and image of a discipline. If themes are absent from the textbook, then they are likely to be absent from the curriculum. Surveys of current textbooks and curriculum materials indicate that women and minorities have historically received inadequate treatment. While this treatment is changing, studies need to address this issue at all levels and in all media materials.

1. Are women and minorities portrayed in a positive manner?

2. Are women and minorities portrayed in non-stereotyped roles and careers?

3. Are references to women and minorities non-sexist and non-racist?

4. Are women's and minority experiences and issues included?

The Bibliography

The following listings of published materials on underrepresented groups in geography and related fields are offered as incentive for further work on the subject. Use these ideas in your own work. Assign them in your courses and seminars, discuss them with your colleagues. We offer these pages only as a beginning for "Finding a Way."

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Comprehensive report assessing gender differences in American schools. Report indicates widespread bias against girls in tests, textbooks and teaching practices.

Andrews, A. C., and Moy, K., 1986. Women geographers in business and government: A survey. *The Professional Geographer*, 38:406-410.

Survey of women AAG members in applied geography shows a concentration in the Washington, DC area and employment in the private sector.

Association of American Geographers. 1972-1993 membership profiles. *AAG Newsletter.*

Annual membership data by occupation, educational levels, and sex.

Atwater, M. M., 1986. We are leaving our minority students behind. *The Science Teacher*, 53(5):54-58.

Documents underrepresentation in science of African-Americans, Hispanics, and Native Americans. Suggests methods that teachers can use to encourage minority participation in science.

Atwater, M. M., and Simpson, R. D., 1984. Cognitive and affective variables affecting African-American freshmen in science and engineering at a predominantly white university. *School Science and Mathematics*, 84:100-112.

Analysis of variables related to success and nonsuccess including determination of which factors are significant for African-American students.

Bank, B.; Biddle, B.; and Good, T., 1980. Sex roles, classroom instruction and reading achievement. *Journal of Educational Psychology*, 72:119-132.

Suggests that teachers may favor students of their own sex, which could explain why males receive more attention in classrooms as most science teachers are male.

Barba, R., and Cardinate, L., 1991. Are females invisible students? An investigation of teacher-student questioning interactions. *School Science and Mathematics*, 91:306-310.

Identification of quality and quantity of science classroom interactions in relationship to gender. Female students have fewer interactions with teacher, are asked lower-level questions, and are not target students.

Bazler, J. A., and Simonis, D. A., 1991. Are high school chemistry textbooks gender fair? *Journal of Research in Science Teaching*, 28:353-362.

Significant differences between frequencies of illustrations of men and women, but not boys and girls. Only one current text achieves gender balance; others overwhelmingly favor pictures of males.

Beatty, W. W., and Troster, A., 1987. Gender differences in geographical knowledge. *Sex Roles*, 16(11-12):565-590.

Testing of college undergraduates for location of places on U.S. map, using total continent and regional base maps. Males consistently located places more accurately than females.

Becker, B. J., 1989. Gender and science achievement: A re-analysis of studies from two meta-analyses. *Journal of Research in Science Teaching*, 26:141-170.

Re-analysis of 30 studies on gender and science achievement. Males show advantage in biology, general science, and physics. No gender differences in mixed science, geology, earth science, and chemistry.

Becker, J. R., 1981. Differential treatment of females and males in mathematics classes. *Journal for Research in Mathematics Education*, 12(1):40-53.

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Provides introductory statistical data and bibliography.

Carson, B. S., 1988. Factors affecting minority learning in scientific fields. *Journal of College Science Teaching*, 17(5):340-341.

Minority students' levels of achievement are influenced by parents, teachers and counselors, peer pressure, and the need for sound study habits.

Carswell, R. J. B., 1970. Evaluation of affective learning in geography education. In *Evaluation in Geographic Education, The 1971 Yearbook of the National Council for Geographic Education*, ed. D. G. Kurfman, pp. 108-109. Belmont, CA: Fearon Publishers.

Attitude, as well as knowledge, determines the likelihood a student will use geography. Discusses three types of attitude measures.

Castaner i Vivas, M., and Centelles i Rabadan, N., 1985. La mujer y la geografia universitaria española. *Documents d'Analisi Geografica*, 7:103-140.

Survey of status of women in geography departments in Spanish universities.

Chang, K. T., and Antes, J., 1987. Sex and cultural differences in map reading. *American Cartographer*, 14(1):29-42.

Study of map-reading skills and gender differences.

Chang, K. T.; Antes, J. R.; and Lenzen, T., 1985. The effect of experience on reading topographic relief information: Analyses of performance and eye movements. *The Cartographic Journal*, 22:88-94.

Focus on map-reading skills while identifying gender-based performance differences. Uses variables such as eye movements and response times with repeated trial learning experiments.

Chapman, A., 1988. *The Difference it Makes - A Resource Book on Gender for Educators.* Washington, DC: National Association of Independent Schools.

An excellent introduction to gender issues and how they relate to schools.

Cheek, H., ed., 1984. *Handbook for Conducting Equity Activities in Mathematics Education.* Reston, VA: National Council for Teachers of Mathematics.

Includes review papers on women and mathematics as well as various ethnic minorities. Provides information and resources for conducting equity workshops.

Chipman, S. F.; Brush, L. R.; and Wilson, D. M., eds , 1985. *Women and Mathematics: Balancing the equation.* Hillsdale, NJ: Lawrence Erlbaum Association.

Research on factors that influence student participation with specific reference to gender differences in mathematics.

Clark, J., 1985. The status of science and mathematics in historically black colleges and universities. *Science Education*, 69:673-679.

Survey of 72 successful African-American female science professionals in diverse fields indicates four factors influential in career choice: early exposure to science, role models, parental influence, and persistence.

Clark, J. V., 1988. Black women in science: Implications for improved participation. *Journal of College Science Teaching*, 17(5):348-352.

Review of the status of African-American women in science, including a consideration of the barriers to success in science for females and minorities. Provides recommendations for educators.

Cline, R. J., 1984. Gender and geography: Sex differences in spatial pattern preferences. *Southern Speech Communication Journal*, 49(4):380-395.

Examines possible differences in seating preferences due to gender. Leads to communication functions, defines intimacy, creates gender roles, and allocates status within relationships.

Cohen, S. B., 1990. Geographic gender studies: Fresh approaches but with integration. *The Professional Geographer*, 42:231-232.

Reply to Sanders' article (1990). Geographers are beginning to recruit talented minorities.

Collins, M., and Matyas, M. L., 1985. Minority women: Conquering both sexism and racism. In *Women in Science: A Report from the Field*, ed. J. B. Kahle. Philadelphia, PA: The Falmer Press.

Traces progress from pre-collegiate to undergraduate, graduate, and career levels; includes comparison of African-Americans and whites.

Community Relations Commission, London, 1974. *A Bibliography for Teachers: Education for a Multi-Cultural Society*. Third Edition. London: Community Relations Commission.

Annotated bibliography for teachers of students of multi-racial, multi-cultural backgrounds; geography included.

Contreras, A., and Lee, O., 1990. Differential treatment of students by middle school science teachers: Unintended cultural bias. *Science Education*, 74:433-444.

Examines differential treatment of minority students by two middle school science teachers both in and out of classrooms.

Costo, R., ed., 1970. Textbooks and the American Indians. San Francisco, CA: *The Indian Historian.*

Independent Indian publishing house established to provide classroom instructional materials. Description of program, evaluation of textbooks, and bibliography of resources.

Crane, J., 1986. Women and geography. *Focus*, 36(1):1.

Editorial on the status of women in geography.

