Bibliography of Multicultural Issues in Mathematics Education: Practice

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The bibliography presented here is part of the Annotated Bibliography of Multicultural Issues in Mathematics Education . The latter was the product of work at the University of Georgia from June 1990 - June 1991. We appreciate the advice and contributions of scholars throughout the world who have critiqued the contents and offered entries. We sincerely hope the work will contribute to the promotion of changes in mathematics classroom practices. This could be done by making this bibliography available to critically read the articles and disscuss them with other colleagues. We also hope this work will contribute to the international effort that is being made to relate theoretical frameworks and research in diverse fields such as mathematics, history, psychology, sociology, and anthropology to work in mathematics education. The bibliography focuses on both the contributions of many cultures to mathematics and the ways in which culture may affect mathematics teaching and learning.

Bilbliogaphy

Anderson, S. E. (1990). Worldmath curriculum: Fighting Eurocentrism in mathematics. *The Journal of Negro Education, 59,* 348-359.

Antonouris, G., & Sparrow, L. (1989). Primary mathematics in a multicultural society. *Mathematics Teaching, 127,* 40-43.

Ascher, M., & Ascher, R. (1971/72). Numbers and relations from ancient Andean quipus. *Archive for History of Exact Sciences, 8,* 288-299.

Ascher and Ascher pointed out that not enough attention is devoted to developments in mathematics in ancient America. They claim we need to overcome this restrictive frame and bias in order to appreciate the background of human intellectual accomplishments. Specifically, the authors were interested in the *quipu,* an artifact invented by the Incas in Perú. Quipus were colored cords with knots tied in them for recording numerical and relational information. Ascher and Ascher did not address educational issues in this paper, but the information provided could be helpful in designing mathematical activities and a history of mathematics course that include groups or people who are traditionally excluded.

Beane, D. B. (1990). Say YES to a youngster's future: A model for home, school, and community partnership. *The Journal of Negro Education, 59,* 360-374.

Brown, T. (1984). Teaching in Dominica. *Mathematics Teaching, 108,* 30-31.

Brown, T. (1987). A social context for mathematical statements. *Mathematics Teaching, 124,* 10-13.

Clarke, D. (no date). *The social context of mathematics learning*. Unpublished paper. Institute of Catholic University, Oakleigh, Victoria.

Coates, D., & McGowan, P. (1987). Multicultural contexts. *Mathematics Teaching, 118,* 27.

Cotton, A. (1990). Anti-racist mathematics teaching and the national curriculum. *Mathematics Teaching, 132,* 22-26.

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Crawford, K. (1984). Bicultural teacher training in mathematics education for aboriginal trainees from traditional communities. In P. Damerow, M. E. Dunkley, B. F. Nebres, & B. Werry (Eds.), *Mathematics for all* (pp. 101-108). Paris: UNESCO.

Crowe, D. W. (1987). Symmetry rigid motions and patterns. *The UMAP Journal, 8*(3), 207-236.

Dawe, L. (1986). Teaching and learning mathematics in a multicultural classroom--Guidelines for teachers. *Australian Mathematics Teacher, 42*(1), 8-13.

Dawe, L. (1989). Mathematics, education and society: Mathematics teaching and learning in village schools in the South Pacific. *The Australian Mathematics Teacher, 45*(1), 12-13.

Dyson, D. (1986). Multicultural approach. In R. K. Arora, & C. G. Duncan (Eds.), *Multicultural education* (pp. 117-134). London: Routledge & Kegan.

Escalante, J., & Dirmann, J. (1990). The Jaime Escalante math program. *The Journal of Negro Education, 59*, 407-423.

Ford Foundation. (1982). *Minorities and mathematics.* New York: Ford Foundation.

Frankenstein, M. (1989). *Relearning mathematics: A different third R-Radical math*. London: Free Association.

