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Multicultural Approaches in Math and Science

America's classrooms are becoming increasingly more culturally diverse, and educators are turning to new approaches and resources to better address the varied backgrounds and educational needs of their students. This issue brings together a selection of multicultural materials and teacher perspectives.

Welcome to the electronic version of the *ENC Focus* issue on the topic **Multicultural Approaches in Math and Science**.

This page provides access to the full text of all articles in the print version of the magazine. Some articles have been enhanced for this electronic version.

This electronic version has other benefits. Live links are provided for all web sites mentioned. [Focus on the Collection](#) links to complete catalog records of resources selected from ENC's vast collection.

You will also find theme articles from this issue in the Topic area [Equity and Diversity](#). That area will grow as new content is added and links are made to related resources in other areas of ENC Online.

Focus On Multicultural Approaches in Math and Science

This issue brings together a selection of multicultural materials and perspectives to help teachers use this approach in their classrooms. Included are interviews with educators from different parts of the country, in both rural and urban settings, to gather their perspectives.

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Introduction to this Issue

America's classrooms are becoming increasingly culturally diverse as the century draws to a close, and educators are turning to new approaches and resources to better address the varied backgrounds and educational needs of their students. These multicultural approaches span disciplines and grade levels and draw from all cultures of the world, enabling students to recognize the important contributions made by people from cultures both different from and similar to their own. By bringing a multicultural awareness into the teaching of mathematics and science, educators can create a learning environment in which students feel their heritage is recognized in the classroom. Such an approach can help students perceive their own connection to science and mathematics, become more confident in their own abilities to do math and science, and develop a greater understanding of other cultures.

This issue of *ENC Focus* brings together a selection of multicultural materials and perspectives. To a greater extent than any previous edition, this issue also incorporates contributions from educators, who share their insights and discuss strategies. We have interviewed four educators from different parts of the country, in both rural and urban settings, to gather their perspectives on the value of a multicultural approach in math and science, and on how they are implementing it in their own classrooms. In addition, Claudia Zaslavsky, author of *Africa Counts: Number and Pattern in African Culture* and *The Multicultural Math Classroom*, offers her insight into how a multicultural approach affects students and enriches curriculum.

In selecting materials that support multicultural classroom approaches, we have included resources that connect mathematics and science to their historical roots in various cultures - some as background information (such as *Africa Counts* and *Science for All Cultures*) and others as sources of classroom activities (*Multicultural Science and Math Connections*). You'll find information about some of the many curriculum resources - including World Wide Web sites - available to help educators learn about and implement a multicultural approach in their own classrooms.

We have also provided information on a variety of articles and papers that address multiculturalism in math and science, discussing topics from dealing with bilingualism to creating a multicultural learning environment. Finally, this issue describes some of the many videos and children's literature books available for use in direct classroom instruction.

The resources featured in this issue were selected from the existing collection at ENC. Many new multicultural materials are being developed and we continue to add resources to our repository, so be sure to search our online catalog, Resource Finder, for other multicultural resources not highlighted in this issue. Please let us know of other materials that you

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would recommend via e-mail at submit@enc.org. We will do everything possible to include them in our collection. ENC is committed to the continuing professional development of teachers and to helping their ongoing efforts to examine and improve their practice.

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Bringing the World into the Math Classroom

This article includes excerpts from Claudia Zaslavsky's book: *The Multicultural Math Classroom: Bringing in the World* (Heinemann, a division of Greenwood Publishing Group, Portsmouth, NH, 1996). Reprinted by permission of the author.

by [Claudia Zaslavsky](#)

Who Does Mathematics?

Throughout the ages, people all over the world have engaged in mathematical activities to the extent of their needs and interests. They all count objects, measure various quantities, and invent calendars and other ways to describe the passage of time; they design works of art, plan buildings, and play games that involve mathematical concepts. Furthermore, they invent terminology that enables them to discuss these activities. But each society, each group, solves these problems in its own way. Very often, new ideas are borrowed from other cultures, just as the numerals with which we calculate so efficiently originated in India and entered Europe through Arabic-speaking Asians and North Africans.

Much of the foundation for the math that our children learn in elementary and middle school was laid in Africa and Asia. More than five thousand years ago, the Egyptians were using a system of written numerals based on grouping by tens, just as we do today. The right triangle relationship, known by the name of the Greek philosopher Pythagoras, was understood by the scholars of Mesopotamia for more than a millennium before Pythagoras was born. That clever calculating device called an abacus is still in use in China, Japan, Korea, and Russia.

Yet my experience tells me that for most young students, math is not concerned with people at all, but rather springs full-blown from the textbook or the teacher's head. By bringing multicultural perspectives into the math curriculum, teachers can enrich students' learning, giving them a broad view of the scope of mathematics and its place in the development of societies. Students should realize that real people in all parts of the world and in all eras of history developed mathematical ideas because they needed to solve the vital problems of their daily existence. This understanding is equally applicable to the lives of students in our own society and our own times.

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A Multicultural Math Curriculum

What do we mean by multicultural education? The "cultures" in the term "multicultural" may refer to women and men, to ethnic/racial groups, to geographic regions, to people in specific occupations or age groups. Local communities also have their own cultures, as well as their own issues in which students can become involved.

The mathematics curriculum must be meaningful to all students and must prepare them for the world as it is today, as well as for the world of the future. The most important and most valid mathematics curriculum is one that resonates to the students' own lives and experiences.

Several considerations govern the design of a multicultural mathematics curriculum and its implementation in the classroom:

- Teachers must believe that all students can learn. They should be willing to explore such aspects as learning styles, appropriate materials, and assessment procedures that are relevant to the content of the curriculum.
- The mathematics curriculum must engage students and challenge them to develop their critical thinking skills. "Mathematics as reasoning" is one of the main standards in the mathematics reform movement. Dressing up a routine type of exercise by placing it in an unreal story context does not engage many students, regardless of the ethnic and cultural content.
- The curriculum should promote the sharing of cultural knowledge and encourage respect among the students for one another, as well as for the members of the community and peoples of the world.
- A multicultural curriculum should empower all students by developing their leadership qualities, promoting creativity, and building confidence in their ability to apply mathematical concepts to the problems they encounter.

Mathematics comes alive when students participate in activities that illustrate how mathematical decisions arose from the basic needs of societies. For example, why do people build their homes in certain shapes and sizes and use particular materials? An investigation into styles of building in various cultures provides valuable experiences with shapes and sizes, perimeter and area, estimation and approximation, while at the same time it shows the relevance of mathematics to social studies, art, and other subjects. Students might consider a tipi, an African mud-and-wattle round house, or an Inuit igloo to be "primitive" dwellings compared with an urban apartment house or suburban ranch house. Yet the people who build these homes are using their available materials and technology to the best advantage.



Cliff palace at Mesa Verde, Colorado

Teachers must be careful that they do not introduce cultural applications as examples of "quaint customs" or "primitive practices." These applications must form an integral part of the mathematics curriculum. They must inspire students to think critically about the reasons for these practices, to dig deeply into the lives and environment of the people involved. It is easy to trivialize the concept of multicultural education by throwing in a few examples as holidays approach. Better not to do it at all!

The multicultural context is relevant to many aspects of the mathematics curriculum. A discussion of the number words and numeration systems of non-English-speaking peoples may do wonders in raising the self-esteem of students who speak these languages, as well as enhancing the understanding of all students. It may come as a surprise that in some languages grouping is by twenties rather than by tens, as it is in English. Games of chance and games of skill, and patterns in art and architecture, are all sources of learning experiences. Some of the richest contributions may come from students and their families.

Is This Another "Add-On?"

Multicultural math education does not imply an "add-on." Rather, it means a different way of involving students in mathematical activities and mathematical thinking.

The reform movement in mathematics education is a reaction to the sad fact that much of the traditional mathematics curriculum had little relevance to the lives of students or to other aspects of school life. Mathematics was not connected to anything. Many students were unable to apply the math they learned in school to solve everyday problems.

Multicultural mathematics education involves meaningful math activities integrated with other subjects, joint planning with teachers of those subjects, use of appropriate literature, performance-based assessment, attention to students' learning styles, and work with families and the community. The achievement of a genuine multicultural education would require a revision of the whole curriculum, all subject areas, to embrace those groups—women, working people, ethnic/racial groups—whose contributions and place in history have been distorted, marginalized, or ignored completely. I include the issues and problems that the students and their communities face today.

Change takes time, and all the elements of change must work together. Teachers who are responsible for all or most of the subject areas are

indeed fortunate. They can weave the study of mathematics into the context of life in colonial America by having their students make quilts and, incidentally, learn that the art of quilting was one of the few means of expression for women in that society. Similarly, the history of calendars fits right in with the study of the solar system and can lead to a discussion of the almanacs of Benjamin Banneker, the eighteenth century self-taught African American scientist and mathematician. The opportunities for interweaving the various disciplines are endless. Increasingly, middle and secondary mathematics teachers also find that their teaching benefits from collaborative lesson planning with teachers of other disciplines.

Students and Multicultural Math Education

In each class and with each group, the teacher can tailor the curriculum to emphasize those aspects that are of the greatest interest to that specific community. People look for affirmation of their cultural heritage. Each individual wants to know, Where do I fit in? Students can take pride in the contributions of their people, and at the same time learn to appreciate what others have accomplished.

Claudia Zaslavsky has taught mathematics at several levels, from middle grades to graduate courses for teachers. In 1973, her research into the development of mathematical ideas led to the publication of her book [Africa Counts: Number and Pattern in African Cultures](#). Several articles on multicultural education, talks at conferences, and books of activities followed. Through her work, Zaslavsky has celebrated the mathematical genius not only of the African but also of the Asian and Native American cultures, among others. Her most recent book is [More Math Games and Activities from Around the World](#). Visit her [web site](#) to learn more about her publications and to find additional multicultural resources related to mathematics.

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In the Classroom with... Carolyn Goohs



A Level Playing Field

*by Julia L. Harris
ENC Publications Team*

America's heritage is one of cultural diversity and the unique challenges posed by that diversity. Nowhere is this multiculturalism more evident than in California, a state that is home to ever increasing numbers of ethnic minorities.

Carolyn Goohs, science lab coordinator for third to sixth grade at San Diego's Grant Math/Science Magnet School, believes that a large part of the state's appeal can be traced to its longstanding efforts to promote a "level playing field" in which everybody- regardless of ethnicity or gender- has the same opportunities to succeed. The philosophy of equal opportunity is one that Goohs sees demonstrated at Grant School, and one that she actively follows in her own teaching.

The Magnetism of Math and Science

The Ulysses S. Grant Math/Science Elementary Magnet School, situated in an urban section of San Diego, has been in existence for 13 years. It enrolls 607 students, 57% of whom are minority, and there are approximately 700 students on the waiting list. "It's not uncommon for parents to put their child on the list as soon as he or she is born," Goohs notes. The school's popularity is due to its emphasis on meeting all the national standards for math and science, which it does through a series of enrichment classes in addition to the instruction students receive in their classrooms.

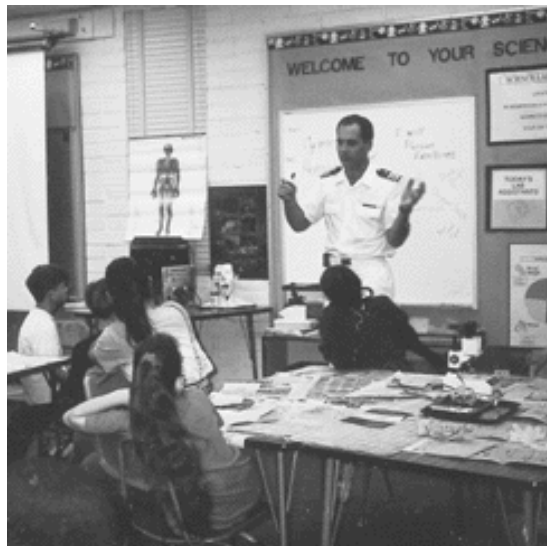
Given the demographics in her school, Goohs has made it a priority to offer her students an educational experience that reflects the rich diversity of the group. Because she uses a hands-on constructivist approach, she relies less upon traditional textbook materials than upon providing a variety of activities and problem-solving situations. In fact, she does not even use a textbook in her teaching, opting instead to write all of her own curricula based on the *California Science Framework*, *Benchmarks for Science Literacy*, and the *National Science Education Standards*.

To keep abreast of changes made in science education, Goohs is a member of a variety of science organizations, including the National Science Teachers Association, California Science Teachers Association, and Computer Using Educators. "I find that the local affiliations of the California Science Project, California Science Implementation Network, and the San Diego Science Educators Association help me keep my objectives in line with the national standards," she says. "Having an open dialog with other teachers is critical to writing your own curriculum."

Among the many science resources that Goohs utilizes are *AIMS* (Activities Integrating Mathematics and Science), *Ranger Rick's Nature Scope*, and *GEMS* (Great Explorations in Math and Science). She has created units that she uses on a rotating basis: one set for her third and fourth graders and another for fifth and sixth.

Three Layers of Learning

Within these units, Goohs uses a three-pronged approach to provide her students with a varied learning experience. She seeks out speakers from the community to give presentations and interact with her students. While she doesn't stipulate that these speakers be of a particular ethnicity or background, she does try to get a diverse range of professions represented in her classroom. For example, heart surgeons and physicians have come in for units on lungs and hearts, an electrician presented for a unit on electricity and magnets, and parents who are actively involved in environmental preservation have led field trips for units on environmental science.



A community member talks to the class

Goohs identifies many of the speakers through an organization in San Diego called Science Alliance, which publishes a directory of professionals and others who are willing to come and share their knowledge with classrooms.

"Community response is amazing when you actually get up the nerve to ask," she laughs. "It's wonderful how many people will take the time to make a difference in a child's education."

Before bringing a speaker into the classroom, Goohs works with her students to help them develop questions and activities with which to engage the speaker. For students who have difficulty with English as their second language, she encourages them to make use of white boards so that they can feel free to modify their ideas. "A lot of students are afraid to write on paper right away," she explains. "It's not a pleasant experience for them in many ways. With the white board, they feel like they can change it at any moment."

The students' questions and activities make the interaction with the speakers much more meaningful to them. Goohs relates one experience with a heart surgeon who worked with students on dissecting sheep hearts: "We were studying the human body, and he came in and dissected hearts with one group of children. Then that group of kids worked with other groups of children. We came up with a group of mentor students- sixth graders who worked with the other children in the lower grades."

The second element of Goohs' approach entails the use of films that incorporate professionals of many ethnic backgrounds. "The most important concept in utilizing movies is that it gives students another mode of learning," she notes. "They see a real life connection to concepts that we approach in hands-on/minds-on science activities."

Rather than showing entire movies in class, Goohs generally uses clips that can range from 30 seconds to five minutes in length. She uses these clips to reinforce science concepts that the students are currently learning. After a lesson on telegraphs and Morse Code, for example, when the students had made their own telegraphs and sent messages to each other using the code, she used a 20-second section from the recent blockbuster movie "Independence Day" to further reinforce the important concepts. "In that part of the movie, the Earth was about to be saved by sharing information around the world using Morse Code," she explains. "The students recognized the clip immediately and the concept was exemplified as something they could relate to and would remember. They had made the telegraph, used it, talked about it, and then related the concept to something outside the classroom that they were familiar with."

The third layer in her multicultural curriculum involves highlighting inventors who come from a variety of ethnic groups. Every year, Grant participates in the San Diego County Invention Showcase, which means that all students are required to come up with their own unique invention. To supplement the instruction they receive in their regular classrooms, Goohs uses the science lab time to present what she calls "American Achievers": people who have accomplished something remarkable in science and inventions. Often, the students learn about the inventor through plays or reader's theater. "It's amazing what has been invented by a very diverse group of people that most of us don't even know," she notes.



1996 Invention Showcase

Goohs is pleased to see how her students have responded to the multicultural emphasis in her science lab. When children are given the chance to work in cooperative groups of their own choosing, for example, Goohs notices that they do not make selections based on race or skin color, but rather on the basis of collaborative compatibility. "They don't really see African American, Caucasian, Hispanic, or Asian," she says. "What they are more interested in is finding the best person to work with."

In whatever approach she is using, Goohs keeps in mind that her primary objective is to make sure all of her students realize that they can do and be anything they want, as long as they work at it. She strives to ensure that all

students are given the same opportunities to succeed. "I want them to become aware that everyone should be valued, no matter what skin color they have or what language they speak."

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In the Classroom with... Petra Martinez

by Julia L. Harris, ENC Publications Team

Garden Variety Science

At the Jesse Sanchez Elementary School in Salinas, California, a flourishing and well-tended garden is yielding much more than just fruits and vegetables: it is raising up a harvest of enriched science and language learning and cultural validation for the mostly Hispanic students who work and learn there.

The school has been participating for the last three years in a local systemic change initiative called LASERS (Language Acquisition in Science Education for Rural Schools). Funded by the National Science Foundation, the program combines science instruction and English as a Second Language (ESL) in a way designed to make science relevant to the students and to honor the students' primary language. "Research on second language learning is telling us it's important to make ESL instruction content-based so students start developing academic language and can be successful in using a second language within the school context," explains Roberta Jaffe, Project Director.

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Elementary students admire the plants in their garden

Linking English and Science

In addition to its involvement with the LASERS project, the Sanchez school recently adopted a new English program that incorporates many science themes, so it dovetails perfectly with the Life Lab Science Program, the science curriculum used by LASERS. Petra Martinez, a kindergarten teacher and co-director of the school's K-6 computer lab, is excited to be part of the LASERS project. She credits it and its use of the Life Lab curriculum with instilling a new appreciation for science and learning in her students. "The students are learning more quickly, and they're enjoying it. English and science are kind of the same thing for them and it's their favorite subject," she says.

One of the greatest benefits Martinez sees in the program is the high priority it places on professional development. Although not every teacher is part of the LASERS project, all are encouraged to bring questions and problems to the LASERS staff developer who comes to the school twice a month. Those teachers who are involved in the project have been sent to workshops, and this past summer participated in a program that focused on effectively implementing the Life Lab curriculum.

Fostering Biculturalism

Martinez's involvement with LASERS is only one way she seeks to create an environment that nurtures learning. Well acquainted with the sense of marginalization that students of color can experience in a traditional classroom, she works diligently to make her students feel honored for who they are. In keeping with the school's recent decision to foster biculturalism—which means that students learn about mainstream American culture as they receive instruction that is sensitive to their own culture—Martinez incorporates multicultural celebrations into her classroom to give all students a sense of inclusion. "For Chinese New Year, we have a big parade," she says. "And we have assemblies and other celebrations. Basically, we just try to include students and make sure they feel welcome and that their culture and language have been validated."

This atmosphere of cultural acceptance, Martinez notes, seems to have given her students a sense of comfort with learning that she herself did not experience. From her own background, she describes how alienated she would feel when her teachers would quiz her on what she did for holidays: "Thanks-giving meant nothing for us, because we didn't understand it. I didn't eat turkey-we ate something else. But it just seemed like the teacher assumed everybody was going to celebrate," she says. "I don't do that. I try to let the kids have the freedom to express themselves, and I never say anything is wrong or bad."

Given that most of her students are of Mexican heritage, providing the freedom for them to express themselves often means that Martinez conducts some portions of the lessons in Spanish. When she taught high school, she did a great deal of work with ESL students, and she believes that bilingual instruction gives children the self-esteem they need to be able to ask questions.

Martinez's own personal interest in cultural validation and language acquisition, combined with her love of science, are the motivating factors behind her involvement with the LASERS project. "I think that one of the biggest benefits we wanted to see-and we are seeing-is that LASERS would serve as a vehicle to help kids learn English more quickly," she says. "Science is such a natural thing; it's all about letting kids be inquisitive and explore and investigate. It's just so fun."

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An Indian Father's Plea

By Robert Lake (Medicine Grizzlybear)

Wind-Wolf knows the names and migration patterns of more than 40 birds. He knows there are 13 tail feathers on a perfectly balanced eagle. What he needs is a teacher who knows his full measure.

Dear teacher, I would like to introduce you to my son, Wind-Wolf. He is probably what you would consider a typical Indian kid. He was born and raised on a reservation. He has black hair, dark brown eyes, olive complexion. And like so many Indian children his age, he is shy and quiet in the classroom. He is 5 years old, in kindergarten, and I can't understand why you have already labeled him a "slow learner."