Crawley, R. E. III, and Coe, A. S., 1990. Determinants of middle school students' intention to enroll in a high school science course. *Journal of Research in Science Teaching*, 27:461-476.

Study to determine intentions of 8th grade earth science students to enroll in high school science courses. Attitude and subjective norm were sole predictors of intention.

Crosby, T., 1988. Minorities: Underrepresentation, education, and careers in science: An introduction. *Journal of College Science Teaching*, 17(5):342-343.

Introduction to special issue of Journal of College Science Teaching. Focuses on factors, issues, and problems that influence underrepresentation, education, and involvement in science careers by minorities.

Cross, J. A., 1987. Factors associated with students' place location knowledge. *Journal of Geography*, 86(2):59-63.

Two-year survey of place location knowledge of college students in Introductory World Regional Geography and Cultural Geography. Attending to news media has positive impact on ability to locate countries; previous high school geography has no impact. Males exhibit better mapping skills than females.

Cross, R. T., 1988. Task value intervention: Increasing girls' awareness of the importance of mathematics and physical science for career choice. *School Science and Mathematics*, 88:397-412.

Description of intervention project to reduce sex-stereotyping in secondary mathematics and science in order to increase girls' awareness of non-traditional career opportunities.

Cutter, S. C., and Renwick, H. L., 1980. The myth of the women's session (Association of American Geographers). *Transition*, 10(1):14-17.

Examines the increased participation of women geographers in AAG meetings over five years.

DeBoer, G. E., 1986. Perceived science ability as a factor in the course selections of men and women in college. *Journal of Research in Science Teaching*, 23:343-352.

Examines relationship of perceived ability and course selection. Females rate a lower ability in science as having a negative effect on future participation.

Deskins Jr., D. R., 1969. Geographical literature on the American negro, 1949-1968: A bibliography. *The Professional Geographer*, 21(3):145-149.

Publications in major geographical journals, geographic theses and dissertations, and other literature on African-Americans.

Deskins Jr., D. R.; Cohen, S. B.; and Speil, L. J., 1971. Geography and Afro-America: The anatomy of a graduate training and curriculum development project. *Journal of Geography*, 70(8):465-471.

Outlines the experimental programs of the Commission on Geography and Afro-America in its attempt to develop a multi-phased graduate training and assistance program to improve geography programs at predominantly African-American colleges and universities.

Deskins Jr., D. R., and Sibert, L. E., 1975. Blacks in American geography: 1974. *The Professional Geographer*, 27:65-72.

Third in a series of reports by the AAG Geographers' Commission on Geography and Afro-America. Uses 1973 survey to document current status of participation by African-Americans in geography.

Deskins Jr., D. R., and Speil, L. J., 1971. The status of Blacks in American geography: 1970. *The Professional Geographer*, 23:283-289.

A 1970 survey of geography departments and quality of geographic education in predominantly African-American universities. Update of two 1968 surveys of participation of African-Americans in geography.

Deskins Jr., D. R., and Speil, L. J., 1972. Geography and Black America. *The Professional Geographer*, 24:45-47.

Listing of colleges and universities predominantly African-American in staff and/or student body where geography is included in curriculum. Identification of professors engaged actively in research on African-America.

Donaldson, O. F., 1971. Geography and the Black American: The white papers and the invisible man. *Journal of Geography*, 70(3):138-149.

An examination of geography textbooks and scholarly journals reveals that with few exception they give inadequate treatment of African-Americans. Extensive bibliography.

Donaldson, O. F., 1972. The geography of Black America: Three approaches. *Journal of Geography*, 71(7):414-420.

Discussion of three approaches to the presentation of courses and materials on the geography of African-America at the primary, secondary, and university levels.

Drake, C., 1983. Teaching about third world women. *Journal of Geography*, 82(4):163-169.

This type of course draws attention to the inequitable position, problems, and potential of women around the world. Provides a rationale, outline, and resources for the course.

Driever, S. L., 1983. The relationship between actual and cognitive state sizes. *The Professional Geographer*, 34(2):165-171.

Testing and comparison of gender differences in evaluating sizes of U.S. states. Males were more accurate in estimation of size.

Ebbeck, M., 1984. Equity for boys and girls: Some important issues. *Early Child Development and Care*, 18:119-131.

Observations of preschool teachers for teacher-student interactions. In a total of 2,183 observations, 60% were with male students and 40% with females.

Erickson, G., and Farkas, S., 1987. Prior experience: A factor which may contribute to male dominance in science. In *Proceedings of the Fourth Girls into Science and Technology Conference*, eds. J. Daniels and J. Kahle, pp. 8-15. Ann Arbor, MI: University of Michigan.

Interviews with students reveal that prior science experiences have an impact on science achievement with males having a greater scope of experiences.

Evans, A., 1992. A look at the scientist as portrayed in children's literature. *Science and Children*, 29(6):35-37.

Analysis of 17 books for portrayal of scientists. In general scientists are portrayed as ordinary people. Very few women or minorities are portrayed and the fictional scientist has no other interest.

Fahey, S., 1988. Putting gender into geography. *Australian Geographical Studies*, 26(1):202-213.

Outlines gender issues in geography; reviews current status of gender issues in Australian curriculum and offers practical suggestions to those who wish to teach more effectively about gender issues in their courses.

Fausto-Sterling, A., 1985. *Myths of Gender*. New York, NY: Basic Books.

A detailed and scientific explanation to questions of "nature versus nurture."

Feingold, A., 1988. Cognitive gender differences are disappearing. *American Psychologist*, 43:95-103.

Questions validity of gender differences in spatial ability. Uses norms from four standardizations of the Differential Aptitude Tests and from four standardizations of PSSAT/SSAT.

Feinstermaker, S., West, C;. and Zimmerman, D., 1991. Gender inequality: New conceptual terrain. In *Gender, Family and Economy: The Triple Overlap*, ed. R. Blumberg, pp. 289-307. Newbury Park, CA: Sage Publications.

Research explores historical, social, and cultural factors purported to influence spatial knowledge and abilities of males and females.

Fleming, M. L., and Malone, M. R., 1983. The relationship of student characteristics and student performance in science as viewed by meta-analysis research. *Journal of Research in Science Teaching*, 20:481-495.

Meta-analysis of 122 studies completed since 1960 involving K-12 students. Considers six characteristics related to science achievement, cognitive level, and attitudes. Characteristics include general ability, language ability, mathematics ability, SES, gender, and race.

Fort, D. C., and Varney, H. L., 1989. How students see scientists: Mostly male, mostly white, and mostly benevolent. *Science and Children*, 26(8):8-13.

Analysis of 1,654 student (grades 2-12) responses to NSTA project assessing students' perceptions of scientists. Scientists were portrayed primarily as white benevolent males.

Gale, N.; Golledge, R.G.; Pellegrino, J.; and Doherty, S., 1990. The acquisition and integration of neighborhood route knowledge in an unfamiliar neighborhood. *Journal of Environmental Psychology*, 10(1):3-26.

On specific spatial tasks, particularly those related to wayfinding, pre-teen females performed better than pre-teen males and adults.

Garcia-Ramon, M. D.; Castaner, M.; and Centelles, N., 1988. Women and geography in Spanish universities. *The Professional Geographer*, 40:307-315.

Analysis of the presence and role of women in Spanish universities.

Gilbert, A., 1987. La geographie pratiquee par les femmes: Les memoires et theses presentes dans les universites de langue francaise du Canada. *The Canadian Geographer*, 31:253-262.

Assessment of women in French language universities; compares degrees and areas of research by gender.

Gilmartin, P. P., 1982. The instructional efficacy of maps in geographic texts. *Journal of Geography*, 81(4):145-150.

