What is ethnomathematics, and how can it help children in schools?

Teaching Children Mathematics; Reston; Feb 2001; Ubiratan D'Ambrosio;

Volume:	7
Issue:	6
Start Page:	308
ISSN:	10735836

Full Text:

[Headnote]

In My Opinion

The term ethnomathematics is used to express the relationship between culture and mathematics. The term requires a dynamic interpretation because it describes concepts that are themselves neither rigid nor singular-namely, ethno and mathematics (D'Ambrosio 1987). The term ethno describes "all of the ingredients that make up the cultural identity of a group: language, codes, values, jargon, beliefs, food and dress, habits, and physical traits." Mathematics expresses a "broad view of mathematics which includes ci hering, arithmetic, classifying, ordering, inferring, and modeling" (pp. 2-3). Many educators may be unfamiliar with the term, yet a basic understanding of it allows teachers to expand their mathematical perceptions and more effectively instruct their students.

Teachers and the public in general do not commonly say that mathematics and culture are connected. When teachers do acknowledge a connection, often they engage their students in multicultural activities merely as a curiosity. Such activities usually refer to a culture's past and to cultures that are very remote from that of the children in the class. This situation occurs because teachers may not understand how culture relates to children and their learning. An important component of mathematics education today should be to reaffirm, and in some instances to restore, the cultural dignity of children. Although multicultural mathematics activities are important, they should not be our final goal. As our students experience multicultural mathematical activities that reflect the knowledge and behaviors of people from diverse cultural environments, they not only may learn to value the mathematics but, just as important, may develop a greater respect for those who are different from themselves.

To acquire these skills while maintaining cultural dignity and to be prepared for full participation in society require more than what is offered in a traditional curriculum. Much of today's curriculum is so disconnected from the child's reality that it is impossible for the child to be a full participant in it. The mathematics in many classrooms has practically nothing to do with the world that the children are experiencing. Just as literacy has come to mean much more than reading and writing, mathematics must also be thought of as more than, and indeed different from, counting, calculating, sorting, or comparing.

Today's children are living in a civilization that is dominated by mathematically based technology and unprecedented means of communication. Much of the content of current mathematics programs does little to help students learn the information and skills necessary to function successfully in this new world. It is important to recognize that students and parents have a real expectation that school will improve opportunities for employment. This requirement means that educators must understand the evolution of the job market. As Forrester (1999) states, we are mostly preparing students for jobs that will not exist in the future. A very clear picture of future employment opportunities is given by Robert B. Reich (1992). This picture includes the need for a technologically capable work force whose members participate in the global economy and are able to create solutions to problems that currently do not exist with technologies that have not yet been invented. The goal of mathematics education should be to foster students' ability to successfully use modern technology to solve problems and communicate their thinking and answers as they gain an awareness of the capabilities and limitations of technological instruments.
We can help students realize their full mathematical potential by acknowledging the importance of culture to the identity of the child and how culture affects how children think and learn. We must teach children to value diversity in the mathematics classroom and to understand both the influence that culture has on mathematics and how this influence results in different ways in which mathematics is used and communicated. We gain such an understanding through the study of ethnomathematics.
Ethnomathematics encourages us to witness and struggle to understand how mathematics continues to be culturally adapted and used by people around the planet and throughout time. Traditionally in mathematics classrooms, the relevance of culture has been strangely absent from the content and instruction. The result is that many students and teachers unquestioningly believe that no connection exists between mathematics and culture. Failing to consider other possibilities, they believe that mathematics is acultural, a discipline without cultural significance.
This acultural mathematical perspective is reflected during instruction in several ways. First, in many classrooms, students are not permitted to construct a personal understanding of the mathematics that is presented. The values, traditions, beliefs, language, and habits reflective of the culture of the students are ignored. In such situations, the ways that children might invent personally meaningful conceptualizations are not respected. Children are expected to assimilate prescribed procedures by rote without necessarily gaining a deeper and conceptually significant understanding of the mathematics that they are studying.
This style of instruction unfortunately restricts learning to the length of time that students accurately remember the procedures. An application of the learning is also often context specific and poorly generalized because it is limited to the types of problems practiced when the procedures were taught. Students should be encouraged to construct personal mathematical understandings and be able to explain their work. When cultural characteristics of the children's invention, experience, and application of

mathematics are realized and respected, these students more closely resemble the budding mathematicians we desire.