At the age of 5, he has already been through quite an education compared with his peers in Western society. At his first introduction into this world, he was bonded to his mother and to the Mother Earth in a traditional native childbirth ceremony. And he has been continuously cared for by his mother, father, sisters, cousins, uncles, grandparents, and extended tribal family since this ceremony.

From his mother's warm and loving arms, Wind-Wolf was placed in a secure and specially designed Indian baby basket. His father and the medicine elders conducted another ceremony with him that served to bond him with the essence of his genetic father, the Great Spirit, the Grandfather Sun, and the Grandmother Moon. This was all done in order to introduce him properly into the new and natural world, not the world of artificiality, and to protect his sensitive and delicate soul. It is our people's way of showing the newborn respect, ensuring that he starts his life on the path of spirituality.

The traditional Indian baby basket became his "turtle's shell" and served as the first seat his classroom. He was strapped in for safety, protected from injury by the willow roots and hazel wood construction. The basket was made by a tribal elder who had gathered her materials with prayer and in a

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ceremonial way. It is the same kind of basket that our people have used for thousands of years. It is specially designed to provide the child with the kind of knowledge and experience he will need in order to survive in his culture and environment.

Wind-Wolf was strapped in snugly with a deliberate restriction upon his arms and legs. Although you in Western society may argue that such a method serves to hinder motor-skill development and abstract reasoning, we believe it forces the child to first develop his intuitive faculties, rational intellect, symbolic thinking, and five senses. Wind-Wolf was with his mother constantly, closely bonded physically, as she carried him on her back or held him in front while breast-feeding. She carried him everywhere she went, and every night he slept with both parents. Because of this, Wind-Wolf's educational setting was not only a "secure" environment, but it was also very colorful, complicated, sensitive, and diverse. He has been with his mother at the ocean at daybreak when she made her prayers and gathered fresh seaweed from the rocks, he has sat with his uncles in a rowboat on the river while they fished with gill nets, and he has watched and listened to elders as they told creation stories and animal legends and sang songs around the campfires.

He has attended the sacred and ancient White Deerskin Dance of his people and is well-acquainted with the cultures and languages of other tribes. He has been with his mother when she gathered herbs for healing and watched his tribal aunts and grandmothers gather and prepare traditional foods such as acorn, smoked salmon, eel, and deer meat. He has played with abalone shells, pine nuts, iris grass string, and leather while watching the women make beaded jewelry and traditional native regalia. He has had many opportunities to watch his father, uncles, and ceremonial leaders using different kinds of songs while preparing for the sacred dances and rituals.

As he grew older, Wind-Wolf began to crawl out of the baby basket, develop his motor skills, and explore the world around him. When frightened or sleepy, he could always return to the basket as a turtle withdraws into its shell. Such an inward journey allows one to reflect in privacy on what he has learned and to carry the new knowledge deeply into the unconscious and the soul. Shapes, sizes, colors, texture, sound, smell feeling, taste, and the learning process are therefore functionally integrated -- the physical and spiritual, matter and energy, conscious and unconscious, individual and social.

For example, Wind-Wolf was with his mother in South Dakota while she danced for seven days straight in the hot sun, fasting, and piercing herself in the sacred Sun Dance Ceremony of a distant tribe. He has been doctored in a number of different healing ceremonies by medicine men and women from diverse places ranging from Alaska and Arizona to New York and California. He has been in more than 20 different sacred sweat-lodge rituals -- used by native tribes to purify the mind, body, and soul -- since he was 3 years old, and he has already been exposed to many different religions of his racial brothers: Protestant, Catholic, Asian Buddhist, and Tibetan Lamaist.

It takes a long time to absorb and reflect on these kinds of experiences, so maybe that is why you think my Indian child is a slow learner. His aunts and grandmothers taught him to count and know his numbers while they sorted out the complex materials used to make the abstract designs in the native baskets. He listened to his mother count each and every bead and sort out numerically according to color while she painstakingly made complex beaded belts and necklaces. He learned his basic numbers by helping his father count and sort the rocks to be used in the sweat-lodge --

seven rocks for a medicine sweat, say, or 13 for the summer solstice ceremony. (The rocks are later heated and doused with water to create purifying steam.) And he was taught to learn mathematics by counting the sticks we use in our traditional native hand game. So I realize he may be slow in grasping the methods and tools that you are now using in your classroom, ones quite familiar to his white peers, but I hope you will be patient with him. It takes time to adjust to a new cultural system and learn new things.

He is not culturally "disadvantaged," but he is culturally "different." If you ask him how many months there are in a year, he will probably tell you 13. He will respond this way not because he doesn't know how to count properly, but because he has been taught by our traditional people that there are 13 full moons in a year according to the native tribal calendar and that there are really 13 planets in our solar system and 13 tail feathers on a perfectly balanced eagle, the most powerful kind of bird to use in ceremonial healing.

But he also knows that some eagles may only have 12 tail feathers, or seven, that they do not all have the same number. He knows that the flicker has exactly 10 tail feathers; that they are red and black, representing the directions of east and west, life and death; and that this bird is considered a "fire" bird, a power used in native doctoring and healing. He can probably count more than 40 different kinds of birds, tell you and his peers what kind of bird each is and where it lives, the seasons in which it appears, and how it is used in a sacred ceremony. He may also have trouble writing his name on a piece of paper, but he knows how to say it and many other things in several different Indian languages. He is not fluent yet because he is only 5 years old and required by law to attend your educational system, learn your language, your values, your ways of thinking, and your methods of teaching and learning.

So you see, all of these influences together make him somewhat shy and quiet -- and perhaps "slow" according to your standards. But if Wind-Wolf was not prepared for his first tentative foray into your world, neither were you appreciative of his culture. On the first day of class, you had difficulty with his name. You wanted to call him Wind, insisting that Wolf must somehow be his middle name. The students in the class laughed at him, causing further embarrassment.

While you were trying to teach him your new methods, helping him learn new tools for self-discovery and adapt to his new learning environment, he may be looking out the window as if daydreaming. Why? Because he has been taught to watch and study the changes in nature. It is hard for him to make the appropriate psychic switch from the right to the left hemisphere of the brain when he sees the leaves turning bright colors, the geese heading south, and the squirrels scurrying around for nuts to get ready for a harsh winter. In his heart, in his young mind, and almost by instinct, he knows that this is the time of the year he is supposed to be with people gathering and preparing fish, deer meat, and native plants and herbs, and learning his assigned tasks in this role. He is caught between two worlds, torn by two distinct cultural systems.

Yesterday, for the third time in two weeks, he came home crying and said he wanted to have his hair cut. He said he doesn't have any friends at school because they make fun of his long hair. I tried to explain to him that in our culture, long hair is a sign of masculinity and balance and is a source of power. But he remained adamant in his position.

To make matters worse, he recently encountered his first harsh case of

racism. Wind-Wolf had managed to adopt at least one good school friend. On the way home from school one day, he asked his new pal if he wanted to come home to play with him until supper. That was OK with Wind-Wolf's mother, who was walking with them. When they all got to the little friend's house, the two boys ran inside to ask permission while Wind-Wolf's mother waited. But the other boy's mother lashed out: "It is OK if you have to play with him at school, but we don't allow those kind of people in our house!" When my wife asked why not, the other boy's mother answered, "Because you are Indians, and we are white, and I don't want my kids growing up with your kind of people."

So now my young Indian child does not want to go to school anymore (even though we cut his hair). He feels that he does not belong. He is the only Indian child in your class, and he is well-aware of this fact. Instead of being proud of his race, heritage, and culture, he feels ashamed. When he watches television, he asks why the white people hate us so much and always kill our people in the movies and why they take everything away from us. He asks why the other kids in school are not taught about the power, beauty, and essence of nature or provided with an opportunity to experience the world around them firsthand. He says he hates living in the city and that he misses his Indian cousins and friends. He asks why one young white girl at school who is his friend always tells him, "I like you, Wind-Wolf, because you are a good Indian."

Now he refuses to sing his native songs, play with his Indian artifacts, learn his language, or participate in his sacred ceremonies. When I ask him to go to an urban powwow or help me with a sacred sweat-lodge ritual, he says no because "that's weird" and he doesn't want his friends at school to think he doesn't believe in God.

So, dear teacher, I want to introduce you to my son, Wind-Wolf, who is not really a "typical" little Indian kid after all. He stems from a long line of hereditary chiefs, medicine men and women, and ceremonial leaders whose accomplishments and unique forms of knowledge are still being studied and recorded in contemporary books. He has seven different tribal systems flowing through his blood; he is even part white. I want my child to succeed in school and in life. I don't want him to be a dropout or juvenile delinquent or to end up on drugs and alcohol because he is made to feel inferior or because of discrimination. I want him to be proud of his rich heritage and culture, and I would like him to develop the necessary capabilities to adapt to, and succeed in, both cultures. But I need your help.

What you say and what you do in the classroom, what you teach and how you teach it, and what you don't say and don't teach will have a significant effect on the potential success or failure of my child. Please remember that this is the primary year of his education and development. All I ask is that you work with me, not against me, to help educate my child in the best way. If you don't have the knowledge, preparation, experience, or training to effectively deal with culturally different children, I am willing to help you with the few resources I have available or direct you to such resources.

Millions of dollars have been appropriated by Congress and are being spent each year for "Indian Education." All you have to do is take advantage of it and encourage your school to make an effort to use it in the name of "equal education." My Indian child has a constitutional right to learn, retain, and maintain his heritage and culture. By the same token, I strongly believe that non-Indian children also have a constitutional right to learn about our Native American heritage and culture, because Indians play a significant part in the history of Western society. Until this reality is equally understood and applied in education as a whole, there will be a lot more schoolchildren in grades K-2 identified as "slow learners."

My son, Wind-Wolf, is not an empty glass coming into your class to be

filled. He is a full basket coming into a different environment and society with something special to share. Please let him share his knowledge, heritage, and culture with you and his peers.

Lake reports that Wind-Wolf, now 8, is doing better in school, but the boy's struggle for cultural identity continues.

Robert Lake (Medicine Grizzlybear), a member of the Seneca and Cherokee Indian tribes, is an associate professor at Gonzaga University's School of Education in Spokane, Wash.

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Charting New Maps: Multicultural Education in Rural Schools

ERIC Digest

Authors: Oliver, Jenny Penney; Howley, Craig

ERIC Clearinghouse on Rural Education and Small Schools, Charleston, WV.

The United States is one of the most ethnically and culturally diverse nations in the world. This circumstance holds implications for education even in places where the local population is not very diverse, as often happens in rural areas ([Spears, Oliver, & Maes, 1990](#)). This Digest briefly reviews the concepts of "culture" and "multicultural education." It then considers the relevance of multicultural education for rural schools in which neither ethnic nor cultural diversity is great.

CULTURE AND MULTICULTURAL EDUCATION

One view interprets culture as a sort of map that provides "standards for deciding what is...what can be...how to feel...what to do, and...how to go about doing" ([Goodenough, 1963](#), p. 258-259). Culture comprises traditional ways of making sense of and conducting oneself in the world. It shapes unspoken values, as well as social institutions such as education, religion, marriage, and work ([Gollnick & Chinn, 1990](#)). Needless to say, cultures vary immensely. Culture applies to any group with coherent norms and traditions that help members engage the world around them. It governs how people share information and knowledge, as well as how they construct meaning.

Because the United States is a multicultural society, citizens need to understand and respect one another, both as individuals and as members of culturally distinct groups. To this end, education that is multicultural ([Grant & Sleeter, 1989](#))--or simply "multicultural education"--has received considerable attention. The National Council for the Accreditation of Teacher Education (1982) describes multicultural education as "preparation for the social, political and economic realities individuals will experience in culturally diverse and complex human encounters...providing a process for individuals to develop competencies for perceiving, evaluating, and behaving in different cultural settings" (p. 14).

Multicultural education nonetheless represents a change in educational thinking. After all, social structures in most nations often put minorities at a disadvantage, and the United States is no exception according to many observers (e.g., [Anderson, 1990](#)). State-supported schooling in the United States, for instance, began with the attempt to "Americanize" immigrant

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populations. Knowledge of other cultures (e.g., those of immigrants) seldom figured in school curricula, with the result that students often developed narrow views of the world (Boyer, 1990).

Whereas critics of multicultural education worry that it may fragment students' views of culture (Hartoonian, 1988), supporters believe this view to be short-sighted. In fact, many supporters do not propose a specific multicultural curriculum at all. Rather, they have in mind a framework from which to shape curriculum and carry out instruction. The aim is to help students understand how culture not only shapes, but also limits, their actions. Such understanding permits students to perceive both their own culture and others in a more critical light ([Spears et al., 1990](#)). In this sense, multicultural education seeks to create an environment in which students can understand, respect, and ultimately value cultural diversity.

WHY MULTICULTURAL EDUCATION IN RURAL SCHOOLS?

Multicultural education in rural schools merits attention for several reasons. First, the character of rural life is changing ([Deaton & McNamara, 1984](#)), and thus rural needs are changing as well ([Stern, 1992](#)). Historically, rural schools have responded to a full range of educational, personal, and professional needs in their communities. Faced with economic, technological, and demographic changes, rural communities and schools are, however, recognizing the need to look outside, rather than only within, for answers to questions about human meaning and purpose. Second, after its founding, the United States welcomed the immigration of people from many differing ethnic and religious backgrounds. Many groups settled in rural areas, making contributions that persist to this day. Third, recent demographic trends, including continued immigration to the United States, are rapidly increasing the ethnic and cultural diversity of American society.

These developments make interaction among individuals and groups with quite different backgrounds increasingly more common. Certainly such interaction will be more productive if carried out on the basis of mutual understanding and respect, rather than suspicion and prejudice. Three considerations bear on making multicultural education work in rural schools, as follows: (1) reducing cultural isolation in rural schools, (2) adapting practice to accommodate local needs, and (3) the nature of outcomes.

REDUCING CULTURAL ISOLATION

[Pearse \(1989\)](#) warns that the lack of contact with--or complacency about--other cultural and ethnic groups will place students at a disadvantage. Multicultural understanding helps students overcome the cultural isolation that lack of ethnic diversity in rural areas may impose. It prepares rural students with the broader understanding of culture that the future will most certainly require.

The purposes of multicultural education are compelling, however, only when rural schools make sense of them in terms of their own circumstances ([Spears et al., 1990](#)). This seeming paradox rests on the fact that rural traditions are part of the cultural diversity of the United States. Rural students, therefore, can understand other cultures best when they understand their own culture well. Educators such as those involved with the Foxfire Network understand this principle ([Wigginton, 1985](#)). Foxfire engages students in examinations of their own cultures, partly as a way to show students the meaning of culture.

ADAPTING PRACTICE

School practices designed to address diversity are, in fact, as varied as rural communities themselves. Whatever the scope of the multicultural effort, [Spears and colleagues \(1990\)](#) suggest that attention to the following features are critical for success: mission, staffing, curriculum and instruction, home and community linkages, extracurricular activities, and student characteristics.

Rural schools reported a number of successful strategies to increase the ethnic diversity of their staffs ([Spears et al., 1990](#)). Programs like "Teach for America"--and connections with schools of education--helped secure ethnically diverse staff as visiting or resource teachers. Sometimes, these visiting teachers became permanent faculty. Some rural districts also recruited ethnically diverse teachers, whom they rotated among schools. When neither of these strategies was possible, white teachers visited multi-ethnic schools or took part in workshops about cultural diversity.

Some schools provided students and teachers with materials or inaugurated instructional events that reflected cultural diversity. Strategies included (1) replacing older textbooks with ones that treated multicultural issues, (2) using packaged multicultural materials, (3) selecting relevant library materials or supplementary texts to be used in student assignments, and (4) using ethnic holidays and celebrations as the basis for class assignments and school celebrations.

Cultivating links between home and school also proved to be essential. Strategies to enlist parental support included (1) participation in planning, (2) developing newsletters about the progress and purpose of the multicultural effort, (3) inviting parental participation at cultural events and on field trips, and (4) conducting family workshops about cultural diversity.

Extracurricular activities included making field trips to museums and cultural festivals or inviting speakers to address students. Hosting exchange students was another successful strategy. Exchange students often became celebrated members of the community and willingly served as speakers at community events.

OUTCOMES

Due in part to the continuing debate over how to define multicultural education--why it should be and for whom it is intended--little has been written about "hard" outcomes. But evidence does exist that multicultural education makes a difference. This evidence generally emerges from the local meaning--symbolic or personal--that participants assign to multicultural reform.

[Spears and colleagues \(1990\)](#) reported that, to some participants, multicultural education made school more "relevant," contributing, they believed, to decreased rates of dropping out. Others reported a decrease in racial stereotyping, leading to better relationships among students. Among ethnic minority students, a cultural "grounding," or sense of belonging was reported, and demonstrated through behaviors indicating increased self-confidence.

[Oliver \(1991\)](#) established a positive relationship between racial attitudes of white college students and exposure to practices associated with multicultural education, with curriculum and instruction representing the strongest influence. [Tomlinson \(1990\)](#), who introduced multicultural reforms in 23 British schools, reports more egalitarian and sensitive attitudes as evidence of the value of multicultural education.

MULTICULTURAL EDUCATION AND SOCIETY

Many rural communities are now facing a cultural crisis ([Berry, 1990](#)). Societies experience such crisis when cultural traditions no longer conform to the preoccupations and needs of everyday life ([Nash, 1974](#)). Outmigration, profound restructuring of the rural economy, and the increase in rural poverty ([Stern, 1992](#)) add to the crisis.

Multicultural education can help individuals and communities value and preserve their own cultural uniqueness. It can also serve the same function more generally, so that our multicultural society values and preserves itself.

Multicultural education offers a relevant view of educational purpose in an increasingly complex world. It is not a quick fix. It does, however, provide a map from which to chart the future, and it can help educators and communities challenge arrangements that reproduce inequity ([Sleeter, 1992](#)).

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Jenny Penney Oliver is affiliated with the Rural Clearinghouse for Lifelong Education and Development. Manhattan, KS.

Craig Howley is codirector of ERIC/CRESS.

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Teaching Science to English Learners, Grades 4 to 8

by [Ann K. Fathman](#), [Mary Ellen Quinn](#) and [Carolyn Kessler](#)

This guide helps teachers plan, design, and implement science activities for students learning English as a second language. It presents teaching strategies and suggests steps for designing science experiences that effectively integrate language and science. By integrating the teaching of science with language learning, students who are learning English may learn scientific inquiry processes, English vocabulary and structures, and social interaction skills. *NCBE Program Information Series, Guide 11, 1992* [ENC-002133](#)

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Schools Where Speaking Spanish Is an Asset

Harvard Education Letter

A team of researchers identifies six exemplary practices at several high schools serving large populations of Latino students in California and Arizona. All the schools place great value on the students' native language and culture and treat the ability to speak Spanish as an advantage, not a liability. Students are encouraged to take advanced placement Spanish courses to earn college credit for skills in their native language. The schools also provide a range of support services, including tutorials and extended learning time, before or after school counseling with bilingual staff, mentoring, and advocacy. *Harvard Education Letter*, vol. 7, no. 6, November/December 1991 [ENC-009497](#)

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Adria Steinberg, editor

The two studies described in this article conclude that Latino students have greater linguistic and intellectual competence than they demonstrate in a typical classroom. The first study analyzed the performance of four low-achieving students and found that they seemed slow and hesitant in class because, although they were in a bilingual program, Spanish was not treated as a legitimate language for academic work. In the second study, researchers questioned students in Spanish about material they had just read in English. They also developed a unit in which students worked with parents and community leaders to build a model of their town. In the process, students read books, interviewed community members, and worked collaboratively to share what they learned in both written and oral accounts. *Harvard Education Letter*, vol. 7, no. 6, November/December 1991 [\[ENC-009620\]](#)

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This article describes two studies that concluded that Latino students have greater linguistic and intellectual competence than they demonstrate in a typical classroom and that they think at more complex levels than their usual class performance would suggest. The first study analyzed the performance of four low achieving students and found that they seemed slow and hesitant in class because, although they were in a bilingual program, Spanish was not treated as a legitimate language for academic work. In addition, lessons consisted of basic tasks, such as memorizing spelling lists and word definitions that failed to motivate the students. In the second study, researchers designed an experiment that used bilingual communicative support help student use their Spanish language skills to enhance their performance in English. Researchers questioned students in Spanish about material they had just read in English. They also developed a thematic unit in which students learned about construction by working with

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Working With Native American Children

Lee Little Soldier

For 20 years I have been working with elementary school (K-6) and Head Start classrooms that have a large population of Native American children. When I visit Head Start classrooms, typically run by one tribe or another, I find children bubbling with enthusiasm and chatter. There are no communication blocks here! I have noticed that classrooms . . .