Frankenstein's mathematics textbook differs a great deal from traditional mathematics texts since it includes not only mathematical content but also approaches to learning mathematics, a social and political context for learning mathematics, and numerous historical insights. The style of the book provides strong support for the idea that mathematics is a human endeavor and mathematics can be a powerful tool for all people. The mathematical topics included were integers, rational numbers, numerical operations, and variables. The author "situates the teaching of mathematics within a rationale that links schooling to the wider considerations of citizenship and social responsibility."

Frankenstein, M. (1990). Incorporating race, class, and gender issues into a critical mathematical literacy curriculum. *The Journal of Negro Education, 59,* 336-347.

Fraser, B. J., Malone, J. A., & Neale, J. M. (1989). Assessing and improving the psychosocial environment of mathematics classrooms. *Journal for Research in Mathematics Education, 20,* 191-201.

This is a paper on research on classroom environment, focusing on how mathematics teachers might apply ideas from research in guiding practical improvements in mathematics classrooms. In their study, use was made of a new short form of My Class Inventory (MCI). Which was found to be a valid instrument. They then asked a teacher to use the MCI in a systematics attempts to improve a mathematics class. The results were promising. The authors conclude their paper with optimism and they quote Fraser and Fisher and write, “In recent studies of person-environment fit, students were found to achieve better when there was a higher congruence between the actual classroom environment and that preferred by the students”.

Garcia, J. (1988). Minority participation in elementary science and mathematics. *Education and Society, 1*(3), 21-23.

Gerdes, P. (1985). Conditions and strategies for emancipatory mathematics education in underdeveloped countries. *For the Learning of Mathematics, 5*(1), 15-20.

Gerdes, P. (1988). On culture, geometrical thinking and mathematics education. *Educational Studies in Mathematics, 19,* 137-162.

Gerdes, P. (1988). On possible uses of traditional Angolan sand drawings in the mathematics classroom. *Educational Studies in Mathematics, 19,* 3-22.

Gerdes, P. (1988). A widespread decorative motif and the Pythagorean theorem. *For the Learning of Mathematics, 8*(1), -39.

Gilbert, D. (1984). Multicultural mathematics. In M. Straker-Weds (Ed.), *Education for a multicultural society* (pp. 97-107). London: Bell & Hyman.

Harris, M. (1987). An example of traditional women's work as a mathematics resource. *For the Learning of Mathematics, 7*(3), 26-28.

Hemmings, R. (1984). Mathematics. In A. Craft, & G. Bardell (Eds.), *Curriculum opportunities in a multicultural society* (pp. 113-131). New York: Harper & Row.

Hudson, B. (1987). Global and multicultural issues. *Mathematics Teaching, 119*, 52-55.

Hudson, B. (1987). Multicultural mathematics. *Mathematics in School, 16*(4), 34-38.

This article was in part the result of research in which materials were developed and then trial-tested and evaluated for the teaching of mathematics from a global and multicultural perspective. The thesis used in developing the materials was that the issue of global inequality could be explored while involving meaningful mathematical activities.

Jones, L. (1989). Mathematics and Islamic art. *Mathematics in School, 18*(4), 32-35.

Joseph, G. (1984, October 5). The multicultural dimension. *The Times Educational Supplement*. pp. 45-46.

Krause, M. C. (1983). *Multicultural mathematics materials.* Reston, VA: National Council of Teachers of Mathematics.

Mellin-Olsen, S. (1987). *The politics of mathematics education*. Boston: D. Reidel.

Moore, C. G. (1988). The implications of string figures for American Indian mathematics education. *Journal of American Indian Education, 28*(2), 16-26.

Moore presented evidence to support his hypothesis that preliterate tribes people were capable of mathematical thought as exhibited through their invention and mastery of string art figures. This common activity possessed elements of mathematical thought, namely, logic and intuition, analysis and synthesis, and generality and individuality, in accord with a definition of mathematics by Courant and Robbins. This information may impact American Indian students' conception of being mathematically disadvantaged when among Anglo students.

Moore, C. G. (1988). Mathematics-like principles inferred from the petroglyhps. *Journal of American Indian Education, 27*(2), 30-36.