Investigation of map-use in texts for their ability to communicate spatial relationships. Higher scores are achieved using maps; males scored higher in group using no maps; marginal gender differences in group using maps.

Gilmartin, P. P., 1986. Maps, mental imagery and gender in the recall of geographical information. *The American Cartographer*, 13(4):335-344.

Investigation of map-reading skills and gender. Provides some evidence of developmental hypothesis concerning the emergence of spatial skills.

Gilmartin, P. P., and Patton, J. C., 1984. Comparing the sexes on spatial abilities: Map-using skills. *Annals of the AAG*, 74(4):605-619.

Questions the validity of generalizing from spatial ability to mapping skills. Results of five map-use studies; generally, no gender-related performance differences.

Goggins, E. O., and Lindbeck, J. S., 1986. High school science enrollment of African-American students. *Journal of Research in Science Teaching*, 23:251-262.

Identifies variables which characterize science course enrollment of African-American students. Significant predictors are U.S. Census Regions and grades of A or B in English.

Goldberg, J., and Kirman, J. M., 1990. Sex-related differences in learning to interpret Landsat images and in road map reading in young adolescents. *Journal of Geography*, 89(1):15-25.

Examination of sex-related differences of 153 adolescent males and females in Landsat mastery, road map reading, and map drawing. Low correlation between spatial ability and mapping skills.

Golledge, R. G., and Halperin, W C., 1983. On the status of women in geography. *The Professional Geographer*, 35:214-218.

A 1982 study of 60 graduate geography departments, comparing data from 1976 to 1981. Cites departmental innovations to attract and retain female graduate students.

Good, T. L.; Sikes, J.; and Brophy, J. E., 1973. Effects of teacher sex and student sex on classroom interaction. *Journal of Educational Psychology*, 65:74-87.

One of the largest studies completed on teacher-student interactions in math and social studies classrooms. Both male and female teachers differentially treat students, with male students receiving more attention.

Grieve, T. D., and Davis, J. K., 1971. The relationship of cognitive style and method of instruction to performance in ninth grade geography. *Journal of Educational Research*, 5(3):137-141.

Examines whether cognitive style differentially influences performance under either expository or discovery method of instruction. Neither cognitive style or method of instruction has overall effect on acquisition of knowledge.

Grim, R. E., 1976. *National Archives and Records Service Resources for the Study of Native Americans.* (ERIC Document Reproduction Service ED 124 321).

Introduction to resources for geographical studies of Native Americans.

Gunderson, P. K., 1978. Involving college students in geographic research on women. *Journal of Geography*, 77(5):186-189.

Author's experience and strategies for involving college students in geographic research on women.

Hall, R. M., and Sandler, B. R., 1982. The classroom climate: A chilly one for women? In *Project on the Status and Education of Women*, Association of American Colleges, pp. 1-22. Washington, DC: Association of American Colleges.

Assesses ways in which teachers perpetuate bias against achievement by female students, especially in methods of giving praise.

Hardy, J., 1984. Sexism: Practical strategies for raising levels of awareness. *Contemporary Issues in Geography and Education*, 1(2):30-32.

Practical classroom activities designed to educate students about sexism and ways to eliminate it.

Herman, J.; Heins, J.; and Cohen, D., 1987. Children's spatial knowledge of their neighborhood environment. *Journal of Applied Developmental Psychology*, 8(1):1-15.

No gender-related difference in ability to infer spatial relations in familiar large-scale environment in young children, age 6-11.

Herman, J., and Siegel, A., 1978. The development of cognitive mapping of the large scale environment. *Journal of Experimental Child Psychology*, 26:389-406.

Study of mapping skills of elementary school children. Inconsistent results in terms of gender-related performance.

Hill, O. W.; Pettus, W. C.; and Hedin, B. A., 1990. Three studies of factors affecting the attitudes of blacks and females toward the pursuit of science and science-related careers. *Journal of Research in Science Teaching*, 27:289-324.

Assesses seven factors involved with science career choices of African-Americans and females; race and gender differences noted. For both races and sexes, the major factor affecting science-related career interest is personal and positive contact with a scientist.

Holt, E. R., 1990. *Remember the ladies — Women in the curriculum.* ERIC Digest. (ERIC Document Reproduction Service, No. ED 391 652).

Examines three questions: (1) How have women been treated in social studies textbooks and curricula? (2) What are some strategies for including women in social studies? (3) What resources are recommended for teachers and students?

Horvath, R. J.; Deskins Jr., D. R.; and Larimore, A. E., 1969. Activity concerning Black America in university departments granting M.A. and Ph.D. degrees in geography. *The Professional Geographer*, 21:137-139.

Survey to assess degree to which African-Americans participate in geography at predominantly white institutions. Data includes number of staff members, graduate students, and current research on African-Americans.

Hubbard, R., and Stoddard, R. H., 1979. High school students' images of geography: An exploratory analysis. *Journal of Geography*, 78(5):188-194.

Assessment of high school students' knowledge of and attitudes toward geography.

Hyde. J. S., 1981. How large are cognitive gender differences? A meta-analysis using ϖ and δ. *American Psychologist*, 36:892-901.

Re-analysis of studies of cognitive differences cited by Maccoby and Jacklin (1974) in order to determine magnitude of differences. Indicates that sex-related differences were very small.

Imperatore, W., 1971. Geography at the kindergarten level: Report of a study. *Journal of Geography*, 70(5):296-302.

Study of teaching of a conceptual geography unit. Race and SES are significant variables in achievement while gender and pretest scores are not.

Jakle, J. A., 1973. *Ethnic and Racial Minorities in North America: A Selected Bibliography of the Geographical Literature.* (ERIC Document Reproduction Service No. ED 134 670).

Bibliography of literature related to 46 ethnic and/or racial minorities.

Jones, M. G., 1990. Action zone theory, target students and science classroom interactions. *Journal of Research in Science Teaching*, 27:651-660.

Analysis of seating patterns of target students in high school science classes. Target students dominate classroom interactions and receive more direct questions, teacher conversations, and sustained feedback.

Jones, M. G., and Wheatley, J., 1988. Factors influencing the entry of women into science and related fields. *Science Education*, 72:127-142.

Review of literature concerning factors that affect whether females choose science-related classes and careers.

Jones, M. G., and Wheatley, J., 1989. Gender influences in classroom displays and student-teacher behavior. *Science Education*, 73:535-545.

Of 193 graphic representations of scientists in the classroom, 93% were male. Males generally chosen to help with demonstrations and dominate teacher-student interactions.

Jones, M. G., and Wheatley, J., 1990. Gender differences in teacher-student interactions in science classrooms. *Journal of Research in Science Teaching*, 27:861-874.

Observation of 30 high school science classes reveal gender differences in classroom interactions for teachers and students.

Journal of Geography., 1978. Women in the geography curriculum, special issue. *Journal of Geography*, 77(5).

Issue devoted to theme of women in the geography curriculum.

Jumper, S. R., and Harrison, L. G., 1986. Characteristics of the AAG membership in 1982. *The Professional Geographer*, 38:390-396.

AAG membership examined by sex for 16 characteristics.

Kahle, J. B., 1983. *Girls in School: Women in Science.* (ERIC Document Reproduction Service No. ED 158 812).

Discussion of traits and teaching methods of teachers who are successful in encouraging female students toward future science studies and careers.

Kahle, J. B., 1985. Retention of girls in science: Case studies of secondary teachers. In *Women in Science: A Report from the Field*, ed. J. B. Kahle, pp. 49-76. Philadelphia, PA: The Falmer Press.

Examines traits of teachers who have been identified as successful in encouraging girls to study science. Studies have implications for all educators.