- that are more open and informal;
- that offer children more freedom of movement and choices of activities -- autonomy; and
- in which bonds of trust and respect have been established through the way adults relate to children and through an abundance of cooperative projects

. . . appear to produce the most language, in quality as well as in quantity. Good language skills are one of our goals.

I do *not* usually see such communicative Native American children when I visit public (and private) school kindergartens and first grades, and *very rarely* do I see such talkative, happy Native American children in the upper elementary grades; often these children are perceived as uncommunicative and difficult to reach. Why is this? In part because silence is comfortable in traditional Native American culture and in part because education (almost anywhere) tends to become more formal in the upper grades. When the lecture/recitation method, of which I see a lot, is relied upon heavily, and the dialogue -- if it could be called that -- is from teacher to student with emphasis on "the right answer," there is little opportunity for *any* students to interact or discuss. This is a problem for all but the brightest and boldest young people, not only for Native Americans. Also, if there is pressure for "correct" answers, the Native American student may choose to remain silent when called upon rather than risk embarrassment and ridicule.

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Why do Native American children fear that they will be embarrassed and ridiculed? Because for a century this has often been the case. Although there are exceptional schools, teachers, and Native American families, there is often a chasm between the child's home life and life at school that is not bridged by the conventional elementary school. Sadly, many Native American children drop into this chasm and eventually drop out.

Different values: Group versus individual, cooperativeness versus competitiveness

Traditionally, the Native American child has grown up as a member of an extended family and is group oriented. Striving for individual achievement may be foreign to the child's world outside of school. The teacher who pressures children for individual answers through the use of questioning in front of the entire class and gives rewards of stickers that are prominently displayed on a chart in the classroom may cause inner turmoil for the child who would like to succeed at school tasks but does not want to be singled out and embarrassed by having her efforts showcased. Many Native American children prefer anonymity and value group membership and harmony over individual achievement in the classroom. For these students, cooperative learning strategies may be a preferred mode of instruction.

Cultures change through the years, so the degree of cultural orientation that children bring with them into the classroom will vary contingent on the strength of their ethnic identification and how acculturated their parents are.

Cooperative learning structures, which have lately become very popular in the literature but less so in the classroom, allow the Native American child to succeed without being singled out and to use the social skills acquired outside of school in a productive manner within the classroom. Many Native American students are team oriented. Native American teams excel in a variety of sports. But because it is the *group* receiving the accolades, individual team members are able to contribute to the success of the group yet maintain a posture of modesty. The teamwork and esprit de corps exhibited on the basketball court can readily translate into academic success in the classroom through the use of cooperative learning techniques in a variety of subject areas (Little Soldier, 1989).

Native American children are not unique in this regard. Research shows that *a great many* children do better in school when encouraged to work cooperatively (Johnson & Johnson, 1975). However, more non-Native American children seem able to accommodate to the highly competitive atmosphere of many elementary classrooms, where each child is placed in a race against all others, than can Native American children, whose traditional cultures so strongly discourage this behavior.

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school in a productive manner within the classroom.

Avoid stereotyping: Not all Native American families are the same

There are more than 250 federally recognized Native American tribes in the United States. Each tribe has a land base and its own distinct history, culture, and language; thus it is difficult to make generalizations about tribes. There are certain core beliefs, however, that transcend these tribal differences and that are shared by the majority of Native American people. Some familiarity with these core values, attitudes, and behaviors can enable teachers to gain a perspective on where Native American children are probably coming from socioculturally.

Cultures change through the years, so the degree of cultural orientation that children bring with them into the classroom will vary contingent on the strength of their ethnic identification and how acculturated their parents are. This, in turn, is affected by their level of educational attainment, the types of jobs they hold, and where the family lives. Parents who have a high level of education and social status -- well paying positions on or off the reservation -- are more likely to have accommodated to the non-Native American value system and behaviors and to feel comfortable in a variety of social settings. However, if a family lives on or near a reservation and keeps in close contact with the Native American community, the family is more likely to hold to traditional values and beliefs and to feel comfortable mainly in the Native American world.

When children from traditionally oriented homes are pressured to conform to an unfamiliar value system in school, frustration and identity problems may result from the conflicts they experience. It is not easy to face these pressures on a daily basis in school. Children attempt to strike a balance between the two sets of value systems and to reduce the inner turmoil they experience. Disorientation may result along with a questioning of one's tribal beliefs. As a result, Native American children may determine that it is easier to emulate only the values and behaviors of the non-Native American world. This attitude is reinforced by the emphasis on materialism found in the media and pervasive in our society. Children may tend to focus on behaviors that will get them the material rewards they want *here and now*. They may become alienated from their native culture, and lose part of their identity in the process. Later, children may discover that even though they may talk and act like non-Native Americans, they are not completely accepted by the non-Native American world because they still carry the physical characteristics of their people. No matter how hard these children try, they may still be regarded as second-class citizens in our color-conscious society; thus, they may feel even *greater* hostility, anger, and frustration.

Many families fall between the two extremes of traditional orientation and total assimilation. Somewhere in the middle lies the ideal -- the ability to live in both the Native American and the non-Native American worlds successfully. African Americans and other minority groups in this country have always struggled with this issue. Melting pot? Separatism? The ability to live with one foot in each of two worlds is what acculturation is all about. It means identifying with your home culture but acquiring the behaviors necessary to fully function in the dominant society. This is the task of the school -- to help each Native American child find a place on the acculturation continuum with which he can feel comfortable and that provides the most inner harmony.



Many Native American children thus feel torn between the two worlds. They feel marginal in both cultures. Biculturalism has to be an educational priority for these children.

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Many Native American children adjust to the dominant society's school world, but. . .

Most Native American children learn to modify their behavior to match what is expected of them in the school setting; however, we continue to "lose" too many children who experience a high degree of inner turmoil and have not developed the necessary coping skills -- personal strategies for values clarification (and conflict resolution) -- to succeed in the alien school system. Often these children live on or near their reservation and have strong kinship ties. They may have had limited contact with the non-Native American world outside of school and may be less affluent than many non-Native American classmates. Consequently these children feel inferior and less-accepted (as do many of our minority children of poverty). This results in a paradox for many children. Because they feel a real or perceived rejection by the dominant society, Native American children have a need to hold on to their Native American identity, yet they may feel equally pressured to live in the dominant society and to exhibit non-Native American behaviors in order to succeed in school or on the job to satisfy their material wants and needs.

Many Native American children thus feel torn between the two worlds. They feel marginal in both cultures. Biculturalism has to be an educational priority for these children. These children need to grow into fully functioning, productive human beings who have the array of choices

available to many other Americans. They need to learn to take the best of each world and to synthesize these components into a world view that is positive and personally satisfying. These children cannot reach this goal alone, however; they need the help of teachers, counselors, administrators, and others in the school to help them become truly bicultural individuals. If we are to know where to begin with regard to both content and processes in the classroom, if the educational institution is to serve these children well, then we must become learners before teachers and tap into every opportunity to gain understanding of the traditional orientation of Native American people.

What are some of the values differences that often cause home/school discontinuity?

Traditional child-rearing practices among Native American families must be considered by teachers of young Native American children.

1. Direct personal criticism and harsh discipline that might negatively influence a child's self-esteem are avoided in the home. Traditionally, children in Native American families were not spanked. Even today, many Native American parents prefer noncorporal means of discipline, such as facial expressions and other body language, ignoring, shaming, and withholding praise and attention. Sibling and peer pressure are also employed. Schools that use corporal punishment within their discipline plan -- and, appallingly, some still do! -- violate these child-rearing practices, which attempt to build an inner locus of control. The classroom management strategies recommended by early childhood educators in innumerable books, articles, videos, conference sessions, workshops, and good programs for children fit with traditional Native American ways of disciplining children in the home; using these strategies will reduce conflict and stress for children and their families.

Relatives other than the child's natural parents may be responsible for disciplining the children. Often the mother's brother serves as the disciplinarian thus allowing parents to develop a supportive, nonthreatening relationship with their children, so when a teacher arranges a parent conference to discuss a child's school behavior, the teacher may be addressing the wrong adult in the child's family, unless the appropriate relative is also invited to the conference too.

2. Native Americans may feel Indifference to acquiring material goods, something that non-Native Americans often fail to understand and accept. Traditionally, the acquiring of "things" for the sake of ownership or status was not viewed as important as was being a good person. Historically, a person was held in high esteem for who he or she *was*, irrespective of material wealth. This indifference to ownership coupled with the Native American value of sharing as evidenced even now, in "give away" ceremonies has to be understood within the historical context. The old adage, "it is better to give than to receive," is operationalized in many Native American homes today. It has been said that historically, Native Americans as a group were either fat or slim but never a mixture of both because when game was plentiful all tribal or clan members shared in the bounty. When there was little to eat, all

suffered the consequences equally.

Native American children bring this cultural background into the classroom with them, often on an unconscious level. If the teacher has some understanding of the child's traditional value set and world view, she is better prepared to help children translate these values into behaviors that will facilitate achievement in school as well as success later in the world of work. For example, the Native American values of bravery and patience can no longer be expressed by fearlessly and patiently stalking and hunting buffalo; however, it may take bravery and patience just to get to school on certain days, to complete assignments on time, or to make decisions that may invite censure by one's peers.

The first step in the process of self-examination for Native American children is to bring the value system into the conscious level and to examine these values in view of today's world. This self understanding is the beginning of helping children feel good about themselves and reducing some of the conflicts these children face as they acquire the knowledge and behaviors needed to succeed in our high-tech society.

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3. Many Native Americans tend to view time as flowing and relative; things are done as the need arises rather than by the clock or according to some future-oriented master plan. Many "inside" jokes are made about Native American time. If a visitor to the reservation has had exposure to Native American or reservation time, the savvy visitor will not expect the Powwow to begin at the time posted, but rather when participants have assembled and are ready to begin. This might be an hour or two beyond the announced time. (Native Americans are not the only minority group in this country that views time differently than does the dominant clock-driven culture.) Time is perceived as flexible and geared to the activity at hand. Many Native American languages had no word for *time* or words to express future tense. Certainly, in the past, Native Americans relied on the sun, moon, and seasons to mark the passage of time. This system does not lend itself to a view of time that is linear and segmented into tiny, measurable bits. This orientation clashes with the demands of the school -- getting to school on time and scheduling parent conferences precisely. Educators need to avoid making assumptions about parents when they arrive late for appointments at school and should not consider them to be uncaring and

irresponsible. Parents must be informed about the expectations of the school and must be helped to modify their behavior to meet the needs of the school without embarrassing them or putting them down.

The traditional present-time orientation of Native Americans can cause school conflicts between *children* and teachers, as well as between *parents* and teachers. Some Native Americans have a tendency toward living only in the present and seeking immediate satisfaction of wants and needs; thus, the school's emphasis on the long-term benefits of academic achievement may not motivate children. It is more effective to work toward short-term goals. Rewards should be attainable within a short time frame. Long-term goals can be postponed until children are more mature.

Traditional Native Americans tend to view time as flowing and relative; things are done as the need arises rather than by the clock or according to some future-oriented master plan.

4. Not all children, certainly not all Native American children, learn best in the logical, linear, and sequential teaching style typical of today's elementary school. As we all know, many learners are more intuitive, spontaneous, emotional, creative, and people oriented. They are not linear learners. Often they excel in aesthetic/ expressive areas, such as art, music, and dance. Many Native American children exhibit these characteristics. This does not mean that they are unable to acquire other ways of learning, but unfortunately our schools have historically favored the learner who excels in details and fragments and language and math, the content areas that are the backbone of the curriculum. Whereas some learners are more holistic and look at the forest, other learners are more analytical and see the trees. In planning lessons, teachers must build in activities that accommodate these differences in learning styles so that *all* children can succeed and feel good about themselves. The ideal is to develop all learning modes as fully as possible in each child in order to maximize his or her potential without penalizing any child along the way for the way she learns best. Working toward that end for all children should be a high priority for the school.
5. Physical modesty should be considered; the need for privacy in toileting, dressing/undressing, and showering in physical education classes must be taken into account and arrangements must be made that will not cause children embarrassment.

Many Native American children living on or close to reservations are considered *at risk* because the enculturation on these children from families with strong ethnic identification often is at odds with the expectations of the school. Differences of

cultural heritage, combined with poverty and isolation, result in serious discontinuities for these children.

What can we do to ensure that Native American children do well in our preschools and elementary schools?

There is a tendency among educators to oversimplify situations and to use labels to communicate complex thoughts and ideas. The recent use of the term *at risk* to label children who come from homes that do not reflect Anglo-American middle-class values and behavior patterns and whose life experiences outside of school have not prepared them for success in conventional schools is unfortunate at best. Many factors can place a child in this "at risk" category. To label a child "at risk" is less than helpful in terms of planning school experiences that will reduce the risk of failure and dropping out.

We have to begin where children are and not where we feel they ought to be. Although this is one of the most basic and enduring tenets of early childhood education's core philosophy, it is not often practiced even in preschool, and it is *less* often practiced in elementary schools. Knowing where Native American children are is the key to planning relevant and effective educational experiences. The end result should be to enhance these children's self esteem through successful school experiences and to increase the holding power of the schools as each child goes up through the grades. "Self-esteem" is a buzz phrase that can be heard from primary and preschool teachers alike. It is vitally important that more teachers *actualize* the idea of enhancing children's self-esteem. To help build positive self-esteem in children, we have to encourage each child each day in various ways and in various areas of her development and learning -- starting where she is.

Not all children, certainly not all Native American children, learn best in the logical, linear, and sequential teaching style typical of today's elementary school.

Conclusion

It has been said that the Indian Nations really constitute a Third World within our society. Perhaps this is true. The unemployment rate on most reservations is almost unbelievable -- approaching 80% in some instances! Poverty abounds. Roads remain unpaved. Many families have to haul water long distances for cleaning and cooking; many don't have electricity. Harsh weather conditions and poor roads restrict travel during the winter months and cause children to miss school. Health services may not be readily available. The situation for many families living on the reservation is grim, indeed. But a move into town may not result in much improvement in living conditions and may cause other problems, such as loss of one's psychological support base, loosening of family ties, as well as a great deal of insecurity and stress.

The school cannot solve the complex problems facing the Native American world today; however, teachers and other school staff can make important

contributions to the lives of Native American children and their families. Building the self-esteem and prideful identity of these people is the first priority. Understanding where they come from and where they want to go will help educators plan relevant, success-oriented school experiences that work within rather than against cultural parameters. It is imperative that these children -- that all children -- be taught how to think critically, solve problems, weigh alternatives, and make wise decisions. If the complex problems facing Indian Nations today are to be resolved, we teachers at all levels must do our part. Finally, Native American children need to understand who they are as Native Americans and why they feel and behave as they do. We must equip these children with values clarification and conflict resolution strategies so that inner harmony can be achieved. Teachers, paraprofessionals, counselors, administrators -- indeed, all school personnel -- need to work together toward these ends. It has to be a team effort. Working with Native American children is challenging and frustrating at times, but ever so rewarding. As we enrich the lives of others, we cannot help but enrich our own lives.

Follow-up activities for teachers

If your library does not receive *Navajo Times*, subscribe by writing to: *Navajo Times*, P.O. Box 310, Window Rock, Ariz. 86515; \$30 for 12 issues.

Obtain a list of addresses of tribal headquarters from the Bureau of Indian Affairs by contacting: Office of Indian Education Programs, 1849 C Street, N.W., Mail Stop 3530, Washington, DC 20240; 202-208-6123.

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Lee Little Solder is a professor of education at Texas Tech and a consultant in Indian education.

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Research Matters - to the Science Teacher

Creating a Multicultural Learning Environment in Science Classrooms

Alejandro J. Gallard, Science Education, Florida State University, Tallahassee, FL 32306

Introduction

Most science teachers do not need to be reminded that creating a learning environment for today's science students is an increasingly complex problem. We are faced with dramatic changes in student demographics. As an example, Newsweek (1991) reported that:

. . . more than 5 million children of immigrants are expected to enter US public schools during the 1990s. About 3.5 million schoolchildren are from homes where English is not the first language. More than 150 languages are represented in schools nationwide. (p.57)

The wide assortment of languages, customs and experiences, associated with today's immigration movement, are very different from what has been experienced in past like movements. Yesterday's immigrants were European and constituted a large part of the minority population in the US. For these immigrants the teaching styles, images in textbooks, teachers and schools encountered in the US were extensions of those which characterized their homelands. In contrast, today's immigrants emanate from such places as the Caribbean, Latin America, Mideast and Southeast Asia. For these people, the traditional images associated with education differ markedly from those which apply to white, European cultures. However, the images encountered in present classrooms derive from white, European traditions ([Beane, 1988](#)). Because the present anthropological, linguistic and sociological context is so diverse, it becomes vital for science teachers to address the different languages, customs, and experiences (multiperspectives) that students bring to science classrooms.

The multiperspective change our classrooms' populations have undergone have a substantial impact on science teachers striving to create a

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classroom environment in which all students can learn. According to [Tobin \(1991\)](#) learning in science:

. . . is regarded as an interpretive process of making sense of experiences in terms of extant knowledge. The heart of the learning process is the negotiation of meaning. Learners must be given opportunities to make sense of what is learned by negotiating meaning; comparing what is known to new experiences, and resolving discrepancies between what is known and what seems to be implied by new experiences.

Therefore, learning is a result of students making sense of the world they live in. This process is complicated if a student's basis for making sense is radically different from how others in the classroom are making sense. For instance, a Caucasian, middle class American student and a Hispanic migrant student may read the same textual information on plants. Because of the Caucasian's experiences, he may focus on plants as aesthetic extensions of his home or school when constructing meaning. On the other hand, the migrant Hispanic student will interpret the information in light of his fieldwork experience. In both instances construction is correct because it has been determined by the learner's cultural context. However, the Caucasian's efforts at making sense may more closely resemble what a science teacher who has not had any fieldwork experience may consider as correct responses. This includes the languages that both students use to make sense and as they communicate what they have learned to others as well. The implication is that students need to work in a classroom environment that enables and encourages them to use their cultural tools. These tools include language, cognitive referents which include myths, personal beliefs and metaphors, images, preferred learning styles, and the time and space to apply extant knowledge to problem-solving situations.

It is important for us as science teachers to realize that a student's knowledge is a result of her/him interacting and making sense of the culture in which she/he lives. Even though students have immigrated to the US, their cultural experiences are an important component of this extant knowledge. Thus, it becomes incumbent on us as science teachers to find ways that students may use their knowledge, or views of the world, in ways that draw on their prior cultural experiences. Staying with our example of a student with fieldwork experience we could have him share with his classmates his knowledge about plants to include the vocabulary he uses to distinguish plant parts or even plants themselves.

One's own words, based on personal experiences to describe, interpret and understand science phenomena is referred to by [Cobern \(1991\)](#) as a way of looking at the world which is based on

. . . the foundational beliefs. i.e., presupposition about the world that support both common sense and scientific theories -- that is a world view. (p. 7) A world view defines the self. It sets the boundaries of who and what I am. It also defines everything that is not me, including my relationships to the human and non-human environments. (p. 9)

Thus, a student's world view, of which language plays a major role, is the major source of cognitive tools she/he brings to science classrooms as she/he goes about trying to make sense of the science that is being taught.

Making sense is a critical factor to consider; because interpretation of a science lesson will be in accord with each individual student's world view, students can interpret the same science phenomena in many different ways. [Cobern \(1991\)](#) offers the following excellent illustration of how varied interpretation may be.