Moore identified iteration, recursion, similitude, tiling, and symmetry as principals of mathematics-like thought used by petroglyph carvers. He supported his claim with examples of carvings which illustrated each principal. He concluded the article with several suggestions for classroom activities.

National Council of Teachers of Mathematics. (1984). *Handbook for conducting equity activities in mathematics education*. Reston, VA: The Author.

Materials in this handbook are the result of work of supervisors, administrators, teachers, counselors, and teacher-educators who attended 5 conferences organized by the NCTM in Florida, New Mexico, Maryland, and Minnesota. They included suggestions for conducting mathematics equity surveys, designing and organizing equity conferences and other teacher in-service activities, developing networking strategies, and developing curriculum and instructional strategies which deal with equity issues in mathematics. Also included is a resource list of mathematics equity materials and an appendix with papers that were presented at the conferences on underepresented groups in mathematics.

Newnham, J., & Watts, S. (1984). Developing a multicultural science curriculum. In M. Straker-Weds (Ed.), *Education for a multicultural society* (pp. 97-107). London: Bell & Hyman.

The authors outlined their work in revising the lower school science curriculum of a school system to take into account today's multicultural society. Their sources for this project were the current curriculum, suggestions from students, and units from the Third World Science Project. The authors' rough draft of the revised curriculum attempted to eliminate gender and ethnic biases and stereotypes by including illustrations from various cultures, not just the

European and North American cultures. The units described in this article allowed students to read and/or write about the topic being studied in real world situations in order to make the material more relevant.

Patterson, R. (1990). Helping minority students with limited mathematics skills to succeed. *Black Issues in Higher Education, 7*(1), 88.

Presmeg, N. C. (1989). Visualization in multicultural mathematics classrooms. *Focus on the Learning Problems in Mathematics, 11*(1-2), 17-24.

Reyes, L. H. (1980). Attitudes and mathematics. In M. M. Lindquist (Ed.), *Selected issues in mathematics education* (pp. 161-184). Evanston, IL: National Society for the Study of Education and National Council of Teachers of Mathematics.

Secada, W. G. (1990). The challenges of a changing world for mathematics education. In T. J. Cooney, & C. R. Hirsch (Eds.), *Teaching and learning mathematics in the 1990s.* (Yearbook, pp. 135-143). Reston, VA: National Council of Teachers of Mathematics.

Silva, C. M., & Moses, R. P. (1990). The Algebra Project: Making middle school mathematics count. *The Journal of Negro Education, 59*, 375-391.

Stanfield-Potworowsky, J. (1988). Socializing mathematics. *Mathematics Teaching, 125*, 3-8.

This is a copy of an Association of Teachers of Mathematics, in England, closing lecture in 1988 by the author. Through the use of many anecdotes and examples, the author makes the point that mathematics is created in social settings and the directions of its development are socially determined. The claim is made that the interpretation of mathematics development (history books) was laden with ideological stances, political influences, and racial prejudices.

Taylor, L., Stevens, E., Peregoy, J. J., & Bath, B. (1991). American Indians, mathematical attitudes, and the Standards. *Arithmetic Teacher, 38*(6), 14-21.

Tobias, S. (1978). *Overcoming math anxiety*. New York: Norton.

In this book, Tobias examined the myths surrounding mathematics. She reported on intervention techniques that she tried out in an experimental clinic at her university. It is primarily a discussion of how intimidation, myth, misunderstanding, and missed opportunities have affected a large proportion of the population. The principal purpose for writing the book was to convince women and men that their fear of mathematics is the result and not the cause of their negative experiences with mathematics, and to encourage them to give themselves one more chance.

Whitcombe, A., & Donaldson, M. (1988). Shongo networks: A multicultural theme in the classroom. *Mathematics in School, 17*(5), 34-38.

Yao, E. L. (1984). The infusion of multicultural teaching in the classroom. *Action in Teacher Education, 6*(3), 43-48.

Zaslavsky, C. (1970). Black African traditional mathematics. *Mathematics Teacher, 63*, 345-356.