Kahle, J. B., 1985. *Women in Science: A Report from the Field.* Philadelphia, PA: The Falmer Press.

Collection of essays focusing on contemporary biological scientists, principally those in educational settings. Most of the papers are based on literature reviews.

Kahle, J. B., 1988a. Gender and science education II. In *Development and Dilemmas in Science Education*, ed. P. Fensham, pp. 249-265. Philadelphia, PA: The Falmer Press.

A stereotyped male image prevails in science and may contribute to the lack of females in science classes and careers.

Kahle, J. B., 1988b. Recruitment and retention of women in college science majors. *Journal of College Science Teaching*, 17(5):382-384.

Addresses different attributes and concerns of women and men who select science majors as part of strategy to recruit and retain women as college science majors.

Kahle, J. B., and Lakes, M. K., 1983. The myth of equality in science classrooms. *Journal of Research in Science Teaching*, 20:131-140.

Surveyed males had more opportunities than females to experience science-oriented activities outside school. These experiences may affect achievement in the classroom.

Kauchak, D., and Peterson, K., 1983. Differences in science students' view of ideal and actual role behavior according to success and gender. *Journal of Research in Science Teaching*, 20:565-570.

A Q-sort indicates differences in perceptions of ideal and actual student behavior according to success. No overall pattern of differences are indicated for gender; three ideal and one actual student behavior are significantly different.

Kirman, J. M., and Goldberg, J., 1984. A Landsat color 1 in-service training program for elementary school teachers and the mass testing of their 718 pupils. *Canadian Journal of Remote Sensing*, 10:143-148.

Testing of grades 4-6 on Landsat image interpretation. Small, but consistent, gender-related difference in performance favoring males.

Kirman, J. M., and Goldberg, J., 1987. Sex related differences in interpreting Landsat images by grade six children - implications for remote sensing education. In *Proceedings of the Tenth Canadian Symposium on Remote Sensing*, eds. M. Thompson and R. J. Brown, pp. 565-570. Ottawa: Canadian Aeronautics and Space Institute.

Examines Landsat image and road map interpretation of 6th graders. No gender-related difference in performance.

Kirman, J. M. and Goldberg, J., 1992. Grade six children's perception of a map symbol. *Journal of Geography*, 91(1):38-40.

Examines tendency of boys and girls to differentially rotate house symbols on maps. Majority of children selected map-like pictures with roof peaks at 90-degrees to the street; no significant difference between boys and girls.

Kirschner, V., 1982. What research says: Females and mathematics. *School Science and Mathematics*, 82:511-513.

Analysis of math classes indicates teachers and students expect sex differences in achievement. Male and female students are treated differently and students respond differently in class consistent with sex-role expectations.

Klein, C. A., 1989. What research says: About girls and science. *Science and Children*, 27(2):28-31.

Summary of research concerning factors that influence the interest and achievement of girls and young women in science. Provides concrete strategies for teachers to improve science education for females.

Koballa Jr., T. R., 1988. Persuading girls to take elective physical science courses in high school: Who are the credible communicators? *Journal of Research in Science Teaching*, 25:465-478.

Results of a survey of girls in 8th grade physical science indicates four highly credible communicators: father, women high school teacher, mother, and boy high school student. Desirable attributes of communicators are prestige and trustworthiness.

Larimore, A. E., 1978. Humanizing the writing in cultural geography textbooks. *Journal of Geography*, 77(5):183-185.

Women generally excluded from scholarly work of American cultural geographers; males dominate cultural geography images and language. Includes list of published guidelines for textbooks.

Larimore, A. E.; Scott, E. P.; and Deskins Jr., D. R., 1969. Geographic activity at predominantly Negro colleges and universities: A survey. *The Professional Geographer*, 21:140- 144.

Survey assess predominantly African-American colleges and universities for position of geography in curriculum. Includes consideration of faculty and interaction with other geographers and professional organizations.

Larsen, B., 1983. The gender gap in the geography curriculum. In *Racist Society: Geography Curriculum.* London: Association for Curriculum Development in Geography.

School geography texts tend to show women as passive and ornamental items of illustration, if they are represented at all. Little or no acknowledgement of their contributions to the economy.

Lawrenz, F. P., 1988. Native American school environments: Focus on science and mathematics education. *School Science and Mathematics*, 88:676-682.

Description of environments in schools having a majority of Native American students. Attempts to identify areas where changes might result in improved involvement of Native Americans in science and mathematics.

Lee, D. R., 1978. Feminist approaches in teaching geography. *Journal of Geography*, 77(5):180-183.

Suggests ways to incorporate gender into courses to combat the perception and reality of geography as a male dominated discipline. Review of textbooks.

Lee, D. R., 1984. Women and Geography, 1984: A Bibliography. *Transition*, 14(4):20-26.

Updated bibliography of research on women and geography. Includes 75 items.

Lee, D. R., 1987. *Women and Geography, 1987: A Bibliography*. Boca Raton, FL: Florida Atlantic University.

Bibliography of 60 sources for the study of women.

Lee, D. R., 1988. *Women and Geography: A Comprehensive Bibliography*. Boca Raton, FL: Florida Atlantic University.

Contains 658 entries (published and unpublished) of women's literature in geography.

Lee, D. R., 1989. *Update to Women and Geography: A Comprehensive Bibliography*. Boca Raton, FL: Florida Atlantic University.

Contains 134 entries of works which deal with gender considerations in human geography.

Lee, D. R., 1990. The status of women in geography: Things change, things remain the same. *The Professional Geographer*, 42:202-211.

Study of U.S. geography departments focuses on (1) sex ratios of departmental faculty; (2) rank, tenure, and salary of male and female faculty; (3) comparison of academic geography of late 1980s and earlier studies and with sociology; and (4) suggestions for solutions to problems identified.

Lee, D. R. and Loyd, B., 1981. *Women and Geography: A Bibliography*. Cincinnati, OH: Socially and Ecologically Responsible Geographers.

Bibliography of 300 resources, 1970-1981.

Lee, R., 1985. Where have all the geographers gone? *Geography*, 70(1):45-59.

Data on flow of geographers through United Kingdom educational system.

Lewis, L. T., 1974. The geography of black America: The growth of a sub-discipline. *Journal of Geography*, 73(9):38-43.

African-Americans still generally omitted from the geographic literature or portrayed in less than humanistic ways. Advocates integrating these studies in proper perspective into geography courses.

Libbee, K. S., and Libbee, M., 1978. Geography, education, and the women's movement: Speculations about their inter-relationships. *Journal of Geography*, 77(5):176-180.

Examines relationship of geographic education and the woman's movement. Describes classroom strategies to generate involvement by women students.

Linn, M., and Hyde, J., 1989. Gender, mathematics, and science. *Educational Researcher*, 18(8):17-19, 22-27.

Meta-analysis reveals psychosocial and cognitive abilities differences by gender are decreasing.

Linn, M., and Petersen, A., 1985. Emergence and characterization of sex differences in spatial ability: A meta-analysis. *Child Development*, 56:1479-1498.

Comprehensive review and meta-analysis of research on spatial ability. Differentiates three subfactors of spatial ability and analyzes gender differences.

Lord, T. R., 1987. A look at spatial abilities in undergraduate women science majors. *Journal of Research in Science Teaching*, 24:757-768.

Investigates gender differences among two-year college science majors. Examines if the spatial perception of females in science is as accurate as their male counterparts. After intervention, females improved more rapidly than males.

Loyd, B., and Rengert, A., 1978. Women in geographic curricula: An introduction to the issue. *Journal of Geography*, 77(5):164-166.

Introduction to special issue of the Journal of Geography concerning issues of women in the geography curriculum.