Three men went to see Niagara falls. One was an Indian from India, one was a Chinese, and one an American. On seeing the falls, the Indian, as a matter of course, thought of his god, manifested in this grandeur of nature. The Chinese simply wished to have a little hut beside the falls, where he might invite a friend or two, serve tea, and enjoy conversation. The American, however, on viewing the falls, immediately asked himself what could be done to make the most of such an enormous amount of energy (p. 50).

The Role of Communication

In the US, the use of a language other than English for instructional purposes has been of great controversy. Researchers such as [Cummins \(1981,1986\)](#), [Cuevas \(1984\)](#), [Hakuta \(1986\)](#), [Ramirez \(1991\)](#), and [Walsh \(1991\)](#) have demonstrated that students' use of their primary language in the classroom adds to their ability to learn and excel in the English language. These authors are referring to limited English proficient students attending bilingual classrooms where teaching and learning is in the student's native language and English.

A major reason that limited English proficient students eventually excel in English, by using their primary language, is that these students are provided the opportunities to develop major conceptual understandings of what they are trying to learn as opposed to trying to learn vocabulary words that are detached from real contexts.

Conceptual understanding begins when direct experiences are discussed in terms of language that is the everyday language of the student. Once experiences are understood in this way the language of science can be added; the language of science is then connected through everyday language, and to the student's direct experiences. Thus, it seems that we need to create and maintain science classrooms that are rich in opportunities for students to use their native language as they attempt to make sense of the world.

It is important for us to keep in mind that "communication is culture bound. Students with different cultural norms are at risk if teachers have little knowledge, sensitivity, or appreciation of the diversity in communication styles." ([Taylor, 1987, p.1](#)). Perhaps student communication, in our science classrooms, is a matter of whether we stress learning (as learning previously has been defined) or vocabulary accumulation. [Cummins \(1981\)](#) refers to this as the difference between classroom environment that emphasizes context-embedded versus context-reduced communication.

Context-embedded communication derives from interpersonal involvement in a shared reality that reduces the need for explicit linguistic elaboration of the message. Context-reduced communication, on the other hand, derives from the fact that this shared reality cannot be assumed and thus linguistic messages must be elaborated precisely and explicitly so that the risk of misinterpretation is minimized. (p.11)

The notion of context-embedded communication seems to fit neatly with making sense of science phenomena through diverse, multi-sensory experiences and working in cooperative groups. Students in a context-embedded classroom would have an opportunity to explore science in a manner that emphasizes conceptual understanding and not vocabulary expertise.

In many cases integrating a student's culture into school activities has been confined to activities such as celebrating Cinco de Mayo, Black History Month, or the Chinese New Year. Such activities are often designed to assist students in the majority culture to better understand the cultures of minority groups. However, "neat multicultural activities" fail to meet the learning needs of culturally diverse students, in science classrooms. Lessons that acknowledge cultural differences must be a daily part of the science curriculum; such lessons should not be reserved for special enrichment activities. In order to meet the learning needs of culturally diverse students, we must provide, in every lesson we plan to teach, regular opportunities for all students to make sense of their experiences in ways that are personally meaningful. Science activities planned in this manner will necessitate the use of all the languages students bring into the classroom. This would be especially important for limited English proficient students. A way of facilitating the use of many languages is through cooperative grouping with classmates who speak the same language thus providing them with opportunities to negotiate meaning. After students have used their own experiences to construct new meanings they should then be provided opportunities to negotiate meaning in English.

The idea of facilitating cultural experiences that are familiar to minorities of color or language should not be limited to the classroom but extended to the whole school. For example, when working with Hispanic students, [Lucas, Henze, and Donato \(1990\)](#) recommend (1) valuing the students' cultures, (2) setting high expectations, (3) emphasizing parent involvement, (4) offering courses in three modes for: students who do not speak English; beginning English speakers; and fluent English learners.

The Milieu of Science Teaching and Learning

We also need to think of ways that facilitate students examining science knowledge in historical, social and multicultural contexts; activities that integrate a science curriculum associated with scientific advances identified with non-Western cultures, or comparing science in different cultures. For example instead of introducing the contributions of George Washington Carver only during Black History month, his scientific contributions should be key elements when such topics as botany, agribusiness or biotechnology emerge in the classroom.

If the suggestions are initiated, the students' multiperspectives become the basis for not only teaching but the whole of the schools culture. [Pugh \(1990\)](#) summarized these points by suggesting that teachers consider the following:

1. Science is not free of cultural influence.
2. Science textbooks are not free of racism.
3. History and development of science should not be solely attributed to European cultures.

The ideas mentioned by Pugh center around the notion that In science and science teaching there is no written rule that a particular view directly and

easily connects into the life experiences of all students.

Summary

Perhaps one of the most difficult issues for a science teacher to deal with is developing ways to encourage learning through facilitating students' use of extant knowledge, which includes culture, and language, in a multi-cultural setting. Adding to the complexity of a multi-cultural classroom is the notion that the discipline of science has its own culture and language, and so does the science teacher. The key to comprehending this milieu is to understand that learning, which is the process of making sense, is culture dependent. Specifically, if we provide students with opportunities to make sense of science phenomena through diverse, multi-sensory incidents, learning will take place. Thus, students would be able to use their experiences, which include language and culture, as they interpret science phenomena. Students would then be able to compare what they know to these new experiences and find ways to make sense of them.

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World Cultures in the Mathematics Class

CLAUDIA ZASLAVSKY

In the classrooms of the United States we have children representing most of the cultures of the world. Some arrived in our country in the past few years, while others are descendants of immigrants who came in previous decades and centuries, and still others trace their ancestry to the original inhabitants of the Americas. At one time the United States was called a "melting pot" of many nationalities and cultures. Yet there were groups that never had the opportunity to become part of the mix-- most Native Americans, people of African descent, and Latinos from the colony of Puerto Rico and from the area that was formerly Mexico, now the Southwestern part of the U.S., to name but a few. They were the throwaways, like the garbage left over after the ingredients had been chosen for the melting pot. They constituted-- and they still do-- a disproportionately large segment of the population living in poverty.

Now we realize that the "melting pot" analogy is false; on the contrary, people have become more interested in recent times in seeking out their roots. The ethnic groups that have lived longest in the Americas-- and have been most oppressed-- are the Native peoples and the Africans who were brought to the New World in chains, to serve as slaves to European plantation owners. Now their descendants are determined to reassert their cultural heritage. Although their ancestors often included English, Spanish, and other Europeans, they frequently choose, or are compelled by societal pressures, to identify with the oppressed peoples. Incidentally, Native Americans and Africans also intermarried, and many African Americans can count American Indians in their ancestors. The United States Census includes people of Spanish origin with either Whites or Blacks, but also calculates the total Hispanic (of Spanish origin) population as a separate, additional group. Subdivisions and names are the subject of disagreement even among the people who belong to these groups, and discussions on the topic are often heated. In the media, in government and commission reports, the term "minorities" includes Blacks, Latinos (Hispanics), Native Americans, and Asian Americans. Members of these groups may resent the implication of the word "minority" as signifying "lesser." They also object to being lumped together as though they are all the same. Even within each of the groups I have named, people differ widely in geographic origin, cultural styles, and social class.

It is estimated that by the year 2000, one-third of all students will be

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"minority." Children growing up in these families and communities often differ from children of the dominant culture in their learning styles. They have less access to educational opportunities, both inside and outside the classroom. These "minority" students, except for those of Asian background, attend schools that are poorly serviced, score lowest in the all-important standardized- "achievement" tests, and drop out of school at a high rate. A disproportionate number of these children are placed in the lowest track (or stream) from the earliest grades, where they are presented with a limited, outdated curriculum, taught by rote memorization methods, and tested by standardized paper-and-pencil, multiple choice tests.

The mathematics community in the United States is embarking upon a program to reach all students. As stated in the *Curriculum and evaluation standards for school mathematics* [[NCTM, 1989](#)]:

It is crucial that conscious efforts be made to encourage all students, especially young women and minorities, to pursue mathematics. [page 68]

Recognition is given to the varied backgrounds and interests of the students:

Students should have numerous and varied experiences related to the cultural, historical and scientific evolution of mathematics. [page 5]

It is not only children of minority groups who benefit from the inclusion of topics relating to their heritage. Students in our "global village" must learn to respect and appreciate the contributions of peoples in all parts of the world.

Educators are beginning to recognize the value of infusing mathematics with the achievements of world cultures, to "multiculturalize the curriculum." [[Bishop, 1988](#); [D'Ambrosio, 1989](#); [Gerdes, 1988](#)]

Introducing a cultural perspective

Leading educators in the United States deplore the extent to which standardized tests and textbooks drive the mathematics curriculum. Tests take priority. "If it's not on the test, don't teach it," is the prevailing viewpoint of many school administrators and teachers.

Here and there some teachers are motivated to implement the mandated curriculum by introducing a cultural perspective. Teachers may even present language, social studies or art lessons that have mathematical content without being aware of the mathematics, as the following incidents will show.

To celebrate Children's Book Week, the reading supervisor of a local school invited me to talk to eight-year-old students about my book [Count on your fingers African style \[1980\]](#) . The majority of the children in this school are low-income, dark-skinned, Spanish-speaking immigrants or children of immigrants from the Dominican Republic.

The teachers had already discussed the book with the children, and the students were prepared with questions about counting, about writing books, about the process of publication. Many could count in Spanish, and several, from Haiti, knew French. We compared the counting words in the three languages-- English, Spanish, and French-- noting the similarities and the differences.

I asked the children to pretend that they were visiting a market in an African country, where no one spoke their language. How would they ask for eight oranges? Of course, they suggested using their fingers. Then I proposed that each child imagine how he or she would indicate eight, and, when I gave the signal, to raise their hands showing "eight" on their fingers. What a variety of ways! Some children used the methods described in the book, while others invented unique styles. Many ways to solve one problem, all equally valid, and a good mathematics lesson in the guise of a talk about books!

We discussed numbers and how useful they are. One boy contributed a remark about "playing the numbers," the illegal gambling game that is popular in low-income communities, in conflict with the legal state lottery. The teacher quickly interrupted: "But watch out for the cops (police)." The boy seemed bewildered by her comment, but she did not explain.

As I left the school I noticed a beautiful patchwork quilt hanging in the lobby, the work of a class of nine-year-olds. It was composed of thirty squares in a 5x6 arrangement. The squares were identical in construction, each consisting of small squares and triangles of print or solid color cloth sewn together. By mixing and matching the colors and patterns of the fabrics as their fancy led them, the children were able to achieve a varied and pleasing effect.

I arranged to interview the teacher to learn more about this mathematical production. "I was an art major," she said, "and I had them make the quilt so that they would get a feeling for life in colonial times (18th century). I like to combine social studies with art. Now we are doing Native American bead patterns." When I added that the children were also doing very good mathematics, she seemed surprised. After all, this activity was not in the mathematics curriculum, nor were these applications included on the standardized achievement test. Later I read about an exhibit of African-American patchwork quilts. The author commented on the similarity of many standard quilt patterns to traditional African textiles and the possibility that patchwork quilting was introduced into England and America by African slave women. [\[Barry, 1989\]](#)

I asked the teacher whether the boys had objected to sewing. "Oh, no," she replied. "I told them that tailors sew. No problem whatsoever." The photographs of the quilt and of the students working with beads will appear in the [Arithmetic Teacher \[Zaslavsky, 1990\]](#).

In this article, I shall describe some of the mathematical practices of African peoples and of the indigenous peoples of the Americas.

Numbers and numeration

Work with numbers has dominated the mathematics curriculum since the beginning of public schooling, satisfying the needs of shopkeepers, clerks, farmers, and factory workers. All peoples have developed numeration systems to the extent of their needs. The English system of numeration and most European systems are based on grouping by tens and powers of ten. Why is ten commonly used as a base? Is it because we have ten fingers (digits)? The peoples of West Africa and Middle America, as well as the Inuit of the far north, group by twenties. In some languages, such as Mende of Sierra Leone, the word for twenty means "a whole person"-- all the fingers and toes.

Children can learn about numeration systems by examining the construction of larger numbers. In the Yoruba (Nigeria) language, for

example, the name for 65 means "take five and ten from three twenties," using the operations of multiplication and subtraction, rather than multiplication and addition, as in most European languages. Different solutions to the same problem, one just as good as the other. [[Zaslavsky, 1979a: page 207](#)]

Finger gestures to express numbers are commonly used by people who do not speak each other's languages. These gestures may be related to the number words; or, again, they may be quite different. When the indigenous peoples of North America were pushed westward by European settlers, tribes speaking different languages were thrown together. Of necessity, they developed systems of finger signs, including signs for numbers. [[Zaslavsky, 1979b](#)]

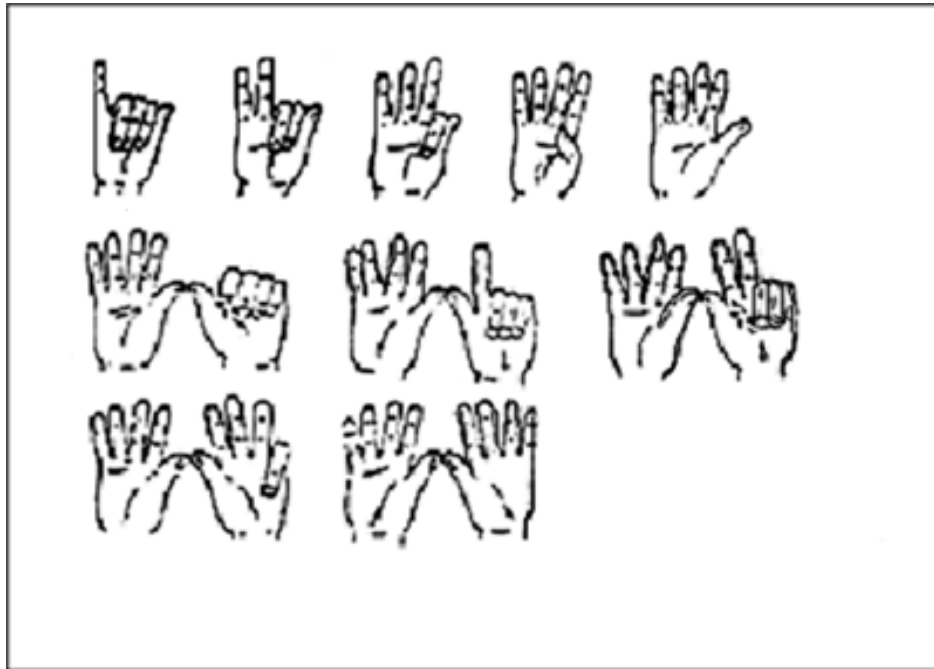


Figure 1

Illustration from William Tomkins: *Indian Sign Language* (Dover, New York)

Ancient Egypt provides a rich source of material about numbers, numeration systems, written numerals, computational methods, and applications. [[Gillings, 1979](#), [Joseph, 1991](#)] Less well known is the African origin of this great civilization in the upper Nile valley of the land that is now Sudan and in the once fertile Sahara region. Prior to the rise of modern imperialism, historians had acknowledged that the ancient Egyptians were dark-skinned people. However, Europeans could not admit that the peoples they had conquered and enslaved, the Black people of Africa, were kin to the inventors of ancient Egypt's high civilization. Africans had to be portrayed as less than human and denied their history, in order to justify their enslavement, while Egypt was detached from the African continent. In his book [Black Athena](#), [Martin Bernal \[1981\]](#); see also [Davidson, 1987](#)] discusses this issue in great detail and with voluminous documentation. Furthermore, many of the Greeks whom we revere as the "fathers of mathematics" either studied in Egypt or were Egyptians themselves-- Pythagoras, Eudoxus, Euclid were but a few. [[Joseph, 1987](#)], [Beatrice Lumpkin \[1983a\]](#) discusses the three great periods of

African participation in the development of mathematics: the ancient period of the pyramids and temples, the classical Hellenistic period, and the Muslim period.

The peoples of Middle America developed their own systems of written numerals, in the case of the Maya dating back at least two thousand years. The systems were based on twenty and powers of twenty, and included the use of zero, positional notation, addition, and the repetition of symbols. When applied to Mayan chronology, the groupings proceeded in this fashion: 20, 18x20, 18x20x20, etc., to represent the twenty-day months, 18-month year, and larger groupings. The secular year consisted of eighteen months of twenty days each, plus five additional days to make 365, with cycles of fifty-two years. The sacred year consisted of thirteen twenty-day months. Both counts are used simultaneously. For an excellent reference work on the mathematics of the Americas, see [Closs \[1986\]](#).

The Inca *quipu* represents a unique system of record-keeping. A positional numeration system, based on ten and powers of ten, is embodied in a collection of colored strings resembling a tangled mop. Yet the quipu can encompass a whole census. For an entrancing discussion of quipu construction and usage in the context of the Inca empire, which included all of Peru and a large section of the Andean region five hundred years ago, see [Ascher \[1981\]](#).

Another aspect of number is the ability to do mental arithmetic. The year 1990 marks the 200th anniversary of the death of the slave Tom Fuller, known as the African Calculator. Shipped to North America in 1724 at the age of fourteen, he developed remarkable powers of calculation, although he was forbidden access to any kind of schooling, as were all slaves, and he could neither read nor write. Late in his life he was used by anti-slavery advocates to demonstrate the mental capacity of Black people. [\[Fauvel & Gerdes, 1990\]](#)

Design and pattern

Most cultures have developed characteristic designs, which they incorporate into their cloth, basketry, wooden objects, and buildings. For example, the Navajo of the southwestern United States are known for their beautiful rugs, and the fine workmanship of these rugs, sometimes called the "first American tapestries", earn for them a well-deserved place in museums. When the Spanish conquistadors introduced sheep in the sixteenth century, the Southwest tribes, traditionally weavers of cotton, turned to the use of wool. The Navajo learned weaving from the Pueblo tribes, probably in the late seventeenth century. From weaving plain cloth and blankets with simple designs for their own use, they turned to creating richly-patterned blankets and rugs for the commercial market. By the mid 1800s these weavings commanded a good price. In recent years individual women have become famous for their fine weaving and innovative design. Navajo rugs, with their geometric motifs and repeated patterns, provide an excellent medium for the analysis of symmetry. [\[Zaslavsky, 1990\]](#)



Figure 2

The seven one-color one-dimensional patterns (Bakuba, Zaire)

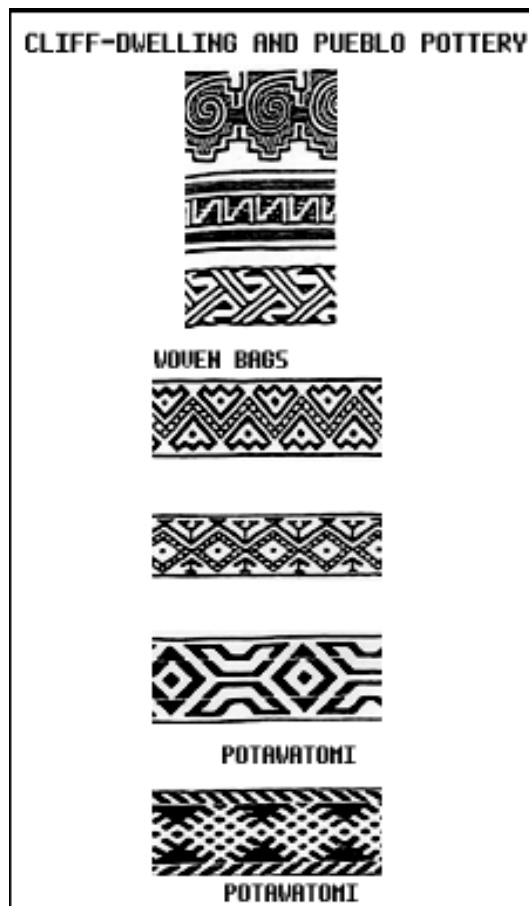


Figure 3

The seven one-color one-dimensional patterns (Native American) from Le Roy H. Appleton, *American Indian design and decoration*

The Bakuba people of Zaire are justly famous for their embroidered raffia cloth, known as "Bakuba velvet," and for their marvelous wood carvings. Characterized by the repetition of traditional geometric motifs, these art works, too, have found their way into many museums in Europe and the United States. Some of the pieces in the British Museum date back more than

two centuries. A visit to a museum to study these works of art might inspire students to create their own patterns. [[Zaslavsky, 1979a](#); [Washburn & Crowe, 1988](#)]

Architecture

Most of us are so accustomed to living in a rectilinear environment that it is difficult for us to imagine different surroundings. Our furniture and accessories are designed to fit along straight walls and into right-angled corners. Yet, people of other cultures would be just as uncomfortable if they had to give up their circular houses for our rectangles. The Native peoples of the Great Plains (northcentral U.S.) traditionally lived in conical *tipis*, portable tents made of animal skins and decorated with meaningful symbols-- a dwelling appropriate to the life style of the people. Early in this century, Black Elk, one of their leaders, lamented:

We made these little gray houses of logs that you see, and they are square. It is a bad way to live, for there can be no power in a square. You have noticed that everything an Indian does is in a circle, and that is because the Power of the World always works in circles and everything tries to be round.