Zaslavsky, C. (1973). Mathematics in the study of African culture. *Arithmetic Teacher, 20*, 532-535.

In this short article, the author explored some mathematical ideas developed in Africa outside of ancient Egypt. She claimed that history-of-mathematics books do not include African mathematics; thus leaving the impression that nothing had been accomplished in that part of the World. The main purpose of the article was to present some suggestions for the incorporation of mathematical ideas in the study of African culture, e.g. as a part of a total learning experience. Mathematical ideas related to weaving, knots, networks, divination, gambling, measuring, currency, and gaming were presented.

Zaslavsky, C. (1975). African network patterns. *Mathematics Teaching, 73*, 12-13.

Zaslavsky, C. (1979). Symmetry and other mathematical concepts in African life. In S. Sharron (Ed.), *Applica*

tions in school mathematics (Yearbook, pp. 82-95). Reston, VA: National Council of Teachers of Mathematics.

Zaslavsky, C. (1981). Networks--New York subways, a piece of string, and African traditions. *Arithmetic Teacher, 29*, 42-47.

Zaslavsky, C. (1985). Bringing the world into the math class. *Curriculum Review, 24*(3), 63-65.

The author presented ways of integrating the real-world as well as other school subjects into the mathematics curriculum. The investigation of various numeration systems, unique housing styles, and games from different cultures encouraged students to analyze their own concepts of mathematics. Each of these activities helped students to make meaningful connections between the mathematics taught in the classroom and real-life situations, in addition to exposing students to other cultures.

Zaslavsky, C. (1987). *Math comes alive: Activities from many cultures*. Portland, ME: Weston.

Zaslavsky, C. (1989). People who live in round houses. *Arithmetic Teacher, 37*, 18-21.

Zaslavsky, C. (1990). Symmetry in American folk art. *Arithmetic Teacher, 38*, 6-12.

In this paper, the author offers a series of activities with symmetrical designs and repeated patterns for the mathematics classroom. Ideas taken from quilt patterns and Navajo rugs≈ are included with historical notes. The author tries to help students become aware of the role of mathematics in society, including the realization that mathematics is a dynamic, growing, and changing human activity. He also tries to help students learn to appreciate other cultures.

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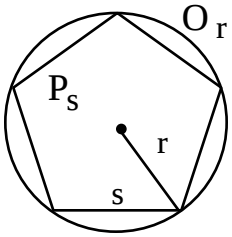
A Divine Revelation

If P_s is a regular pentagon of side length s and O_r is the circumscribed circle of radius r, show that

$$s = \frac{1}{2} r \sqrt{10 - 2\sqrt{5}} \quad .$$



This is a well known problem that was suggested by Dr. Leslie P. Steffe, a professor of mathematics education at The University of Georgia.

1991 Joseph R. Hooten Award for Excellence in Mathematics Education

On June 5, 1991, the Joseph R. Hooten Award for Excellence in Mathematics Education was awarded to Christy Lancaster, an undergraduate mathematics education student. This award was instituted at The University of Georgia in honor of Joseph R. Hooten Jr. for his love of teaching and interest in his students. Dr. Hooten was a faculty member at The University of Georgia from 1965 to 1985. He was a nationally known school mathematics textbook author and an authority on instructional television in the 1960s. He expected a lot from his students and always received praise from them for his teaching skills, his patience, and his concern for students.

The Keynote speaker at this year's presentation was Dr. Sigrid Wagner. She has been a faculty member at The University of Georgia since 1978 and will be joining the faculty of Ohio State University in the Fall of 1991. She advised the preservice teachers to take care in selecting problems to be discussed in their classrooms since these problems could cause students' misconceptions. This was an exciting day for these students, in particularly for Christy who was presented the award by Dr. Patricia Wilson. It was a day in which they were honored for their hard work and achievement. It seems that it would be beneficial for more students to be honored in this way. The Hooten Award was designated for secondary mathematics education students. Are similar awards being instituted for middle and elementary school preservice teachers?