Maccoby, E. E., and Jacklin, C. N., 1974. *The Psychology of Sex Differences*. Stanford: Stanford University Press.

Review of 1,400 studies of differences between males and females. Indicates there was consistent evidence for four basic psychological differences, one being that females have higher verbal skills and another that males have higher skills in math and on visuo-spatial tasks.

Malcolm, S. M., 1976. *Programs in Science for Minority Students, 1960-1975*. Washington, DC: American Association for the Advancement of Science. (ERIC Document Reproduction Service No. ED 239 851).

List of programs, including geography, to improve science education of minority groups and to increase participation in science and science-related courses.

Malone, M. R., and Fleming, M. L., 1983. The relationship of student characteristics and student performance as viewed by meta-analysis research. *Journal of Research in Science Teaching*, 20:481-496.

Analysis of 300 studies of gender differences in science attitudes and achievement. Differences increased as students reached middle school.

Manning, M. L., and Lucking, R., 1991. The what, why, and how of cooperative learning. *The Social Studies*, 82(3):120-124.

Introduction to methods of cooperative learning and effects on academic achievement, social skills, and self-esteem. Considers effect on intergroup and multi-ethnic relations.

Mason, C. L., and Kahle, J. B., 1989. Student attitudes toward science and science-related careers: A program designed to promote a stimulating gender-free learning environment. *Journal of Research in Science Teaching*, 26:25-40.

Report of effects of teacher training/sensitization to gender-free learning environment on student attitudes toward science and careers. Attitudes were improved, and activities and interest in science careers increased.

Mason, C. L.; Kahle, J. B.; and Gardner, A. L., 1991. Draw-a-scientist test: Future implications. *School Science and Mathematics*, 91:193-198.

Use of the Draw-a-Scientist Test (DAST) to determine the effectiveness of a teacher intervention program to help teachers promote a stimulating gender-free learning environment. Discusses use of DAST as a vehicle to sensitize teachers and students to the need for changing the image of science and scientists.

Massey, D., 1986. Inside a textbook. *Journal of Geography*, 85(3):116-119.

Raises the issue of prepublishing censorship in geography textbooks; provides some examples and suggests ways for teachers and students to address the problem. Considers role of women portrayed in textbook.

Matthews, M. H., 1984a. Cognitive mapping abilities of young boys and girls. *Geography*, 69:327-336.

Examines whether gender influences child's (ages 6-11) awareness of place and ability to represent space. Gender differences may be due to different ways in which boys and girls come into contact with their environment.

Matthews, M. H., 1984b. Cognitive maps of young children: A comparison of graphic and iconic techniques. *Area*, 6:33-40.

Examines types of features represented on recall maps and devises classification scheme of features for future research.

Matthews, M. H., 1984c. Environmental cognition of young children: Images of journey to school and home area. *Transactions, Institute of British Geographers*, 9:89-105.

Both sexes, regardless of age, emphasized individual features, particularly those classed as landmarks.

Matthews, M. H., 1986. Gender, graphicacy and geography. *Educational Review*, 38(3):259-271.

Gender-related performance differences in terms of spatial behavior and competence, favoring males. Mapping ability related to prior experiences around house and in environment.

Matthews, M. H., 1987a. Gender, home range and environmental cognition. *Transactions*, Institute of British Geographers, 12:43-56.

Study of mapping skills yields consistent gender-related differences in performance, favoring males.

Matthews, M. H., 1987b. Sex differences in spatial competence: The ability of young children to map 'primed' unfamiliar environments. *Educational Psychology*, 7(2):77-90.

Effects of gender upon acquisition of spatial and environmental skills in primary grade children. Boys perform better on complex tasks which may be due to more extensive movements through environment.

Matthews, W., 1984. Influences on the learning and participation of minorities in mathematics. *Journal for Research in Mathematics Education*, 15:84-95.

Consideration of variables that may influence the learning and participation of minorities in mathematics; notes that these variables are often not considered in research.

Matyas, M. L., 1985. Factors affecting female achievement and interest in science and scientific careers. In *Women in Science: A Report from the Field*, ed. J. B. Kahle. Philadelphia, PA: The Falmer Press.

Explores the sociocultural, personal, and educational factors that shape women's choices of entering social science, biological science, and physical science.

Mayer, T., 1989. Consensus and invisibility: The representation of women in human geography textbooks. *The Professional Geographer*, 41:397-409.

The representation of woman in human geography textbooks has not been improved by feminist scholarship or the new consciousness.

Mazey, M. E., 1982. The role of women in Ohio geography. *Ohio Geographers: Recent Research Themes*, 10:1-7.

Discussion of historical and contemporary role of women in Ohio geography.

Mazey, M. E., and Lee, D. R., 1983. *Her Place, Her Space*. Washington, DC: Association of American Geographers.

Examines major themes of human geography drawing from the literature on feminism.

McDonald, R., and Eliot, J., 1987 Variables contributing to successful aerial photographic interpretation. *Perceptual and Motor Skills*, 64(2):183-192.

Males favored in aerial photo interpretation.

McDowell, L., 1979. Women in British geography. *Area*, 11(2):151-154.

Geography dominated by male-oriented view of society and by males in university geography departments and journals published by the Institute of British Geographers.

McDowell, L., and Bowlby, S., 1983. Teaching feminist geography. *Journal of Geography in Higher Education*, 7(2):97-107.

A feminist perspective on geography should lead to changes in the content and organization of undergraduate courses and teaching methods.

McDowell, L., and Peake, L., 1990. Women in British geography revisited: Or the same old story. *Journal of Geography in Higher Education*, 14(1):19-30.

Survey, 1987-1988. Follow-up to ten-year study of status of women in British university geography departments.

McGuiness, D., and Sparks, J., 1983. Cognitive style and cognitive maps: Sex differences in representations of a familiar terrain. *Journal of Mental Imagery*, 7(2):91-100.

Gender differences in construction of maps of college campus. Males have greater topographical sense of terrain while females are more accurate with distance.

McTeer, J. H., 1977. *Student Interest in Social Studies Content and Methodology*. (ERIC Document Reproduction Service No. ED 139 712).

Survey of Georgia 7th and 8th grade students to determine attitudes toward social studies, including geography. Students more interested in social than physical geography.

McTeer, J. H., 1979. High school students' attitudes toward geography. *Journal of Geography*, 78(2):55-56.

Survey of Georgia high school students to determine attitudes toward five subjects: history, psychology/sociology, government, economics, and geography. History most liked; geography least liked. Interviews with students, teachers, and administrator suggest reasons for low rating of geography.

Mitchell, O., and Smith, N., 1990. Bringing in race. *The Professional Geographer*, 42:232-234.

Proposes that geography as a discipline has historically excluded and failed to attract minorities. Suggestions for inclusion of minorities in geography.

Momsen, J., 1980a. Women in Canadian geography. *Canadian Geographer*, 24:177-183.

Examines relative participation of female geography students in Canadian universities at each academic level.

Momsen, J., 1980b. Women in Canadian geography. *The Professional Geographer*, 32:365-369.

Data from Canadian Association of Geographers and geography departments in Canadian universities to document status of women in academia; comparison with Association of American Geographers data.

Monk, J., 1978. Women in geographic games. *Journal of Geography*, 77(5):190-191.

Examines role-playing activities for use of male and female roles and images they promote. Games have more male characters and stereotyped gender roles.

Monk, J., 1983. Integrating women into the geography curriculum. *Journal of Geography*, 82(6):271-273.

Geography curriculum should include a consideration of women's experiences. Requires changes in language, recognition of female contributions, selective treatment of women's experiences, and integration of gender as a variable.