Why has the round house been traditional in some societies? One must consider the available materials and technology, as well as the way the society makes its living. A settled agriculturist builds for the future, while a pastoral nomad may abandon a shelter after a few months, or pack it up and move on. Consider this aspect, too: a family that builds its own home, using hard-to-find materials, wants to achieve the largest possible floor space for a given quantity of materials for the walls. In other words, maximize the area for a given perimeter. The circle is the answer.

Circular homes can take a variety of forms: the conical *tipi*, the hemispheric *igloo* of the northern Inuit, the beehive-shaped thatched dwelling on Mt. Kilimanjaro, the tall mud-brick, thatch-roofed cylinders of West Africa. For suggested lessons based on these ideas, see [[Zaslavsky 1987, 1989](#)].

Who has not been impressed by the splendor and accurate construction of the Egyptian pyramids, now five thousand years old? The early inhabitants of the land that is now Mexico also built pyramids, some over two millennia ago. This fact, as well as other evidence, indicates a link between ancient Africa and ancient America. [[Lumpkin, 1983b, 1986](#)]

Less well known than the Egyptian pyramids is the African city-state, Great Zimbabwe ("great stone house"), with its complex stone architecture. Started perhaps eight or nine centuries ago, it served for several centuries as the seat of government for the rulers of a vast kingdom in southern Africa. Several hundred smaller stone structures, spread across the land, are a memorial to the former power of the realm. [[Asanti, 1983](#)]

Sufficient information is available about the pyramids and Great Zimbabwe to enable students to analyze their measurements, to compare the labor time and the quantity of materials that went into building these edifices, and to construct models.

Games of chance and skill

From time immemorial human beings have tried to divine the future. Some divining practices led to games of chance, and eventually to the important and growing field of mathematical probability and statistics. Tossing a coin is one of the simplest forms of gambling. The Igbo (Nigeria) game of *Igba-ita* ("pitch and toss") involved tossing cowrie shells, still used as currency into the twentieth century, and noting whether they landed with the openings up or down. With the adoption of coinage, the game became known as *Igba-ego* (*ego* means "money"). The British commentator G.T. Basden observed groups of men gambling in the market place. The challenger tosses twelve cowries. "Quick as lightning the players note the positions and forfeit their stakes or collect their gains. The play becomes exceedingly fast, and soon a cloud of dust encircles each group of gamblers. I have watched players at this game, and it has always been quite beyond me to note the positions of the fall; the cowries have been counted and snatched up again long before I could begin to count" [quoted in [Zaslavsky 1979a](#): page 114]. Students can play the game with macaroni shells or other asymmetric objects, and compare these outcomes with the results of tossing symmetric coins. The Native American Bowl Game involves tossing four peach or plum pits that have been marked on one side, and noting the outcomes.

It is claimed that diagrams for three-in-a-row games were chiseled into the roof slabs of the temple to the Egyptian pharaoh Seti I about the year 1300 BC. No doubt the evidence, if it ever existed, has since been worn away by the elements and by pollution. The British play Noughts and Crosses and Nine Men's Morris, children in the United States play Tic-Tac-Toe, while "Mill" is the name of the game in several European countries. One of the most complex versions of three-in-a-row games is the Lesotho *Murabaraba*. In simple or complicated form, such games of strategy help children to acquire the necessary skills in problem-solving and decision-making. [[Zaslavsky, 1982](#)]

In the British Museum is a beautifully carved wooden statue of the ninety-third king of the Bakaba (Zaire) people. Early in the seventeenth century he bought the peaceful arts to his people, and taught them the game they called *Lela*, a variation of the universal African game of transferring, usually known by its Arabic name, *Mankala*. To celebrate his reign, the king is portrayed with a model of the gameboard in front of him.

This ancient African stone game, played in different versions in most of the continent and in parts of Asia, is considered among the world's best games of strategy. In its simplest form, the game is appropriate for children just entering school, and affords practice in counting and in the concept of one-to-one correspondence. At a more advanced level, all four operations of arithmetic come into play. Yet the game is so sophisticated as to challenge adults in national competitions. ([Zaslavsky, 1979a](#): pages 116-136) African teenagers play with such speed that it is virtually impossible for an inexperienced onlooker like me to follow, much less understand, what is going on.

The game has proved its usefulness in several ways. African captives brought it to the Americas, and social scientists have analyzed the rules of the versions popular in the United States, the Caribbean islands, and Brazil, in order to trace the ancestry of Black people living in those regions. In the month I wrote this I received a letter from a teacher in the state of Texas requesting permission to use the sample game in *Africa counts* in her award-winning project entitled "Lasers from the Jungle: Turning Primary Students on with African Legends." I readily granted permission, but asked her to substitute "rain forest" for "jungle" in the title. For one thing, Africa does not have jungles. Secondly, the word "jungle" in connection with Africa has negative connotations, evoking the Tarzan image.

Children can invent new versions of a game by changing the rules, varying the shape of the gameboard, or using a different quantity of playing pieces. Games of strategy encourage young people to develop skill in logical inference, as the following incident will illustrate. In his book *Games of the North American Indians* [1907], Stewart Culin describes a three-in-a-row game called *Picaria*, played by Pueblo youngsters in the Southwest. ([Zaslavsky, 1982](#): pages 46-50). Culin's description of the rules is ambiguous. I had seen one version in several recent publications, but it seemed to me that an alternative set of rules would make a better game. I asked a group of eleven- and twelve-year-old students to play according to the first set of rules. Within a few minutes they complained: "The first person to move always wins". Then I suggested that they try the other version, without telling them that it was the one I favored. They were unanimous in declaring it the better game.

Conclusions

The introduction of multicultural, interdisciplinary perspectives into the mathematics curriculum has many points in its favor:

- Students become aware of the role of mathematics in all societies. They realize that mathematical practices arose out of people's real needs and interests.
- Students learn to appreciate the contributions of cultures different from their own, and to take pride in their own heritage.
- By linking the study of mathematics with history, language arts, fine arts and other subjects, all the disciplines take on more meaning.
- The infusion into the curriculum of the cultural heritage of "minority" students builds their self-esteem and encourages them to become more interested in mathematics. As one eleven-year-old boy wrote in his evaluation of a classroom activity based on African culture: "As you probably don't know I feel very strongly and am in deep thrust with my black people, and the math has made me feel better". There is little that one can add to this heart-felt comment!

Note: For lessons incorporating some of the concepts described in this article, as well as other activities, see [Krause \[1983\]](#), [Seattle Public Schools \[1984\]](#), and [Zaslavsky \[1987\]](#), as well as references in the text of the article.

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**KNOWLEDGE
BRIEF**

Issues in Cross-Cultural Assessment: American Indian and Alaska Native Students

Elise Trumbull Estrin and Sharon Nelson-Barber

This *Brief* explores some of the historical and sociocultural factors that have affected the schooling of American Indians and Alaska Natives, with a view to identifying broad strategies for improving educational outcomes for these students. Improved learning, of course, can be demonstrated only through appropriate assessment practices; yet the best assessment system is of little help unless it is accompanied by--or prompts--improved teaching. So, while this brief focuses primarily on assessment issues for Native* students, it also touches on other pedagogical issues for those same students. (Table 1 offers background information on Native students and communities, which readers may find helpful.)

Table 1
Some Important Facts about American Indians and Alaska Natives

- Approximately two million people identify themselves as American Indians and Alaska Natives.
- The largest numbers of American Indians and Alaska Natives live in Oklahoma, California, and Arizona.
- There are 550 federally recognized tribes, among which are 223 Alaska Native villages.
- The Native population of Alaska constitutes 15.6 percent of the state's total population of 55 million.

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- There are approximately 250 remaining American Indian and Alaska native languages, about half on the verge of extinction.
- Officially reversing earlier policies, the Native American Languages Act of 1990 makes it a policy to preserve, protect, and promote the rights and freedoms of Native Americans to use, practice, and develop Native American Languages.
- There are approximately 400,000 American Indian and Alaska Native students in grades K-12.
- About 44,000 students (10 percent) attend Bureau of Indian Affairs schools; most of the remainder attend public schools.
- There are 28 tribally-controlled colleges with an enrollment of more than 7,000 students.
- The Office of Indian Education (in the U.S. Dept. of Education) funds and oversees programs that provide services to about 380,000 American Indian and Alaska Native students (Title V programs)

Sources: [Utter, 1993](#)
[B.I.A., 1994](#)

What Are the Issues?

A Current Problem with a Historical Legacy

Native peoples of the Americas have rich histories and cultural heritages that have always served as a foundation for preparing future generations for meaningful and productive life. Traditionally, Native elders took on much of the responsibility for teaching new generations the skills, traditions and knowledge of their people. In everyday situations, children were taught to work cooperatively and collectively and to reflect on what they were learning from life's daily "lessons." These strategies served to increase the impact of the elders' words about the particular "lesson" inherent in a given experience, thus increasing its power. This experiential, hands-on education in a real-world context featured the most authentic assessment system possible: the daily challenges of life itself. Performance on the various assessment tasks determined whether people would live or die and whether a tribe's culture would survive.

Today, Native elders continue to shoulder the same responsibilities, using traditional methods to prepare younger generations for success in their own communities and to instill in them culturally-based "funds of knowledge." ([Moll, Amati, Neff & Gonzalez, 1992](#)). Their educational strategies--emphasizing cooperation and reflection in a meaningful context--are remarkably similar to those promoted in current educational reform agendas. One might assume, therefore, that Native students would have a decided advantage in today's classrooms. Unfortunately, the

opposite is more true.

The reasons lie in several intersecting realities:

- often troubled historical relations between tribes and the federal government affecting the schooling of Native students;
- ongoing educational practices that reflect little understanding or valuing of the cultural ways of knowing and learning of Native communities; and
- the dearth of American Indian and Alaska Native teachers.

Though most Native students now attend local public schools, in the past most received their formal education at federally supported Bureau of Indian Affairs schools. And though at times government policies supported maintenance of Native languages and cultures, more often than not they promoted assimilation to a Euro-American way of life and rejection of Native languages. For example, children were removed from their communities and placed in boarding schools far from home--sometimes several states away. Such policies continued well into the middle of this century, leaving Native communities with deeply conflicted feelings about education. In these communities, educators' expectations for parental involvement and commitment to the goals of schooling must be tempered by an awareness of the profound ambivalence that many parents feel as a result of their own experiences with school.

Common practices of many schools have either directly or indirectly devalued Native ways of life. A few decades ago, such practices were, perhaps, more blatantly disrespectful: cutting students' hair without consent, physically punishing students for using their Native languages, forcing the study and practice of Christianity against parents' wishes and, in general, excising from children's lives anything connoting "Indianness" ([Chavers & Locke, 1989](#), p. 6). But current curricula and pedagogies (including assessment practices) that make no connections to the cultures, histories and languages of Native students are similarly alienating. By contrast, curricula that support the building of cultural identity has been associated with lower dropout rates ([Eberhard, 1989](#)) and improved literacy skills among Native students ([George & Just, 1992](#); [Teachers' Panel, 1994](#)).

Also affecting the schooling of these students has been the shortage of Native teachers. When teacher and students have no shared cultural identity, a teacher has less to go on in making decisions about what is appropriate to teach students and how to effectively teach it. In such circumstances, the teacher is also less able to accurately interpret students' motives and behavior. By contrast, a teacher who shares the culture of his students is more likely to convey subject content within a context of familiar cultural experiences and local values. Better able to recognize students' personal and cultural strengths, that teacher is also likely to communicate more meaningfully ([Nelson-Barber, 1991](#)). Thus, the educational success of Native students is further hindered by the small number of Native teachers available. This dearth results in part from higher education programs that are unresponsive to the needs of Native students; the nature of college entrance and certification testing; and the general lack of understanding about certain culturally-based pedagogical practices employed by Native teachers, such as their practice of sharing classroom control with students rather than exerting unilateral control themselves.

Need for a Sociocultural Perspective on Classroom Learning

Understanding the school performance of Native students requires moving

beyond a psycho-educational framework that focuses on individual cognition to a sociocultural perspective. Children are not merely "information processing machine[s]" (Cole & Bruner, 1971, p.872). Their orientation to the types of learning, knowledge and ways of thinking and doing valued by their community is not just an individual psychological process. It is also a multilayered social process. In fact, many cognitive psychologists now challenge the view that a student's cognitive functioning can be evaluated outside a context that is meaningful to the student and without consideration for the student's intent or purpose when participating in an activity. Studies show that when children do not understand the intent of a question or the teacher's purpose in asking it, for example, they may respond in ways that do not reveal what they actually know (Resnick, 1991).

Schooling, too, takes place in a social context. But the expectations and demands of school compared to home may be very different, especially for Native students who live in traditional communities. Adding to the potential for misunderstanding among students and teachers is that the norms and values of any community are rarely stated explicitly. Rather they are inherent in the life of the community, seldom rising to a level of conscious awareness for anyone.

Conventions of language use are a case in point. Children learn not only the vocabulary and grammar of their home languages, but how to use language for different purposes and within different social situations. For example, in many Native communities, when several people are together, it is the norm to speak to the group as a whole rather than addressing a comment or posing a question to an individual (cf. Swisher & Deyhle, 1992). It is also considered inappropriate for one person to suggest that he or she is better than another or to make someone else uncomfortable by "showing him up." It is easy to imagine how these norms might clash with the norms of a typical classroom in which teachers address questions to individual students and publicly evaluate their responses.

Effective Instructional Styles

Many studies of Native students in classrooms have shown how typical instructional approaches result in students' adopting a "mask of silence" (Dumont, 1979, p. 346). In an experimental summer program for Sioux children, Dumont found that "the more teaching and learning was moved into the cultural complex of the Sioux community, the more students talked, and as it moved within the cultural complex of the school, the more silent they became" (Dumont, 1972, p. 347). In other words, the children's relative participation or silence was directly related to how teacher-student and student-student learning exchanges were structured. When teachers used conventional non-Native ways of exercising authority and enforced a "school" definition of learning (far removed from the experiential learning promoted within the community), students simply stopped talking and otherwise refused to participate.

More recently, observations of Inuit, Cree and Mohawk teachers revealed that, unlike non-Native teachers, they tended to structure classrooms so children learned from each other as well as from the teacher (McAlpine & Taylor, 1993). Teachers did not seem to exercise any overt social control, choosing instead to share control with their students, who had great latitude to interact with peers. Although teachers from the different Native groups did not use all the same procedures and practices to the same degree, the practices mentioned above were observed in all classrooms.

Researchers Eriks-Brophy and Crago (1993) have studied how successful Inuit teachers in northern Quebec adapted classroom discourse practices to

harmonize with their students' communication patterns. Rather than asking individual students to answer questions, teachers allowed the whole group to call out answers. At times, an individual student would respond, and the group would repeat the response in chorus. In addition, teachers did not always directly evaluate the correctness of the group's response after each question. Instead, they gave indirect feedback through the ways in which they continued the discussion, e.g., by eliciting further contributions or through non-verbal cues.

Differences between Native and non-Native approaches to acquiring and organizing knowledge also have implications for teaching, assessment and learning. As noted above, in Native communities children are usually expected to learn through observation and direct experience rather than from explicit verbal instruction. Concepts to be learned are seen as interconnected, and skills are learned in a meaningful context--which according to proponents of apprenticeship models and situated cognition, would be appropriate for all students ([Brown, Collins, & Duguid, 1989](#)).

Many education reformers are now calling for a constructivist approach that recognizes students as active learners who, to learn at the deepest levels, must connect classroom experiences to their existing knowledge structures, which derive, in part, from real-world experiences. Many are also advocating interdisciplinary instruction. In fact, an integrated, more holistic approach to education is potentially very compatible with traditional Native ways of learning. The kind of assessment that logically follows from such instruction would also occur in a meaningful context--ideally, embedded in or continuous with instruction. The type of assessment tools that artificially isolate disparate bits of information--as do most multiple choice tests, for example--is compatible neither with the constructivist approach nor with Native ways of demonstrating understanding or skill. Similarly, for Native students, reliance on questioning or recitation for both instruction and assessment is incongruous with cultural norms ([Swisher & Deyhle, 1992](#)).

Adaptability of Cultures

Current inquiry into the norms for knowing and learning in diverse communities (whether defined in linguistic, ethnic, racial, gender or even occupational terms) does not originate in concern about political correctness. Rather, it grows out of an understanding that communities of people have developed systems and approaches that work for them in their particular circumstances. Just as linguistic research has led to the belief that there are no "primitive languages"--that all languages are sophisticated and flexible enough to communicate any thought their speakers need to express--anthropological research has led to the notion of "psychic unity" ([Cole & Bruner, 1971](#)), which says that cognitive capacity is constant across all populations of people. Differences arise simply because diverse groups organize and categorize the world differently, according to their specific needs. "By this view, different conclusions about the world are the result of . . . different, but equally logical, ways of cutting up the world of experience. From this perspective, descriptions of the 'disorganization' of minorities would be highly suspect, this suspicion arising in connection with questions like, 'disorganized' from whose point of view?" ([Cole & Bruner, 1971](#), p. 872).

For cultures to have survived, they have necessarily evolved cognitive tools to aid memory or management of the environment--tools that suit local purposes, such as mathematical and writing systems, computational devices and maps. "Cognitive tools embody a culture's intellectual history; they have theories built into them, and users accept these theories--albeit often unknowingly--when they use these tools" ([Resnick, 1991](#), p. 7). These tools facilitate thinking and problem-solving, but in certain ways, they are also constraining. Thus, Native students who are expected to

move from one set of cognitive tools/theories/approaches to another may well need explicit instruction on how to do so.

Given all this, it is clear that to understand a student's performance on a given task, one must consider how the demands of the task intersect with his or her own ways of knowing, approach to problem-solving and familiarity with the cognitive tools required to complete the task ([Cole & Scribner, 1974](#)). An inadequate performance on a task does not necessarily imply lack of competence, particularly when the task is not culturally congruent. Even something as basic as ability to memorize a list of items is affected by familiarity with items on the list and purpose for remembering it.

Misguided Assumptions

The concept of intellectual equality of all human populations, though accepted by those who have studied multiple cultures, may not be broadly accepted among all non-anthropologists, including teachers. After all, until recently, the United States had a history of political, educational and social actions based on a very different set of beliefs: that some cultures are inferior to others intellectually; that European and Euro-American cultures are more advanced than most others; that some peoples are "primitive" and their languages less developed. In the past such beliefs rationalized wholesale destruction of 'less developed' Native societies; imposition of "superior" ideologies and of educational curricula promoting mainstream views; denigration and supplanting of Native languages with European languages; and other social practices that serve to keep "less developed" peoples in lower social and educational tracks. To grasp what has brought American Indian and Alaska Native students to their current status in the American educational system, we must be aware of and reevaluate some of these underlying beliefs and practices that have been based on those beliefs.

What Are the Assessment Issues?

Despite questions about the validity of existing tests for Native students, this population is subjected to a great deal of testing. Among those tests frequently administered are screening, intelligence, placement/ diagnostic, achievement, attitude, language proficiency, reading, personality and competency ([Chavers & Locke, 1989](#)). Countless decisions are based on the results. As long ago as 1979, federal legislation was directed at improving testing practices for Native students--with little apparent consequence. In 1988, the Indian Education Act made provisions for "a program of research and development to provide accurate and culturally specific assessment instruments to measure student performance in cooperation with Tribes and Alaska Native entities" ([Chavers & Locke, 1989](#), pp. 18-19). To date, however, there is no repertoire of standardized tests in Native languages or that draw on Native cultural content and learning processes. Still, current reforms in student assessment, both at the statewide and classroom level, have some potential for remedying the situation.