An acultural mathematical curriculum also distorts the facts that children learn about how mathematics has evolved and who has contributed to this evolution. The historical contributions that are described are all too often Eurocentric, paying homage to the fair-skinned Greeks as the purveyors of most of our significant mathematical knowledge. Children are seldom taught that several of the ancient Greek mathematicians, for instance, Pythagoras and Thales, the legendary founder of Greek mathematics, traveled and studied in such places as India and northern Africa, where they acquired much of their mathematical knowledge. Students know little of the mathematical inventions or applications of such ancient non-European people as the Egyptians, the Babylonians, the Maya, and the Incas, to name but a few, because they have often not been taught that many cultures have contributed to the development of mathematics, cultures with members who were certainly intelligent, resourceful, and creative.

This inaccurate instruction misleads all children about the richness of mathematical history and, to a degree, about the people who have populated this planet. Children of color as a group have not realized the same level of mathematical success as European American students in our classrooms and are often underrepresented in higher-level mathematics courses and professions requiring significant mathematical competence. For these children, the effect of this misinformation may be particularly devastating. Many of these children simply do not realize that they are mathematically capable and that they do in fact possess a long and rich mathematical heritage.

Mathematics is a compilation of progressive discoveries and inventions from cultures around the world during the course of history. Its history and ethnography form a wonderful mosaic of cultural contributions. Today, we too are playing a part in the evolution of the discipline of mathematics. It is time for educators to improve their understanding of the role that culture has played and continues to play in shaping mathematical development. It is time for educators to empower their students with this vital knowledge.

[Sidebar]

The views expressed in "In My Opinion" do not necessarily reflect the views of the Editorial Panel of Teaching Children Mathematics or the National Council of Teachers of Mathematics. Readers are encouraged to respond to this editorial by sending double-spaced letters to Teaching Children Mathematics for possible publication in "Readers' Exchange." Manuscripts of approximately six hundred words are welcomed for review for "In My Opinion."

[Reference]

Bibliography

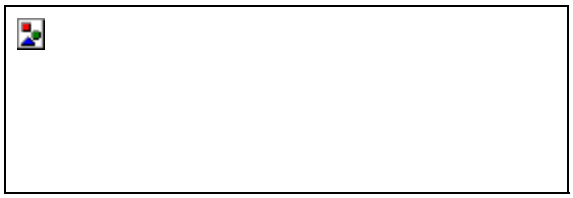
[Reference]

D'Ambrosio, Ubi. "Reflections on Ethnomathematics." International Study Group cn Ethnomathematics Newsletter 3 (1) (September 1987).

-. Literacy, Matheracy, and Technoracy: A Trivium for Today." Mathematical Thinking and Learning 1 (2) (1991): 131-53.

[Reference]

Forrester, Viviane. The Economic Horror London: Blackwell Publishing, 1999.



Hiebert, James, ed. Conceptual and Procedural Knowledge: The Case of Mathematics. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1986.
Kamii, Constance, and Barbara Ann Lewis. "Achievement Tests in Primary Mathematics: Perpetuating Lower-Order Thinking." Arithmetic Teacher 38 (May 1991): 4-9.
Lampert, M. "Knowing, Doing, and Teaching Multiplication." Cognition and Instruction 3 (4) (1986): 305-42.
Masingila, J. "Mathematics Practice and Apprenticeship in Carpet Laying: Suggestions for Mathematics Education." Ph.D. diss.,
javascript:NewRefWin('/pqdweb?RQT=501&IDLQry=INDIANA+UNIVERSITY&IDLType=facility&IDLKbase=idl_hoovers')Indiana University, 1992.
Reich, Robert B. The Work of Nations. Preparing Ourselves for Twenty-First Century Capitalism. New York: Vintage Books, 1992.
Reyes, Laurie Hart, and George M. A. Stanic. "Race, Sex, Socioeconomic Status, and Mathematics." Journal for Research in Mathematics Education 19 (January 1988): 26-43.
Saxe, Geoffrey B. "Candy Selling and Math Learning." Educational Researcher 17 (6) (1988): 14-21. A

[Author note]

Ubiratan D'Ambrosio, Ubi@pucsp.br is a Brazilian mathematician who is an early proponent of ethnomathematics. D'Ambrosio is currently an emeritus professor of mathematics at the State University of Campinas, Sao Paulo, SP, Brazil.