Monk, J., 1985a. Feminist transformation: How can it be accomplished? *Journal of Geography in Higher Education*, 9(1):101-105.

Introduction of feminist perspectives in teaching of geography is the practical application of critical theory.

Monk, J., 1985b. Women in geography. *Women and Environment*, 7(1):25.

Report of the Institute of British Geographers session on women and gender.

Monk, J., 1987. Geography meeting its mission. *Journal of Geography*, 86(4):143-147.

Addresses issue of meeting needs of an increasingly diverse population of learners and motivating and empowering learners to show concern for and act on social, political, economic, and environmental issues.

Monk, J., 1988. Engendering a new geographic vision. In *Teaching Geography for a Better World*, eds. J. Fien and R. Gerber, pp. 91-103, 194-195. Edinburgh: Oliver and Boyd.

Advocates a curriculum that presents the world through the eyes of both genders. Delineates concepts for studying women and gender and their application to geography.

Monk, J., and Hanson, S., 1982. On not excluding half of the human in human geography. *The Professional Geographer*, 34:11-23.

Reviews of feminist contributions in other disciplines. Outlines gender biases in the theories, methods, and content of geographic research. Identifies ways in which non-sexist geography might emerge: (1) feminist strand of research and (2) encouraging feminist perspective within all streams of human geography.

Monk, J., and Williamson-Fien, J., 1986. Stereoscopic visions: Perspectives on gender — challenges for the geography classroom. In *Teaching Geography for a Better World*, eds. J. Fien and R. Gerber, pp. 186-220. Brisbane: Australian Geography Teachers Association with the Jacaranda Press.

Moore, G. T., 1973. Developmental difference in environmental cognition. In *Environmental Design Research*, vol. 2, ed. W. Preisser, pp. 232-239. Stroudsberg: Dowden, Hutchinson and Ross.

Investigates mapping skills of adults, showing borderline significant gender-related difference, favoring males.

Morrison, A., 1974. Testing the effectiveness of road speed maps and conventional maps. *The Cartographic Journal*, 11:102-116.

Performance study to select minimum time routes road maps. No gender-related differences on performance.

Morrison, C., 1982. Options for women in geography: Some experiences shared. *Canadian Geographer*, 26:360-366.

Informal survey and interview of 16 women geographers in the public and private sector. Discusses aspects of geographical training beneficial to specific career fields.

Olson, D.; Eliot, J.; and Hardy, R., 1988. Relationships between activities and sex-related differences in performance on spatial tests. *Perceptual and Motor Skills*, 67:223-232.

Eleven out of 21 academic courses positively correlated with spatial performance; geography was one of the courses.

Otto, P. B., 1991. One science, one sex? *School Science and Mathematics*, 91:367-372.

Review of research on imbalance between men and women pursuing careers in science. Explanations focus on (1) disparity in cognitive abilities; (2) personality characteristics, (3) attitudes toward science; (4) differences between in-school and out-of-school learning experiences; (5) and gender differences in mathematics preparation.

Owens, L. and Barnes, J., 1982. The relationships between cooperative, competitive, and individualized learning preferences and students' perceptions of classroom learning atmosphere. *American Educational Research Journal*, 19:182-200.

Comparison of perceptions of classroom learning atmosphere as related to learning preference. Females tend to prefer cooperative modes over competitive.

Owens, L. and Straton, R., 1980. The development of a cooperative, competitive, and individualized learning preference scale for students. *British Journal of Educational Psychology*, 50:147-161.

Survey of student preference for learning mode as an important variable in effectiveness of learning. Females from prefer cooperative learning, whereas males prefer competitive and individualized modes.

Palm, R., 1984a. President's column. *AAG Newsletter*, 19(8):1-2.

Comparison of status of women in academic geography from '972 to 1984.

Palm, R., 1984b. President's column. *AAG Newsletter*, 20(2):1-2.

Discussion of women in higher academic ranks in geography.

Patton, W. E., 1980. *Improving the Use of Social Studies Textbooks. Bulletin 63*. Washington, DC: National Council for the Social Studies.

Method for teachers and students to work with inappropriate texts as objects of action research and analysis. Example given for portrayal of women in textbooks.

Peltz, W. H., 1990. Can girls + science - stereotypes = success? *The Science Teacher*, 57(9):44-49.

Documents gender differences in attitude, achievement, perception of science, classroom participation, and classroom interaction. Suggestions for a feminine perspective in classroom environment that is non-threatening and encourages female participation.

Pepper, F. C., 1986. Is there an Indian learning style? *Kui Tak*, 2(1):1-2.

Hands-on, concrete teaching fashion suggested as an effective method of promoting Native American student achievement.

Peterson, K.; Burton, G.; and Baker, D., 1983. Geometry students' role-specific self-concept: Success, teacher, and sex differences. *Journal of Educational Research*, 77:122-126.

No significant differences between male and female geometry students' self-concept as geometry students, although differences according to success and teacher were found.

Peterson, K., and Mayes, B., 1981. Ideal teacher behavior perceptions of science students: Success, gender, course. *School Science and Mathematics*, 81:315-321.

Description of a Q-Sort for determining student perceptions of ideal science teacher behaviors. Significant differences by ability level, gender, and specific science classes.

Peterson, P. L., and Fennema, E., 1985. Effective teaching, student engagement in classroom activities, and sex-related differences in learning mathematics. *American Educational Research Journal*, 22:309-335.

Reports that math achievement is negatively correlated with competitive activities and positively correlated with cooperative activities. Suggests that the competitive atmosphere present in some classrooms is a barrier to the achievement of female students.

Philips, R. J., and Noyes, L., 1982. An investigation of visual clutter in the topographic base of a geological map. *The Cartographic Journal*, 10:122-130.

Sample of 124 men and 21 women in college geology courses. Equal gender performance in reading geological maps.

Popcock, D. C. D., 1976. Some characteristics of mental maps: An empirical study. *Transactions, Institute of British Geographers*, 1:493-512.

Females draw less sophisticated maps than males.

Powell, R. R., and Garcia, J., 1985. The portrayal of minorities and women in selected elementary science series. *Journal of Research in Science Teaching*, 22:519-533.

Determines the quantitative and qualitative portrayal of females and minorities in seven elementary science texts. Excellent bibliography for 1970s literature.

Powell, R. R., and Garcia, J., 1988. What research says: About stereotypes. *Science and Children*, 25(5):21-22.

Examines 42 elementary science textbooks for illustrations of minorities and women. Caucasian men appear in significant science roles more often than children, members of minority groups or women.

Rechlin, A., 1992a, May-June. Women's places in the profession of geography, part one. *Progress and Perspective: Affirmative Action in Surveying and Mapping.*

Analysis of progress of women in the profession of geography using Association of American Geographers membership data for 1967 and 1988.

Rechlin, A., 1992b, July-August. Women's places in the profession of geography, part two. *Progress and Perspective: Affirmative Action in Surveying and Mapping.*

Part two of a comparison analysis of women in the profession of geography. Uses Association of American Geographers membership data for 1967 and 1988.

Reid, P. T., and Stephens, D. S., 1985. The roots of future occupations in childhood: A review of the literature on girls and careers. *Youth and Society*, 16:267-288.

Review of research studies on career development of girls indicates that the sex-role stereotyping of occupation strongly discourages young women from pursuing lucrative, nontraditional careers.

Rengert, A. C., and Monk, J., 1980a. *Overcoming Masculine Bias in Introductory College Human Geography: A Module Approach.* Washington, DC: Association of American Geographers.

Series of modules to increase and improve representation of women in college introductory human geography courses.