Factors Affecting Native Students' Test Performance

Native teachers have long believed that existing tests do not reflect what they have been teaching or their students have been learning ([Nelson-Barber & Mitchell, 1992](#); [Teachers Panel, 1994](#)). Standardized, norm-referenced tests have presented the most obvious difficulties:

- content may be inappropriate, because common experience is wrongly presumed, jeopardizing construct validity (i.e., the ability

- of the assessment tool to test what it purports to test);
- the timed nature of the tests penalizes students from communities that view time differently or value reflection over quick response;
- reliance on verbal information and representation to the near exclusion of nonverbal, visual information and representation is culturally incongruous; and
- formal, on-demand testing is alien to Native ways of demonstrating learning.

Inappropriate content is in some ways the most concrete and obvious source of bias. A panel of Native teachers recently convened to discuss assessment issues offered the following examples. Asking Native students to read a passage about a birthday party (an event most White, middle class children of school age have experienced many times) and relate it to their own experience may not be appropriate. Similarly, fairy tales about kings, queens and princes, while perhaps familiar bedtime fare for suburban children, are not at all familiar to many Native children ([Teachers' Panel, 1994](#)). When common experience is wrongly assumed and students are asked to respond to entirely unfamiliar content, it is difficult to know what is being assessed. In such cases, construct validity is suspect. Is the student being assessed on his or her ability to learn--or on familiarity with the White middle class experience?

Time pressures can also inhibit the successful performance of Native students. Some teachers say their Native students need additional time to process the more complex language used in new performance assessments, language that may be very different from that to which they are accustomed ([Teachers' Panel, 1994](#), among others). For many Native students, processing of test language is further complicated by the fact that English is their second language. Even those who speak English as a first language are likely to speak a dialect whose syntax and conventions of use are strongly influenced by the Native language of their community. Time issues notwithstanding, heavy reliance on language for both communicating information and representing knowledge is simply not the norm in many Native communities. Therefore, strictly verbal tests may penalize Native students.

Many Native students also find themselves in conflict with the basic premises of many assessments: for example, the idea, inherent in all multiple choice tests, that only one answer can be right. When asked in interviews which tests they preferred, women Native graduate students opted for essay tests, explaining that the idea of choosing only one answer over all others is antithetical to their way of thinking. Instead, they said, they felt the need to deliberate and give full consideration to all alternatives ([Macias, 1989](#)).

Finally, studies in numerous Native communities have shown that on-demand assessment of children's learning is not customary ([Swisher & Deyhle, 1992](#)). Children tend to have opportunities to learn privately and to practice on their own before performing in public; moreover, it is the student who determines when he or she is ready to perform. In Native communities, both adults and children are expected to maintain a respectful attitude toward any task, and it is considered disrespectful to attempt a task before one is relatively sure of doing it correctly ([Swisher & Deyhle, 1992](#)).

Other factors influencing test performance for Native students are: differences in learning style, conflicted motivation vis a vis investing in the school's value system, an aversion to competition and low expectations on the part of teachers ([Neely & Shaughnessy, 1984](#); [Brescia & Fortune,](#)

[1988](#)).

Assessments as Cultural Events

In general, scores from cognitive tests standardized on a majority culture accurately predict academic success in the dominant culture's educational institutions ([Cress, 1974](#)). But this does not mean the scores are accurate measures of cognitive capacity or intelligence--a common misperception. They merely "reflect the interaction between capacity and the particular conditions of previous training and current test demands" ([Cress, 1974](#), p.16).

It can be argued that most achievement tests are merely indices of the degree to which students have been acculturated to Western cultural knowledge and conventions for displaying knowledge ([Teachers' Panel, 1994](#)). In fact, tests and assessments *are* cultural products or events. "[A] ssessment practice is part and parcel of a professional stance that is bound to middle-class culture and enmeshed with a larger social system that nourishes...ethnocentrism" ([Dana, 1984](#), p.41). For a test to be "culture-free" it would have to be "independent of experiences" ([Deyhle, 1987](#)).

The implication for Native students is clear. As reported by Native teachers, students living on reservations or in isolation from "mainstream" culture may not be able to make sense of the examples that non-Native teachers use in instruction. Furthermore, while teachers can build students' experience vicariously through thematic units that link their personal experiences with those of the wider world, in general, these students may have no other ready means to acquire the background information necessary for performing well on achievement tests.

Even the concept of "test" is not a cross-cultural universal. In her work with Navajo students, [Deyhle \(1987\)](#) has shown that some children acquire a concept of test much later than others. Whereas "Anglo" second graders knew that good test performance was important and related to school success, Navajo second- and third-graders saw tests as events distinct from other classroom activities only by virtue of special procedures surrounding them: "You be quiet, put your books in the desk and he gives you a piece of paper you write on" and "Don't look at others' papers" ([Deyhle, 1987](#), p. 100). Anticipating a test, non-Navajo students experienced some trepidation, while Navajo students said they felt "good" or "happy." In fact, according to Deyhle, some of their teachers (who were non-Native) actually created a 'game-like' atmosphere for the Navajo children. Such apparently patronizing behavior clearly did not convey the importance of test performance. Results of studies in Alaska also suggest that rural teachers are skeptical of standardized tests and may communicate that belief to students ([Parrett, 1988](#), among others).

It was evident from Deyhle's study that "Anglo" students entered school having been indoctrinated by their families about the importance of school and tests. This was simply not so for the traditionally-educated Navajo students in the study.

As Navajo students advance in school they learn that their performance is being judged. Unfortunately, according to Deyhle, they also learn that it is being judged as deficient, at which point, many reject the importance of displaying competence on tests. An historical review of the effects of testing on American Indian students reveals that tests are not regarded as important by many students or their parents; instead, they are viewed as "something to endure" or "something which holds students back and 'proves' that they are not worthy" ([Chavers & Locke, 1989](#), pp. 15-16). If students do not take tests seriously, test results cannot be valid.

Cultural differences in how to approach a task also come into play in testing. When faced with the solitary task of writing a response to an assessment question, students who are accustomed to cooperating with each other and sharing information may not be able to proceed readily. "If you want their opinion, they want to sit and think and share with others," says Principal Joan Gilmore of Leupp Elementary School on the Navajo Reservation near Flagstaff, Arizona. Before these students can handle the state's Arizona Student Assessment Program tasks that require them to write on demand, she says, they need explicit practice with similar tasks. She also believes her students need more time to think and process than assessment developers have estimated.

Everything now known about assessment of Native students suggests that most assessment tools designed and used thus far have very little utility for revealing the learning of Native students. That recognition leads to some important questions: How valid is any decision based on the outcomes of these tests? Is it ethical to continue to make judgments about Native students' performances without understanding the sociocultural contexts in which they occur? What can be done to make assessment and evaluation of Native students both informative and equitable?

How Can Assessment of Native Students be Improved?

The factors that have contributed to serious problems in assessment of Native students are, themselves, suggestive of steps that can lead to more culturally responsive testing practices (see Table 2 for a summary).

Table 2
Guidelines for Culturally-Responsive Assessment for Native Students

- Link assessment to instruction. Avoid packaged tests.
- When possible, embed assessment in instruction.
- Tailor content of assessment to students' experiences in and out of school. Use cultural resources with which students are familiar.
- Use open-ended formats (not T/F or multiple choice).
- Allow time for students to process instructions and tackle various aspects of a task.
- Allow students opportunities to practice; give guided practice with multi-step problems.
- Allow time for reflection and deliberation.
- Allow students choices about when they will be assessed and how.
- Provide for cooperation as well as individual assessment

opportunities. Allow cooperative problem-solving.

- Use forms of assessment that do not rely entirely on language or mastery of standard English (or uses of language unfamiliar to students).
- Give students explicit information on the purpose and meaning of any standardized tests they must take as well as strategies for responding.
- Treat students as whole people with valid experiences; language and culture are part of a student's identity and way of viewing the world.
- Always document the contexts preceding and surrounding assessment.

Flexibility in Task Content

Improving assessment content is one obvious step, particularly at the classroom level where teachers have the freedom to tailor assessment to immediate needs. Assessments must incorporate content that reflects local contexts and experiences. Reading performance, for example, can be assessed using stories related to students' cultural knowledge, whether through historical narratives, legends or expository texts about scientific concepts demonstrable in community life.

Of course, such assessment should be tied to classroom curriculum and instruction. For example, Peach Springs District No. 3 on the Hualapai Reservation in Arizona has developed a curriculum based on themes meaningful to the community, such as ranch life ([Hualapai Cultural and Environmental Curriculum, 1992](#)). Having done so, it is in a better position to develop culturally-linked assessments than a district that relies on textbooks and a pre-packaged curriculum. Native teachers in Utah report that use of students' own language, stories and legends in instruction and in classroom assessment has been associated with improved scores on statewide tests. The bottom line? "Connect to students' experience. Use resources they already have" ([Teachers' Panel, 1994](#)).^{.*}

Flexibility in Ways of Assessing

More broadly, as Edmund Gordon has argued, "it must be possible to develop assessment procedures [that] are a more appropriate reflection of the ways in which people think, learn and work" ([Gordon, 1992](#), p. 2). Native teachers need the freedom to assess students in the ways they (teachers) deem valuable ([Teachers' Panel, 1994](#)) from "perspectives [that] reflect the life space and values of the learner" ([Gordon, 1992](#), p. 6). Ideally, of course, Native teachers would also model appropriate assessment strategies for non-Native teachers.

Among the factors to consider in developing alternative assessments for Native students are: the format of questions (eliminating multiple choice, for example); how students are grouped (asking cooperative pairs of children to solve a problem rather than individuals, for example); the pace

of an assessment task or process; how the language of the instructions is modified by teachers for students; and the language in which an assessment is conducted. Drawing on Native traditions of observation, modeling and experimentation, assessments can take forms other than purely linguistic. Native students may also benefit from explicit guided practice with multi-step assessments ([Teachers' Panel, 1994](#)).

Opportunities for Choice

Options and choices are a critical feature in any assessment system. Despite the best hopes and intentions of assessment designers, when it comes to assessments, one size does not fit all. Students, as well as teachers, need choices. In their own communities, Native students have much freedom of choice in how they go about learning from and with peers: to be successful classroom learners and to demonstrate their true learning, they may require similar freedom in the classroom. They may wish, for example, to take on assessment tasks in small cooperative groups rather than individually. Another element of choice has to do with decisions about when to assess. Much informal assessment is built into instruction; but for more formal summative assessment, it may be important to allow students some choice about when they are ready to be assessed.

Adherence to Standards--But Whose?

The federal Goals 2000 legislation calls for alignment of clear content and performance standards with instruction and assessment. Yet many communities of color, including Native communities, ask two important questions: Whose standards are we talking about? Is one set of standards appropriate for all students? Some call for locally developed standards to ensure compatibility with community values. Others believe it should be possible to set some very broad academic standards for all students and to measure success according to a common set of criteria, while, at the same time, remaining flexible about the specific means for addressing standards and determining student achievement. In the words of Gordon, education should strive for "universal standards and differential indicators" ([Gordon, 1992](#), p. 5).

It remains to be seen whether this sanguine view will prevail. Ongoing issues of the marginalization of educators and parents from non-dominant communities are not resolved. For example, members of such groups may be asked to review assessments after they are virtually completed to ensure that they are unbiased; but these same parents and educators may not be included in the initial conceptualization of an assessment system or individual assessments. In Native communities, this marginalization is exacerbated by the shortage of Native teachers.

Standards, instruction and assessment must be aligned not only with each other, but with community values. To serve the needs of Native students, from the outset this process must include representatives of their community, from Native teachers and paraprofessionals to parents, elders and other community leaders. Obviously, the shortage of Native teachers has hampered this process in many locales. In districts with few or no Native educators, non-Native staff must make extraordinary efforts to link with the Native community, to ensure that its members have the opportunity to participate in designing their children's education. Absent that link, a school or district risks mounting education programs that have no meaning or relevance to the very students it intends to serve.

Documentation of Contexts

For interpretations of student performances to be valid, those evaluating

performance results must know in great detail the contexts of the student's learning and assessment, including: previous experiences in and out of school, including how a student has been educated outside of school; the languages of learning in and out of school; student affect and apparent effort; and the more immediate conditions surrounding the assessment itself, such as time allotted and teacher supports given. All this must be fully documented and described. Some of these elements can be documented by the students themselves, particularly older students.

Cautious Use of Assessment Data

Caution should be exercised when interpreting the meaning of Native students' performances. High-stakes decisions about grade promotion, graduation or program eligibility must be made on the basis of more than one type of assessment, in part because of the wide range of influences that affect Native students' performance. In the best possible situation, the school staff would include Native teachers who can help non-Native teachers understand and judge student work. As in any community, information flow between parents and teachers is also critical to understanding students' school performance.

Are Alternative Assessments the Answer to Equitable Assessment?

Much has been written recently about the potential of alternative assessments, such as portfolios, student exhibitions and performance tasks, to render more useful and equitable depictions of student progress and achievement. At least on the surface, these forms of assessment appear to have great promise because they can reflect the context of the student's educational experiences. For example, in theory, generic tasks that call on predictable sets of skills (such as reading and writing about one's response to a book or investigating and reporting on an environmental topic of importance to the community) can be designed with local contexts and student needs in mind. They can be embedded in instruction and "administered" in flexible ways.

When used as process tools to foster student reflection, decision-making and goal setting and engagement in learning, portfolios can be excellent vehicles for empowering students and representing their learning in terms they understand. While an individual portfolio entry reflects a student's developmental level at a given time, taken collectively, the entries depict learning over time in a way that ready-made tests cannot. For Native students, the portfolio's emphasis on success and growth rather than on what the student has failed to learn is especially important ([Teachers' Panel, 1994](#)). Another asset of portfolios is their link to the specific classroom curriculum and, potentially, to contexts of learning beyond the school. Exhibitions, which sometimes take the form of public demonstrations that are evaluated by community panels, are also very appropriate vehicles for bringing community values to bear on student assessment.

A Final Reflection

The last decade has seen positive changes in the relationship between tribes and the federal government, partly owing to Native communities' success in empowering themselves. At the same time, Native communities have asserted renewed interest in culturally valid curriculum. And, although the numbers of Native teachers are still small, there is increasing recognition that they, along with Native researchers and community members, must be tapped as sources of important expertise if schools are to improve their capacity to teach Native students.

By adopting a sociocultural orientation to understanding how Native students learn and know, educators can reflect more productively on classroom practices and their implications for Native students. Learning about the community, understanding the ways expectations of children are communicated, observing what children do at home--all are important for non-Native teachers ([Teachers' Panel, 1994](#)).

At least one caveat is warranted: even the most culturally-responsive instruction and assessment will not automatically translate into academic success for Native students. These students still face the challenge of developing their own identity in the face of the multiple and sometimes conflicting demands of a highly complex social context. Many may continue to experience personal dilemmas as they make conscious and unconscious decisions about how to bridge cultures. And issues of identity notwithstanding, mastering multiple cultures, alone, demands a great deal of time and energy, both in finite supply. For example, students must decide whether to study modern American Indian literature in addition to Shakespeare--the latter being required reading for Advanced Placement English ([Teachers' Panel, 1994](#)). Some students opt out of this bicultural agenda, either by conscious choice or by default.

However, even with these challenges, many Native students are thriving in programs that are based on culturally responsive curriculum, instruction and assessment. And--fortuitously--the current climate of reform provides all of us an opportunity to reexamine old assumptions and develop new bases of knowledge from which to re-create instruction and assessment.

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Rural Schools Assistance Program in
collaboration with the Native Education Initiative

Stanley H.L. Chow

Director,
Rural Schools Assistance Program

Elise Trumbull Estrin Ed.D.

Senior Research Associate
Rural Schools Assistance Program

Sharon Nelson-Barber Ed.D. Senior Research
Associate
Native Education Incentive

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Far West Laboratory

730 Harrison Street
San Francisco, CA 94107
(415) 565-3000

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People Who Live in Round Houses

by [Claudia Zaslavsky](#)

Written for K-6 teachers, this article presents a framework for a multicultural lesson in geometry. By investigating styles of buildings in different cultures (tipis, igloos, huts), students can gain valuable experiences with shape, size, perimeter, and area. The text features pictures of buildings from a variety of cultures, suggestions for class discussions, and a lesson plan that focuses on area and perimeter. Students are asked to construct plans for building a house that uses the least amount of material and provides the largest floor space, ultimately reaching the conclusion that round houses achieve the greatest possible floor space with a given quantity of building materials. *Arithmetic Teacher*, September 1989 (p. 18-21) [ENC-009739](#)

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More Than Beads, Buckskins and Bolo Ties:

The Role of Culture in Science

By Frank C. Dukepoo

In a very real sense the problems facing ethnic minorities in the United States regarding their educational status are the same ones they faced nearly thirty years ago. In an attempt to reduce the drop-out rate and increase the number of Black, Hispanic and American Indian graduates, the government initiated the TRIO and other programs of the "Great Society" during the 1960s. These ethnocentric innovations were designed and implemented to solve "the minority problem" and bring them "up-to-par" with the rest of the nation. Numerous and very much "in-vogue," they did not.

Not long after these programs were established it became increasingly evident that they were doing an inadequate job of motivating minorities to pursue math, science or engineering careers. While national data revealed scant numbers of Blacks and Hispanics in these disciplines, American Indians were nearly invisible. This time the reformers proffered "culturally-based," "culturally-relevant," and even "gender-sensitive" science and math programs. For the most part they didn't work either. Why?

In the 1990s we are still wrestling with the same burning question. Currently it is such a serious concern that the very prestigious *Science* magazine, in its November 13, 1992 issue, devoted a special section to the dearth of minorities in science entitled: "Minorities in Science: The Pipeline Problem." The crux of that timely feature was despite the billions of dollars spent on thousands of programs designed to increase the number of minorities in math, science and engineering, there is no appreciable gain. In fact, the results are dismal.

In one series of the "Pipeline" section, Calvin Sims, after interviewing numerous government officials, educators and business heads, concluded that much of the money had been misspent. Furthermore, in explaining programmatic failure, he cites the following reasons:

1. little oversight, accountability, or assessment,
2. little genuine commitment from administration and faculty,
3. setting unrealistic goals,
4. inconsistent and unreliable funding,
5. low teacher and counselor expectations,
6. recruiting unprepared students who were then left to sink or swim, and,

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7. targeting college-age students rather than working at the high school and elementary levels where problems originate.

In addition to these, this paper explores briefly the potential beneficial or deleterious role of "culture" in science particularly in American Indian communities.

In response to the question of whether or not "culture" is an issue in teaching science, the answer is an emphatic "yes" for the following reasons.

First of all, it is a foregone conclusion that culture plays a vital and profound role in every aspect of our existence. However, it is perceived differently by various members of society. To the professional, for example, culture encompasses the totality of socially transmitted belief systems, arts, attitudes and patterns of behavior that characterize a given group, community or population. To the proverbial 'man in the street' or the 'Indian on the reservation,' it is simply the way people do things because they like to do it or because it was "handed down" to them. Of extreme significance is the observation that people sometimes participate in a ritual or ceremony or subscribe to a belief system without questioning or knowing why. Typically they reply, "I don't know...it's just the Indian way." What we surmise from this revealing statement is that people of "culture" do culture without pretense. It may well be that the "dominant" culture is making "culture" an "issue."

Second, there is no question that "science" plays a very significant role in our everyday lives. To describe it as awesome would not be an exaggeration. Again, the perception varies. To the professional person, "science" entails the observation, identification, description, experimental investigation and theoretical explanation of natural phenomena. The end result is the accumulation of information and knowledge which, when applied, becomes technology. To the layperson, "science" boils down to "poking around" and solving problems or making new discoveries merely by using your head and a little dab of common sense. Like culture, it is a way of doing things. In this case the layperson knows why he/she accepts it-- it "works." Furthermore, culture and science influence one another. The two are closely intertwined, interdependent and inseparable. Both are dynamic and both evolve. Synergistically, they enhance each other as the following example illustrates.

Imagine that a group of migrating "Indians" found themselves without food and on the verge of starvation. As custom compels, they prayed for guidance and assistance. In due time they came upon some corn-- something not part of their normal menu. Rather than gorge themselves on the spot, a "Project Director" emerged who took charge and conducted "animal or other experiments" to test its edibility. Concluding that it was not only edible but extremely delicious, they offered a prayer of thanks to The Great Spirit.

Thus, through "science" and application of its methodology, corn became part of their culture. In ensuing years as their "corn culture" evolved so did their "science" in that hypotheses were refined and observational skills were sharpened resulting in the establishment of a corn data base. As these data accumulated, new ways of utilizing corn were incorporated into their lifestyles and their culture evolved as did their scientific skills and so on.

This illustration exemplifies the reality that elements of cultural knowledge do not create barriers in the study of science; but rather can enhance, excite and stimulate scientific curiosity and inquiry. Conversely, it also demonstrates that elements of science teaching do not necessarily create cultural barriers but when properly presented can engender cultural

appreciation, understanding, respect and acceptance.

Just as important, the corn story also provides the theoretical base that "culturally-relevant" science and math programs should have worked "like a charm" in Indian communities. In some instances they did but far too often they didn't. One reason for program failure may be attributed to some teachers who rigidly refused to relinquish old notions and stereotypes about Native Americans, science, and their ability to "do" it. In their outmoded thinking "science" was not part of Indian history or culture and because of this Indians couldn't handle it. Many were absolutely convinced that Indians were "incapable of non-linear thinking." And unbelievably, because Indians were "good with their hands" and predominantly "right-brained," they were often discouraged from pursuing science/math careers and shunted into voc-tech avenues. Clearly, teacher expectations exert profound influence on student performance.

The other reason is that teachers basically had good intentions but possessed woeful misconceptions of culture and cultural dynamics and a limited understanding of contemporary American Indians. Somehow they forgot that cultures evolve. Today's Indian student is not the same as one twenty, ten or five years ago or even last summer.

And so returning from the latest "Diversity Conference" fully "immersed," "sensitized" and culturally "aware" and armed with the latest techniques in "cross-cultural communication," the teachers with smiling faces set about revising their syllabi to include "culturally-relevant" math and science lessons. With boundless expectation and thoroughly convinced they had "the answer," they had the students count and categorize beads, buckskins and bolo ties. In response, the kids participated with obvious diffidence, absolute boredom and excruciating agony as they eyed their computers. Predictably, the "quick-fix" turned out to be a "quick-failure" because the well-meaning teacher didn't have a discerning eye or was fearful of the new technology. It is all too obvious that the teacher placed too much emphasis on "culture" and paid too little attention to the personal needs of the students.

In this portrayal counting beads, buckskins and bolo ties did not arouse the interest or capture the attention of the students and using wigwams, wikiups and wojapi may not sufficiently fire them up to scramble for science and math courses either. However, in nearly all the schools in Indian communities teachers practically have to drag students away from their computers to attend the next class. The answer here is simple. If you want exciting and innovative "culturally-relevant" programs, program the activity into computers and watch the show.

It is comforting to know that many successful Indian programs exist throughout the nation. These programs are characterized by caring, motivated teachers, involved and concerned parents and ample, positive administrative support. There is also a de-emphasis on "culturally-relevant" programs and a "new" emphasis on "community-relevant" and even "human-relevant" activities. By employing these approaches, teachers are not overwhelmed trying to learn and incorporate all the cultural nuances of a given group into their daily lessons which can be unduly intimidating for some and unrealistic for others. This is particularly important in multi-cultural settings where guidelines require culturally relevant lessons.

As we move toward the 21st century we cannot help but wonder where we will rank on the education scale. On the one hand there are the pessimists who, with a negative mental attitude, throw up their hands in despair and say "What's the use...we've tried everything!" Then there's the other camp where people have a positive approach and sincerely believe there is hope and that we can improve our situation.

With dwindling resources it is crucial that we evaluate our past efforts critically and identify successful enterprises and support them. Because of time and economic constraints, we cannot afford to repeat our mistakes but rather, learn from them. Pumping more good money into bad programs is senseless because in the end we all "pay" in our pocketbooks, our heads and our hearts. Rather than conduct more studies, we need to *implement* successful *programs* on a national scale. We also need to blast the myth that more money will solve the nation's educational problems.

In searching for "the answer," we must stop looking for "shortcuts," "the easiest route," the "quick-fix," or the "magic formula" especially when working with minority students. We would be further ahead and far better off if we would turn our attention to solving "family" rather than "minority" problems. When families become healthy and are firmly rooted in a value system that emphasizes character, hard work, integrity, decency, dignity, self-respect, honesty and honor we will witness the emergence of cultural pride, cultural sharing, cultural pleasure and willingness to help one another.

In our classrooms we must employ and reward "master" teachers (i.e., the "teacher's teacher") who will set high goals, have high expectations and demand excellence. National standards and national curricula with "value-relevant" content are not out of the question.

In summary, there is no denying that as a nation we have severe educational problems. Like any life-threatening disease, we must cure it before it consumes us. The "treatment" may not be pleasant--it might even be painful. But we must do it. The best way to avoid it is to prevent it. In the past we've attempted to "treat" the minority condition by utilizing "culturally-relevant" remedies and other strategies. In the end we must examine what "culture" really means and answer two significant questions. One, is it more important to teach to hair texture and skin pigmentation; or, to reach and teach the human spirit within? And finally, is it more important to satisfy a cultural nuance; or, satisfy the intellectual curiosity of each and every one of our students? The answers, my friend, are obvious.

Frank C. Dukepoo
October 8, 1993

(Written for Southwest Ed. Dev. Lab. and presented at Conference in Albuquerque on September 18, 1993)

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Asian-American Children: What Teachers Should Know

ERIC Digest

Author: Feng, Jianhua

ERIC Clearinghouse on Elementary and Early Education, Urbana, Ill.

Asian-Americans constitute a significant minority in the U.S. and are one of the fastest growing ethnic groups in this country, yet little is known about their particular educational needs, especially at the early childhood and elementary levels. This digest provides information to help teachers gain a better understanding of Asian-American children, particularly those from East and Southeast Asian cultures, and identify culturally appropriate educational practices to use with those children.

ASIAN-AMERICAN CHILDREN: WHO ARE THEY?

The term Asian-American covers a variety of national, cultural, and religious heritages. Indeed, Asian-Americans represent more than 29 distinct subgroups who differ in language, religion, and customs. The four major groups of Asian-Americans are East Asian, such as Chinese, Japanese, and Korean; Pacific Islander; Southeast Asian, such as Thai and Vietnamese; and South Asian, such as Indian and Pakistani ([Pang, 1990](#)). Although there are similarities among the various subgroups, they have different origins, ecological adaptations, and histories.

In addition to these between-group differences, diversity exists within national groups and among individuals. Individual differences are found in reasons for migration, related hopes and expectations, and reception by the dominant culture. Some immigrants are refugees from countries torn apart by war, others from the middle class of stable countries. Some came with nothing, others with skills and affluence ([Brand, 1987](#)). Many Asian-Americans were born in the U.S. Some are fourth- or fifth-generation Americans. A disparity exists between foreign-born Asians living in this country and American-born Asians who are often quite acculturated ([Hartman & Askounis, 1989](#)).

ASIAN-AMERICAN CHILDREN: ARE THEY ALL "WHIZ KIDS"?

Asian-Americans are generally stereotyped as successful, law-abiding, and high-achieving minorities. The success of many Asian-American students has created a new "model minority" stereotype. They have been described in popular and professional literature as "whiz kids," and as "problem free." Some claim that Asians are smarter than other groups; others believe there is something in Asian culture that breeds success, perhaps Confucian ideas

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that stress family values and education ([Brand, 1987](#)). However, Asian-Americans' educational achievement cannot be attributed to natural superiority or shared cultural and family values, but rather to the interaction of those cultural and family values with social factors ([Siu, 1992](#)).

The "whiz kids" image is a misleading stereotype that masks individuality and conceals real problems. If Asian students are viewed as instant successes, there is less justification for assisting those who may need help. The result may be neglect, isolation, delinquency, and inadequate preparation for the labor market among those students. For many Asian children, the challenge of schooling can be overwhelming. Not only may American schooling contradict their own cultural system, but it may also undermine their sense of well-being and self-confidence ([Trueba & Cheng, 1993](#)) because the ethnic identity of Asian children is often based on their relation to their group. In contrast, American schooling emphasizes independence, individualism, and competition.

Asian-American children are a diverse group. Not all are superior students; some have various kinds of learning difficulties ([Shen & Mo, 1990](#)). Some lack motivation, proficiency in English, or financial resources; others have parents who do not understand the American school system because of cultural differences, language barriers, or their more immediate quest for survival ([Yao, 1988](#)). Many children, struggling with a new language and culture, drop out of school. Further, the majority of Asian-American students do not reach the starry heights of the celebrated few, and an alarming number are pushing themselves to the emotional brink in their quest for excellence ([Brand, 1987](#); [Trueba & Cheng, 1993](#)).

ASIAN-AMERICAN CHILDREN: HOW DO THEY DIFFER FROM OTHER CHILDREN?

Although diversity among Asian-American groups makes overall descriptions difficult, there are general cultural characteristics, values, and practices shared by most Asians, particularly East and Southeast Asians, that are different from the mainstream American culture.

In many East and Southeast Asian cultures, Confucian ideals, which include respect for elders, deferred gratification, and discipline, are a strong influence. Most Asian-American parents teach their children to value educational achievement, respect authority, feel responsibility for relatives, and show self control. Asian-American parents tend to view school failure as a lack of will, and to address this problem by increasing parental restrictions. Asian-American children tend to be more dependent, conforming and willing to place family welfare over individual wishes than are other American children.

Teachers in Asian culture are accorded a higher status than teachers in the United States. Asian-American children may be confused by the informality between American teachers and students and expect considerable structure and organization. Asian children tend to need reinforcement from teachers, and work more efficiently in a well-structured, quiet environment ([Baruth & Manning, 1992](#)).

Self-effacement is a trait traditionally valued in many Asian cultures. Asian children tend to wait to participate, unless otherwise requested by the teacher. Having attention drawn to oneself, for example, having one's name put on the board for misbehaving, can bring considerable distress. Many Asian children have been socialized to listen more than speak, to speak in a soft voice, and to be modest in dress and behavior.

HOW CAN TEACHERS HELP ASIAN-AMERICAN CHILDREN?

Teachers can adopt practices to address problems that relate to their unfamiliarity with Asian-American cultures and to the differences that exist in Asian-American populations. When developing curriculum and instruction that are developmentally appropriate, culturally sensitive, and methodologically adaptable, teachers should:

- Familiarize themselves with the values, traditions, and customs of various cultures; and learn the migratory conditions specific to each of their students' families. If possible, a home visit should be made to gain insight into the student's family life and support system ([Baruth & Manning, 1992](#)).
- Learn at least a few words of their Asian students' native languages. By showing such interest, teachers can set the tone for better communication. Classroom teachers should also collaborate with language professionals and ESL teachers ([Trueba & Cheng, 1993](#)).
- Encourage parents to help children maintain their native language at home, while the school helps the child attain proficiency in English. Teachers can also use English-proficient Asian students as interpreters with Asian parents.
- Base academic expectations on individual ability rather than on stereotypical beliefs.
- Alleviate the disjunctures Asian children may experience between school and home. For example, while a student may be told at school to challenge others' views, the same child may be told at home to be quiet and not challenge authority. To avoid such conflicts, teachers can organize classroom activities around naturalistic interactions that permit the child to take the lead and to build upon modeling.
- Consider peer teaching. Asian-American children who are not fluent in English may feel threatened by having to answer questions in front of the whole class. Peer tutoring can be an effective means of engaging these children in activities that foster language skills.
- Utilize the student's natural support system, including family, friends, and the community. Know who makes the decisions about education in the family, who provides care for the child after school, and, when applicable, who provides translation for the family.
- In planning instruction and activities, avoid assumptions about what the children know. For example, not all children have experienced a birthday party.
- Learn about the Asian population in their school district. Teachers

can encourage parents to assist one another in serving as facilitators and informants ([Trueba & Cheng, 1993](#)), and can work with a network of Asian parents, encouraging parents established in the community to provide assistance for new arrivals.

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Multicultural Education

Development, Dimensions, and Challenges

By James A. Banks

Mr. Banks focuses on the development and attainments of multicultural education -- a story that needs to be told, he says, "for the sake of balance, scholarly integrity, and accuracy."



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The bitter debate over the literary and historical canon that has been carried on in the popular press and in several widely reviewed books has overshadowed the progress that has been made in multicultural education during the last two decades. The debate has also perpetuated harmful misconceptions about theory and practice in multicultural education. Consequently, it has heightened racial and ethnic tension and trivialized the field's remarkable accomplishments in theory, research, and curriculum development. The truth about the development and attainments of multicultural education needs to be told for the sake of balance, scholarly integrity, and accuracy. But if I am to reveal the truth about multicultural education, I must first identify and debunk some of the widespread myths and misconceptions about it.

Multicultural education is for the others. One misconception about multicultural education is that it is an entitlement program and curriculum movement for African Americans, Hispanics, the poor, women, and other victimized groups. [1] The major theorists and researchers in multicultural education agree that the movement is designed to restructure educational institutions so that all students, including middle-class white males, will acquire the knowledge, skills, and attitudes needed to function effectively in a culturally and ethnically diverse nation and world. [2] Multicultural education, as its major architects have conceived it during the last decade, is not an ethnic- or gender-specific movement. It is a movement designed to empower all students to become knowledgeable, caring, and active citizens in a deeply troubled and ethnically polarized nation and world.

The claim that multicultural education is only for people of color and for the disenfranchised is one of the most pernicious and damaging misconceptions with which the movement has had to cope. It has caused intractable problems and has haunted multicultural education since its inception. Despite all that has been written and spoken about multicultural education being for all students, the image of multicultural education as an entitlement program for the "others" remains strong and vivid in the public imagination, as well as in the hearts and minds of many teachers and administrators. Teachers who teach in predominantly white schools and districts often state that they don't have a program or plan for multicultural education because they have few African American, Hispanic, or Asian American students.

When educators view multicultural education as the study of the "others," it is marginalized and held apart from mainstream education reform. Several critics of multicultural education, such as Arthur Schlesinger, John Leo, and Paul Gray, have perpetuated the idea that multicultural education is the study of the "other" by defining it as synonymous with Afrocentric education. [3] The history of intergroup education teaches us that only when education reform related to diversity is viewed as essential for all students -- and as promoting the broad public interest -- will it have a reasonable chance of becoming institutionalized in the nation's schools, colleges, and universities. [4] The intergroup education movement of the 1940s and 1950s failed in large part because intergroup educators were never able to persuade mainstream educators to believe that the approach was needed by and designed for all students. To its bitter but quiet end, mainstream educators viewed intergroup education as something for schools with racial problems and as something for "them" and not for "us."

Multicultural education is opposed to the Western tradition. Another harmful misconception about multicultural education has been repeated so

often by its critics that many people take it as self-evident. This is the claim that multicultural education is a movement that is opposed to the West and to Western civilization. Multicultural education is not anti-West, because most writers of color - such as Rudolfo Anaya, Paula Gunn Allen, Maxine Hong Kingston, Maya Angelou, and Toni Morrison - are Western writers. Multicultural education itself is a thoroughly Western movement. It grew out of a civil rights movement grounded in such democratic ideals of the West as freedom, justice, and equality. Multicultural education seeks to extend to all people the ideals that were meant only for an elite few at the nation's birth.

Although multicultural education is not opposed to the West, its advocates do demand that the truth about the West be told, that its debt to people of color and women be recognized and included in the curriculum, and that the discrepancies between the ideals of freedom and equality and the realities of racism and sexism be taught to students. Reflective action by citizens is also an integral part of multicultural theory. Multicultural education views citizen action to improve society as an integral part of education in a democracy; it links knowledge, values, empowerment, and action. Multicultural education is also postmodern in its assumptions about knowledge and knowledge construction; it challenges positivist assumptions about the relationships between human values, knowledge, and action.

Positivists, who are the intellectual heirs of the Enlightenment, believe that it is possible to structure knowledge that is objective and beyond the influence of human values and interests. Multicultural theorists maintain that knowledge is positional, that it relates to the knower's values and experiences, and that knowledge implies action. Consequently, different concepts, theories, and paradigms imply different kinds of actions. Multiculturalists believe that, in order to have valid knowledge, information about the social condition and experiences of the knower are essential.

A few critics of multicultural education, such as John Leo and Dinesh D'Souza, claim that multicultural education has reduced or displaced the study of Western civilization in the nation's schools and colleges. However, as Gerald Graff points out in his welcome book *Beyond the Culture Wars*, this claim is simply not true. Graff cites his own research at the college level and that of Arthur Applebee at the high school level to substantiate his conclusion that European and American male authors -- such as Shakespeare, Dante, Chaucer, Twain, and Hemingway -- still dominate the required reading lists in the nation's high schools and colleges.^[5] Graff found that in the cases he examined, most of the books by authors of color were optional rather than required reading. Applebee found that, of the 10 book-length works most frequently required in the high school grades, only one title was by a female author (Harper Lee's *To Kill a Mockingbird*), and not a single work was by a writer of color. Works by Shakespeare, Steinbeck, and Dickens headed the list.

Multicultural education will divide the nation. Many of its critics claim that multicultural education will divide the nation and undercut its unity. Schlesinger underscores this view in the title of his book, *The Disuniting of America: Reflections on a Multicultural Society*. This misconception is based partly on questionable assumptions about the nature of U.S. society and partly on a mistaken understanding of multicultural education. The claim that multicultural education will divide the nation assumes that the nation is already united. While we are one nation politically, sociologically our nation is deeply divided along lines of race, gender, and class. The current debate about admitting gays into the military underscores another deep division in our society.

Multicultural education is designed to help unify a deeply divided nation rather than to divide a highly cohesive one. Multicultural education

supports the notion of *e pluribus unum* -- out of many, one. The multiculturalists and the Western traditionalists, however, often differ about how the *unum* can best be attained. Traditionally, the larger U.S. society and the schools tried to create unity by assimilating students from diverse racial and ethnic groups into a mythical Anglo-American culture that required them to experience a process of self-alienation. However, even when students of color became culturally assimilated, they were often structurally excluded from mainstream institutions.

Curriculum changes linked with issues related to race evoke primordial feelings and reflect the racial crisis.

The multiculturalists view *e pluribus unum* as an appropriate national goal, but they believe that the *unum* must be negotiated, discussed, and restructured to reflect the nation's ethnic and cultural diversity. The reformulation of what it means to be united must be a process that involves the participation of diverse groups within the nation, such as people of color, women, straights, gays, the powerful, the powerless, the young, and the old. The reformulation must also involve power sharing and participation by people from many different cultures who must reach beyond their cultural and ethnic borders in order to create a common civic culture that reflects and contributes to the well-being of all. This common civic culture will extend beyond the cultural borders of any single group and constitute a civic "borderland" culture.

In *Borderlands*, Gloria Anzaldua contrasts cultural borders and calls for a weakening of the former in order to create a shared borderland culture in which people from many different cultures can interact, relate, and engage in civic talk and action. Anzaldua states that "borders are set up to define the places that are safe and unsafe, to distinguish us from them. A border is a dividing line, a narrow strip along a steep edge. A borderland is a vague and undetermined place created by the residue of an unnatural boundary. It is in a constant state of transition." [\[6\]](#)

Multicultural Education has Made Progress

While it is still on the margins rather than in the center of the curriculum in most schools and colleges, multicultural context has made significant inroads into both the school and the college curricula within the last two decades. The truth lies somewhere between the claim that no progress has been made in infusing the school and college curricula with multiethnic content and the claim that such content has replaced the European and American classics.