Rengert, A. C., and Monk, J., eds., 1980b. *Toward A Gender Balanced Geography.* Washington, DC: Association of American Geographers and U.S. Office of Education.

Rengert, A. C., and Monk, J., eds., 1982. *Women and Spatial Change: Learning Resources for Social Science Courses.* Dubuque, IA: Kendall Hunt.

Contains teaching units focusing on the effects of spatial change on women which may be used as supplements to introductory college courses.

Rennie, L., 1987. Out-of-school science: Are gender differences related to subsequent attitudes and achievement in science. In *Proceedings of the Fourth Girls into Science and Technology Conference*, eds. J. Daniels and J. Kahle, pp. 8-15. Ann Arbor, MI: University of Michigan.

Evidence that males have more out-of-school experiences than girls that are related to physical science and may enhance science interest and achievement.

Rennie, L. J., and Punch, K. F., 1991. The relationship between affect and achievement in science. *Journal of Research in Science Teaching*, 28:193-209.

Discusses development and testing of model to examine relationship between science-related affect and achievement in 8th grade science.

Reyes, L. H., and Padilla, M. J., 1985. Science, math, and gender. *The Science Teacher,* 52(6):46-48.

Review of research about gender differences and variables which may affect performance in science and mathematics.

Reynolds, A. J., and Walberg, H. J., 1991. A structural model of science achievement. *Journal of Educational Psychology*, 83(1):97-107.

Model yields eight productivity factors that contribute to science achievement. Prior achievement, peer environment, and amount and quality of instruction have positive direct effects. Instruction time mediates effects of other factors, including mass media, peer environment, and class environment. Home environment and motivation have greatest indirect effects.

Richason Jr., B. F., and Mitchell, L. S., 1972. An analysis of NCGE membership. *Journal of Geography*, 71(2):73-86.

Analysis of membership as of September 1969. Reports spatial distribution, degree earned, employment categories, teaching experience, length of employment, membership in other organizations, and views of Journal of Geography.

Riordan, C., 1990. *Girls and Boys in School: Together or Separate.* New York, NY: Teachers College Press.

A survey of the literature and studies on single-sex versus co-educational schools.

Roder, W., 1977. An alternate interpretation of men and women in geography. *The Professional Geographer*, 29:397-400.

Addresses female-male discrepancies noted by other studies. Illustrates evidence for sexual difference in geographic ability concerning spatial perception, orientation in geographic space (2-D), and concern for natural and cultural landscape.

Rowe, M. B., 1977. Why don't blacks pick sciences? *The Science Teacher*, 44:34-35.

Explores eight factors that may affect African-American students' career selection: Career counseling, teachers' expectations, course counseling, student persistence, role models, students' image of science, early exposure to science, and students' involvement in science projects.

Rubin, B., 1979. Women in geography revisited: Present status, new options. *The Professional Geographer*, 31:125-134.

Women in other disciplines have fared better due to actions taken by their professional associations. Urges the AAG to assume leadership in ending sex discrimination.

Rubin, B., 1981. Earned doctorates in geography by sex, 1970-1979. *Transition*, 10(4):32.
Data on earned doctorates in geography by sex, 1970-1979.

Sadker, D., and Sadker, M., 1985a. Is the o.k. classroom o.k.? *Phi Delta Kappan*, 66:359-361.
Study of 4th, 6th and 8th grade classrooms for differential gender interactions in Language Arts-English and Mathematics-Science. In both subjects, males were favored in teacher interactions while teachers failed to recognize a gender communication gap.

Sadker, D., and Sadker, M., 1985b. Sexism in the schoolroom of the '80s. *Psychology Today*, 19:54-57.
Report of differential treatment of boys and girls by teachers in 4th, 6th and 8th grade classrooms.

Sadker, D.; Sadker, M.; and Thomas, D., 1981. Sex equity and special education. *The Pointer*, 26(1):33-38.
Presents argument that teachers are unconsciously and unintentionally perpetuating sex stereotypes in science.

Sanders, R., 1990. Integrating race and ethnicity into geographic gender studies. *The Professional Geographer*, 43:228-231.
Critique of gender studies in geography using AAG panel discussion as departure point. Calls for geography as a discipline to make a more concerted effort to attract minorities and women.

Scott, L. U., and Heller, P., 1991. Team work works! *The Science Teacher*, 58(1):24-28.
Modification of classroom environment and interaction patterns is key to reducing differences in science achievement between white males and females and minorities.

Seager, J., and Olson, A., 1986. *Women in the World: An International Atlas*. New York, NY: Simon and Schuster.
International atlas devoted to women's space and issues.

Self, C. M.; Gopal, S.; Golledge, R. G.; and Fenstermaker, S., 1992. Gender-related differences in spatial abilities. *Progress in Human Geography*, 16(3):315-342.
Comprehensive review of literature on gender-based differences in spatial abilities. Includes literature from cognitive science and cognitive psychology, geography, sociology and anthropology, and relevant anatomical and neurophysiological literature. Concludes that males' superior dominance in spatial ability as reported in literature may be overestimated.

Shemesh, M., 1990. Gender-related differences in reasoning skills and learning interests of junior high school students. *Journal of Research in Science Teaching*, 27:27-34.

Assesses 7th-9th grade students' level of cognitive development and surveys of interest. Discussion of gender differences.

Shepardson, D. P., and Pizzini, E. L., 1991. Gender bias in the classroom — A self evaluation. *Science and Children*, 29(3):38-41.

Method for teachers to evaluate their own verbal behavior and expectations of their students' skills. Teacher discussions of results reveal gender-bias.

Shepardson, D. P., and Pizzini, E. L., 1992. Gender bias in female elementary teachers' perceptions of the scientific ability of students. *Science Education*, 76(2):147-153.

Survey of 42 female elementary teachers indicated differences in perceptions of students' scientific ability based on gender.

Shortridge, B. G., 1987. *Atlas of American Women*. New York, NY: Macmillan.

Excellent reference for numerous topics related to gender issues.

Shrestha, N. R., and Davis Jr., D., 1988. *Status of Minorities in Geography: A National Report*. Washington, DC: Association of American Geographers.

Discussion of minority underrepresentation in geography.

Shrestha, N. R., and Davis Jr., D., 1989. Minorities in geography; Some disturbing facts and policy measures. *The Professional Geographer*, 41:410-421.

Discusses extent of minority underrepresentation in geography. African-Americans, Hispanics, and Native Americans comprise small percentages of geography population sampled in 1987 from geography departments. Possible causes and recommendations for action and policy measures included.

Siegel, A., and Schadler, M., 1977. Young children's cognitive maps of their classroom. *Child Development*, 48:388-394.

Males favored in construction of models of school room.

Simpson- A. W., and Erickson, M. T., 1983. Teachers' verbal and nonverbal communication patterns as a function of teacher race, student gender, and student race. *American Educational Research Journal*, 20:183-198.

Study reveals male students receive more attention and interaction with the teacher, which has been correlated with higher achievement.

Simpson, R. D., and Oliver, J. S., 1990. A summary of major influences on attitude toward and achievement in science among adolescent students. *Science Education*, 74:1-18.

Comprehensive study of 4,000 students in grades 6 through 10 reveals that males have more positive attitudes toward science than females; differences may influence achievement.

Sims, R., 1983. Strong black girls: A ten year old responds to fiction about Afro-Americans. *Journal of Research and Development in Education*, 16(3):21-28.

Review of literature concerning effects of use of books about African-Americans on attitudes and responses of children. Responses of subject illustrate review. Useful bibliography.

Smith, N. J., and Farina, R. V., 1984. Beneath the veneer of sex equity in education. *Educational Considerations*, 11(2):29-33.

Suggests underrepresentation of women in science and engineering may be due to differential classroom experiences of males and females.

Smith, W. S., and Erb, T. O., 1986. Effect of women science career role models on early adolescents' attitudes toward scientists and women in science. *Journal of Research in Science Teaching*, 23:667-676.

A two-month exposure to female science professionals positively affected the attitudes of 5th-8th grade science students toward scientists and women in science.

Snelson, L., 1988. Teaching for justice: Aboriginal studies in geography. *Geographical Education*, 5(4):36-38.

Proposes socially critical geography curriculum including study of spatial justice for Australian Aboriginal people. Strategies to implement and destroy stereotypes.

Stanworth, M., 1983. *Gender and Schooling: A Study of Sexual Divisions in the Classroom.* London: Hutchison.

Results indicate teachers perpetuate sex stereotypes. Includes a review of research on effect of gender specific language on students.

Thompson, B., and Agocs, C., 1973. Ethnic studies: Teaching and research needs. *Journal of Geography*, 72(4):13-23.

Lists problems of research and teaching in ethnic studies and the implications for curriculum.

Thorndyke, W., and Goldin, S. E., 1983. Spatial learning and reasoning skills. In *Spatial Orientation, Theory, Research and Application*, eds. H. L. Pick Jr. and L. P. Acredolo, pp. 195-217. New York, NY: Plenum Press.

Gender difference in methods of drawing maps. Males use grid system in drawing map and females depend on personal association.

Tivers, J., 1981. Perspective on feminism and geography. I. In *Perspectives on Feminism and Geography. Papers—IBG Women and Geography Working Party*, ed. S. Bowlby, pp. 4-7. Reading: University of Reading Geography Department.

Contains introductory perspectives on definitions, the "invisibility" of women in geography, and the possible dimensions of a geography of women.

Tobin, K., and Gallagher, J. J., 1987. The role of target students in the science classroom. *Journal of Research in Science Teaching*, 24:61-76.

A small number (3-7) of target students monopolize interaction, ask more questions, receive higher quality feedback; most target students are males.

Tobin, K., and Garnett, P., 1987. Gender related differences in science activities. *Science Education*, 71:91-103.

Classroom observations of grades 8-11 reveal male students are asked more frequently than females to carry out demonstrations and are more involved with labs and equipment usage.

Townsend, J. G., and Townsend, A. R., 1988. Teaching gender north-south. *Geography*, 73(3):193-201.

Gender has still to be widely incorporated in teaching of human geography. One approach is to enter subject through studies of the South. Provides research reviews and themes appropriate for classroom.

Tracy, D. M., 1990. Toy-playing behavior, sex-role orientation, spatial ability, and science achievement. *Journal of Research in Science Teaching*, 27:637-650.

Examines possible relationships among 5th grade students' extracurricular toy-playing habits, sex-role orientations, spatial abilities, and science achievement. Boys had higher spatial skills than girls, which correlated with higher science achievement scores.

Underwood, J. D. M., 1981. Skilled map interpretation and visual-spatial ability. *Journal of Geography*, 80(2):55-58.

Examination of relationship of visual-spatial ability and map reading skills and impact of geographic training on female students' ability to interpret topographic maps.

Vinge, C. L., 1975. *Jobs for Geographers. Views by Members in the Profession.* East Lansing, MI: Michigan State University.

Employment opportunities of professional geographers can be enhanced, especially for women and minorities.

Vockell, E. L., and Lobonc, S., 1981. Sex-role stereotyping by high school females in science. *Journal of Research in Science Teaching*, 18:209-219.

Survey of high school students to determine gender attitudes toward science. Physical science perceived as a more masculine subject than biology. Females from non-coeducational schools rate physical science less masculine than females in coeducational schools.

Walford, G., 1983. Science education and sexism in the Soviet Union. *School Science Review*, 65(231):213-224.

Observations of science education in Soviet Union reveals similar patterns to United States. Males in science classes receive four times more of the interactions than do females.

Walford, R., ed., 1985. *Geographical Education for a Multi-Cultural Society.* Colchester & London: The Geographical Association.

Booklet on multicultural education.

Wareing, C., 1990. A survey of antecedents of attitudes toward science. *Journal of Research in Science Teaching*, 27:371-386.

Examines relationships among ability, perceived stress, course structure, rewards, number of tests, and attitudes toward science in five high schools. Relationships did exist with a correlation between attitude and achievement.

Watson, S. B., 1992. Cooperative methods. *Science and Children*, 29(5):30-31, 47.

Introduction to cooperative learning techniques, research findings, and underlying theories.

Weaver, V. P., 1988. Education that is multicultural and global: An imperative for economic and political survival. *Social Studies*, 79(3):107-109.

Study by Southern Governors' Association indicates U.S. youth are multiculturally illiterate. Provides a conceptual approach to multicultural education.

Webley, P., 1981. Sex differences in home range and cognitive maps in eight year old children. *Journal Environmental Psychology*, 1:293-302.

Representation of home area and new area by 8-year old children. Inconsistent results in terms of gender-related performance differences.

Webley, P., and Whalley, A., 1987. Sex differences in children's environmental cognition. *Journal of Social Psychology*, 127(2):223-225.

In unfamiliar environments, boys (age 8) displayed superior cognitive mapping abilities to females.

Welch, W. W., and Lawrenz, F., 1982. Characteristics of male and female science teachers. *Journal of Research in Science Teaching*, 19:587-594.

Characteristics of 273 male science teachers compared with 72 female science teachers from a 14-state region of the U.S. Significant differences in the two groups are discussed in terms of science career selection by women.

Westover, T. N.; McDonough, M. H.; and Mesinger, J., 1984. Women in a male-dominated academic environment: The experience of being in a department without women faculty or as a lone woman faculty member. AAG Committee on the Status of Women in Geography. *Guide for Women Geographers*, Series 1984/1. Washington, DC: Association of American Geographers.

Female faculty often feel isolated; difficulties of female graduate students include establishing effective mentoring relationships.

Wiegand, P., 1983, April 1. Geography, gender and justice. *Times Educational Supplement*, 3483:25.

Argues that geographers must be interested in gender bias in their classrooms and teaching. Geographers are urged to address issues of gender differences in spatial ability, experience of place and space, teaching materials, performance on geography exams, feelings and preferences.

Willson, V. L., 1983. A meta-analysis of the relationship between science achievement and science attitude: Kindergarten through college. *Journal of Research in Science Teaching*, 20:839-850.

Meta-analysis of 43 studies for correlation between science achievement and attitudes. Overall relationship was moderate with differences noted by grade level and by gender.

Wright, D. R., 1981. Are geography textbooks sexist? *Teaching Geography*, Jan:81-85.

Study of geography textbooks for presence of sexist stereotyping.

Wright, D. R., 1985, March 29. The reluctant convert (sexism in geography textbooks in Great Britain). *The Times Educational Supplement*, 3587:44.

Study of photographs in 15 recent geography textbooks reveals sexist stereotyping of activities and fewer pictures of females than males.

Zelinsky, W., 1973a. The strange case of the missing female geographer. *The Professional Geographer*, 25:101-106.

Young women contemplating a career in geography can expect substantially less in rewards than a young man of the same age and ability.

Zelinsky, W., 1973b. Women in geography: A brief factual account. *The Professional Geographer*, 25:151-165.

Data from AAG membership presents dismal picture for female geographers.

Zelinsky, W.; Monk, J.; and Hanson, S., 1982. Women and geography: A review and prospectus. *Progress in Human Geography*, 6(3):317-366.

Reviews and assesses available writings dealing with geographic dimensions of women's lives and changing status of female geographers.

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