In the elementary and high schools, much more ethnic content appears in social studies and language arts textbooks today than was the case 20 years ago. In addition, some teachers assign works written by authors of color along with the more standard American classics. In his study of book-length works used in the high schools, Applebee concluded that his most striking finding was how similar present reading lists are to past ones and how little change has occurred. However, he did note that many teachers use anthologies as a mainstay of their literature programs and that 21% of the anthology selections were written by women and 14% by authors of

color.^[7]

More classroom teachers today have studied the concepts of multicultural education than at any previous point in our history. A significant percentage of today's classroom teachers took a required teacher education course in multicultural education when they were in college. The multicultural education standard adopted by the National Council for Accreditation of Teacher Education in 1977, which became effective in 1979, was a major factor that stimulated the growth of multicultural education in teacher education programs. The standard stated: "The institution gives evidence of planning for multicultural education in its teacher education curricula including both the general and professional studies components."^[8]

The market for teacher education textbooks dealing with multicultural education is now a substantial one. Most major publishers now have at least one text in the field. Textbooks in other required courses, such as educational psychology and the foundations of education, frequently have separate chapters or a significant number of pages devoted to examining concepts and developments in multicultural education.

Some of the nation's leading colleges and universities, such as the University of California at Berkeley, the University of Minnesota, and Stanford University, have either revised their general core curriculum to include ethnic content or have established an ethnic studies course requirement. The list of universities with similar kinds of requirements grows longer each year. However, the transformation of the traditional canon on college and university campuses has often been bitter and divisive. All changes in curriculum come slowly and painfully to university campuses, but curriculum changes that are linked with issues related to race evoke primordial feelings and reflect the racial crisis in American society. For example, at the University of Washington a bitter struggle ended with the defeat of the ethnic studies requirement.

Changes are also coming to elementary and high school textbooks, as Jesus Garcia points out elsewhere in this special section of the *Kappan*. I believe that the demographic imperative is the major factor driving the changes in school textbooks. The color of the nation's student body is changing rapidly. Nearly half (about 45.5%) of the nation's school-age youths will be young people of color by 2020.^[9] Black parents and brown parents are demanding that their leaders, their images, their pain, and their dreams be mirrored in the textbooks that their children study in school.

Textbooks have always reflected the myths, hopes, and dreams of people with money and power. As African Americans, Hispanics, Asians, and women become more influential, textbooks will increasingly reflect their hopes, dreams, and disappointments. Textbooks will have to survive in the marketplace of a browner America. Because textbooks still carry the curriculum in the nation's public schools, they will remain an important focus for multicultural curriculum reformers.

The Dimensions of Multicultural Education

One of the problems that continues to plague the multicultural education movement, both from within and without, is the tendency of teachers, administrators, policy makers, and the public to oversimplify the concept. Multicultural education is a complex and multidimensional concept, yet media commentators and educators alike often focus on only one of its

many dimensions. Some teachers view it only as the inclusion of content about ethnic groups into the curriculum; others view it as an effort to reduce prejudice; still others view it as the celebration of ethnic holidays and events. After I made a presentation in a school in which I described the major goals of multicultural education, a math teacher told me that what I said was fine and appropriate for language arts and social studies teachers but that it had nothing to do with him. After all, he said, math was math, regardless of the color of the kids.

This reaction on the part of a respected teacher caused me to think more deeply about the images of multicultural education that had been created by the key actors in the field. I wondered whether we were partly responsible for this teacher's narrow conception of multicultural education as merely content integration. It was in response to such statements by classroom teachers that I conceptualized the dimensions of multicultural education. I will use the following five dimensions to describe the field's major components and to highlight important developments within the last two decades:

1. content integration,
2. the knowledge construction process,
3. prejudice reduction,
4. an equity pedagogy, and
5. an empowering school culture and social structure. [\[10\]](#)

I will devote most of the rest of this article to the second of these dimensions.

Content Integration

Content integration deals with the extent to which teachers use examples, data, and information from a variety of cultures and groups to illustrate the key concepts, principles, generalizations, and theories in their subject area or discipline. In many school districts as well as in popular writing, multicultural education is viewed almost solely as content integration. This narrow conception of multicultural education is a major reason why many teachers in such subjects as biology, physics, and mathematics reject multicultural education as irrelevant to them and their students.

In fact, this dimension of multicultural education probably has more relevance to social studies and language arts teachers than it does to physics and math teachers. Physics and math teachers can insert multicultural content into their subjects -- e.g., by using biographies of physicists and mathematicians of color and examples from different cultural groups. However, these kinds of activities are probably not the most important multicultural tasks that can be undertaken by science and math teachers. Activities related to the other dimensions of multicultural education, such as the knowledge construction process, prejudice reduction, and an equity pedagogy, are probably the most fruitful areas for the multicultural involvement of science and math teachers.

Knowledge Construction

The knowledge construction process encompasses the procedures by which social, behavioral, and natural scientists create knowledge in their disciplines. A multicultural focus on knowledge construction includes discussion of the ways in which the implicit cultural assumptions, frames of

reference, perspectives, and biases within a discipline influence the construction of knowledge. An examination of the knowledge construction process is an important part of multicultural teaching. Teachers help students to understand how knowledge is created and how it is influenced by factors of race, ethnicity, gender, and social class.

Within the last decade, landmark work related to the construction of knowledge has been done by feminist social scientists and epistemologists, as well as by scholars in ethnic studies. Working in philosophy, and sociology, Sandra Harding, Lorraine Code, and Patricia Hill Collins have done some of the most important work related to knowledge construction [11]. This ground-breaking work, although influential among scholars and curriculum developers, has been overshadowed in the popular media by the heated debates about the canon. These writers and researchers have seriously challenged the claims made by the positivists that knowledge can be value-free and they have described the ways in which knowledge claims are influenced by the gender and ethnic characteristics of the knower. Those scholars argue that the human interests and value assumptions of those who create knowledge should be identified, discussed, and examined.

Code states that the sex of the knower is epistemologically significant because knowledge is both subjective and objective. She maintains that both aspects should be recognized and discussed. Collins, an African American sociologist, extends and enriches the works of writers such as Code and Harding by describing the ways in which race and gender interact to influence knowledge construction. Collins calls the perspective of African American women the perspective of the "outsider within." She writes, "As outsiders within, Black women have a distinct view of the contradictions between the dominant group's actions and ideologies." [12]

Curriculum theorists and developers in multicultural education are applying to the classroom the work being done by the feminist and ethnic studies epistemologists. In *Transforming Knowledge*, Elizabeth Minnich, a professor of philosophy and women's studies, has analyzed the nature of knowledge and described how the dominant tradition, through such logical errors as faulty generalization and circular reasoning, has contributed to the marginalization of women. [13]

I have identified five types of knowledge and described their implications for multicultural teaching. [14] Teachers need to be aware of the various types of knowledge so that they can structure a curriculum that helps students to understand each type. Teachers also need to use their own cultural knowledge and that of their students to enrich teaching and learning. The types of knowledge I have identified and described are:

1. personal/cultural,
2. popular,
3. mainstream academic,
4. transformative, and
5. school. (I will not discuss school knowledge in this article.)

Personal/cultural knowledge consists of the concepts, explanations, and interpretations that students derive from personal experiences in their homes, families, and community cultures. Cultural conflict occurs in the classroom because much of the personal/cultural knowledge that students from diverse cultural groups bring to the classroom is inconsistent with school knowledge and with the teacher's personal and cultural knowledge. For example, research indicates that many African American and Mexican American students are more likely to experience academic success in cooperative rather than in competitive learning environments. [15] Yet the typical school culture is highly competitive, and children of color may

experience failure if they do not figure out the implicit rules of the school culture. [\[16\]](#)

The popular knowledge that is institutionalized by the mass media and other forces that shape the popular culture has a strong influence on the values, perceptions, and behavior of children and young people. The messages and images carried by the media, which Carlos Cortes calls the societal curriculum, [\[17\]](#) often reinforce the stereotypes and misconceptions about racial and ethnic groups that are institutionalized within the larger society.

Of course, some films and other popular media forms do make positive contributions to racial understanding. *Dances with Wolves*, *Glory*, and *Malcolm X* are examples. However, there are many ways to view such films, and both positive and negative examples of popular culture need to become a part of classroom discourse and analysis. Like all human creations, even these positive films are imperfect. The multiculturally informed and sensitive teacher needs to help students view these films, as well as other media productions, from diverse cultural, ethnic, and gender perspectives.

The concepts, theories, and explanations that constitute traditional Western-centric knowledge in history and in the social and behavioral sciences constitute mainstream academic knowledge. Traditional interpretations of U.S. history -- embodied in such headings as "The European Discovery of America" and "The Westward Movement" - are central concepts in mainstream academic knowledge.

Mainstream academic knowledge is established within mainstream professional associations, such as the American Historical Association and the American Psychological Association. It provides the interpretations that are taught in U.S. colleges and universities.

The literary legacy of mainstream academic knowledge includes such writers as Shakespeare, Dante, Chaucer, and Aristotle. Critics of multicultural education, such as Schlesinger, D'Souza, and Leo, believe that mainstream academic knowledge in the curriculum is being displaced by the new knowledge and interpretations that have been created by scholars working in women's studies and in ethnic studies. However, mainstream academic knowledge is not only threatened from without but also from within. Postmodern scholars in organizations such as the American Historical Association, the American Sociological Association, and the American Political Science Association are challenging the dominant positivist interpretations and paradigms within their disciplines and creating alternative explanations and perspectives.

Transformative academic knowledge challenges the facts, concepts, paradigms, themes, and explanations routinely accepted in mainstream academic knowledge. Those who pursue transformative academic knowledge seek to expand and substantially revise established canons, theories, explanations, and research methods. The transformative research methods and theory that have been developed in women's studies and in ethnic studies since the 1970s constitute, in my view, the most important developments in social science theory and research in the last 20 years.

It is important for teachers and students to realize, however, that transformative academic scholarship has a long history in the United States and that the current ethnic studies movement is directly linked to an earlier ethnic studies movement that emerged in the late 1800s. [\[18\]](#) George Washington Williams published volume I of the first history of African Americans in 1882 and the second volume in 1883. Other important works published by African American transformative scholars in times past

included works by W. E. B. Du Bois, Carter Woodson, Horace Mann Bond, and Charles Wesley.^[19]

The works of these early scholars in African American studies, which formed the academic roots of the current multicultural education movement when it emerged in the 1960s and 1970s, were linked by several important characteristics. Their works were transformative because they created data, interpretations, and perspectives that challenged those that were established by white, mainstream scholarship. The work of the transformative scholars presented positive images of African Americans and refuted stereotypes that were pervasive within the established scholarship of their time.

Although they strove for objectivity in their works and wanted to be considered scientific researchers, these transformative scholars viewed knowledge and action as tightly linked and became involved in social action and administration themselves. Du Bois was active in social protest and for many years was the editor of *Crisis*, an official publication of the National Association for the Advancement of Colored People. Woodson cofounded the Association for the Study of Negro (now Afro-American) Life and History, founded and edited the *Journal of Negro History*, edited the *Negro History Bulletin* for classroom teachers, wrote school and college textbooks on Negro history, and founded Negro History Week (now Afro-American History Month).

Transformative academic knowledge has experienced a renaissance since the 1970s. Only a few of the most important works can be mentioned here because of space. Martin Bernal, in an important two-volume work, *Black Athena*, has created new interpretations about the debt that Greece owes to Egypt and Phoenicia. Before Bernal, Ivan Van Sertima and Cheikh Anta Diop also created novel interpretations of the debt that Europe owes to Africa. In two books, *Indian Givers* and *Native Roots*, Jack Weatherford describes Native American contributions that have enriched the world.

Ronald Takaki in several influential books, such as *Iron Cages: Race and Culture in 19th-Century America* and *Strangers from a Different Shore: A History of Asian Americans*, has given us new ways to think about the ethnic experience in America. The literary contribution to transformative scholarship has also been rich, as shown by *The Signifying Monkey: A Theory of African-American Literary Criticism*, by Henry Louis Gates, Jr.; *Long Black Song: Essays in Black American Literature and Culture*, by Houston Baker, Jr.; and *Breaking Ice: An Anthology of Contemporary African-American Fiction*, edited by Terry McMillan.

A number of important works in the transformative tradition that interrelate race and gender have also been published since the 1970s. Important works in this genre include *Unequal Sisters: A Multicultural Reader in U.S. Women's History*, edited by Carol Ellen DuBois and Vicki Ruiz; *Race, Gender, and Work: A Multicultural Economic History of Women in the United States*, by Teresa Amott and Julie Matthaei; *Labor of Love, Labor of Sorrow: Black Women, Work, and the Family from Slavery to the Present*, by Jacqueline Jones; and *The Forbidden Stitch: An Asian American Women's Anthology*, edited by Shirley Geok-lin Lim, Mayumi Tsutakawa, and Margarita Donnelly.

The Other Dimensions

The "prejudice reduction" dimension of multicultural education focuses on the characteristics of children's racial attitudes and on strategies that can be used to help students develop more positive racial and ethnic attitudes. Since the 1960s, social scientists have learned a great deal about how racial attitudes in children develop and about ways in which educators can

design interventions to help children acquire more positive feelings toward other racial groups. I have reviewed that research in two recent publications and refer *Kappan* readers to them for a comprehensive discussion of this topic. [\[20\]](#)

This research tells us that by age 4 African American, white, and Mexican American children are aware of racial differences and show racial preferences favoring whites. Students can be helped to develop more positive racial attitudes if realistic images of ethnic and racial groups are included in teaching materials in a consistent, natural, and integrated fashion. Involving students in vicarious experiences and in cooperative learning activities with students of other racial groups will also help them to develop more positive racial attitudes and behaviors.

An *equity pedagogy* exists when teachers use techniques and teaching methods that facilitate the academic achievement of students from diverse racial and ethnic groups and from all social classes. Using teaching techniques that cater to the learning and cultural styles of diverse groups and using the techniques of cooperative learning are some of the ways that teachers have found effective with students from diverse racial, ethnic, and language groups. [\[21\]](#)

An *empowering school culture and social structure* will require the restructuring of the culture and organization of the school so that students from diverse racial, ethnic, and social-class groups will experience educational equality and a sense of empowerment. This dimension of multicultural education involves conceptualizing the school as the unit of change and making structural changes within the school environment. Adopting assessment techniques that are fair to all groups, doing away with tracking, and creating the belief among the staff members that all students can learn are important goals for schools that wish to create a school culture and social structure that are empowering and enhancing for a diverse student body.

Multicultural Education and the Future

The achievements of multicultural education since the late Sixties and early Seventies are noteworthy and should be acknowledged. Those who have shaped the movement during the intervening decades have been able to obtain wide agreement on the goals of and approaches to multicultural education. Most multiculturalists agree that the major goal of multicultural education is to restructure schools so that all students will acquire the knowledge, attitudes, and skills needed to function in an ethnically and racially diverse nation and world. As is the case with other interdisciplinary areas of study, debates within the field continue. These debates are consistent with the philosophy of a field that values democracy and diversity. They are also a source of strength.

Multicultural education is being implemented widely in the nation's schools, colleges, and universities. The large number of national conferences, school district workshops, and teacher education courses in multicultural education are evidence of its success and perceived importance. Although the process of integration of content is slow and often contentious, multicultural content is increasingly becoming a part of core courses in schools and colleges. Textbook publishers are also integrating ethnic and cultural content into their books. and the pace of such integration is increasing.

Despite its impressive successes, however, multicultural education faces serious challenges as we move toward the next century. One of the most serious of these challenges is the highly organized, well-financed attack by the Western traditionalists who fear that multicultural education will transform America in ways that will result in their own disempowerment. Ironically, the successes that multicultural education has experienced during the last decade have played a major role in provoking the attacks.

The debate over the canon and the well-orchestrated attack on multicultural education reflect an identity crisis in American society. The American identity is being reshaped, as groups on the margins of society begin to participate in the mainstream and to demand that their visions be reflected in a transformed America. In the future, the sharing of power and the transformation or identity required to achieve lasting racial peace in America may be valued rather than feared, for only in this way will we achieve national salvation.

Notes

¹ Nathan Glazer. "In Defense of Multiculturalism," *New Republic*, 2 September 1991, pp. 18-22; and Dinesh D'Souza, "Illiberal Education," *Atlantic*, March 1991, pp. 51-79.

² James A. Banks, *Multiethnic Education: Theory and Practice*, 3rd ed. (Boston: Allyn and Bacon, 1994); James A. Banks and Cherry A. McGee Banks, eds., *Multicultural Education: Issues and Perspectives*, 2nd ed. (Boston: Allyn and Bacon, 1993); and Christine E. Sleeter and Carl A. Grant, *Making Choices for Multicultural Education: Five Approaches to Race, Class, and Gender* (Columbus, Ohio: Merrill, 1988).

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James A. Banks is a professor of education and director of the Center for Multicultural Education at the University of Washington, Seattle. He is editor of the Handbook of Research on Multicultural Education (Macmillan, forthcoming).

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The Education of Linguistically and Culturally Diverse Students: Effective Instructional Practices

by [Eugene E. Garcia](#)

In this paper, Garcia summarizes research on educationally effective practices used with linguistically and culturally diverse students in selected areas in the United States. These descriptive studies identified specific schools and classrooms whose Latino, American Indian, Asia, and Southeast Asian language minority students were academically successful. The studies identified a number of common attributes, including an emphasis on functional communication between teachers and students and among fellow students; thematic organization of instruction of basic skills and academic content; and systematic progression from having students write in their native language to writing in English. The author concluded that effective practices utilize instructional strategies that acknowledge, respect, and build up the language and culture of the home. 1991 report from National Center for Research on Cultural Diversity and Second Language Learning [ENC-009760](#)

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The education of linguistically and culturally diverse students: effective instructional practices

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Bilingual education. Classroom management. Cultural awareness. Cultural diversity. English as a second language (ESL). Equity. Instructional improvement. Instructional issues. Multicultural approaches.

Resource Type:

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Media Type:

Print material.

Abstract:

This paper summarizes research that documents educationally effective practices used with linguistically and culturally diverse students in selected areas in the United States. These descriptive studies identified specific schools and classrooms whose Latino, American Indian, Asia, and Southeast Asian language minority students were academically successful. The case study approach adopted by these studies included examination of preschool, elementary, and high school classrooms. Teachers, principals, parents, and students were interviewed and specific classroom observations were conducted to assess the dynamics of the instructional process. These studies identified a number of common attributes in the instructional organization of the classrooms studied. Some of these factors included an emphasis on functional communication between teachers



and students and among fellow students; the instruction of basic skills and academic content was consistently organized around thematic units; and students progress systematically from writing in the native language to writing in English, making the transition without pressure from the teacher to do so. The author concluded that linguistically and culturally diverse students can be served effectively when they are served by instructional strategies that acknowledge, respect, and build up the language and culture of the home. (Author/LCT)

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In the Classroom with... Alice Lopez

Building a Culture Quilt

by *Julia L. Harris*

ENC Publications Team

Alice Lopez, a veteran teacher with almost 18 years of experience, calls herself a "born-again" mathematician and scientist. Her description seems fairly accurate when you look at the almost missionary zeal she brings to her current position, a one-year term with the Colorado Department of Education as the Eisenhower Math/Science Equity Programs Consultant.

Initially brought on board to provide support for facilitating programs such as Family Math, Family Science, and GEMS, Lopez has spent most of her time traveling around the state helping districts and schools design programs that serve limited English proficient and special needs students. She has also been active with the Title I program and has worked extensively with migrant parents, helping them to become empowered and proactive in their children's education. She is currently working to send a core group of these parents out to California for some formal training, so they can return to their own communities and pass on what they have learned.

It is an exciting and challenging position, and Lopez is encouraged by the work she is doing. And yet, her heart belongs to a suburban school in Thornton, near Denver, where a classroom of bilingual, special education first graders waits for her return. "Even as I think about them, I picture their faces and names, and I get all warm and fuzzy," she says. "We work very, very hard; I have very high expectations of all my students, and I know that they are capable of doing great things."

The Ties that Bind

Western Hills Elementary serves approximately 600 K-5 students. The mobility rate is high, and the student population is diverse: Lopez estimates a minority population of 36%, which includes Native American, Hispanic, African American, and Asian. Add to these figures a class of bilingual special education students, and Lopez has her share of challenges. Judging from her recent acceptance of a Milliken Award, an honor bestowed on four teachers each year based on their commitment to education, she is more than able to meet that challenge.

"I really do believe that the best way to educate the children is to keep them all as involved in the 'mainstream' as possible," she explains. "I think children can really learn from one another. We all have strengths and we all have weaknesses, and I think that if we can build a kind of family environment, then we all can learn and benefit from that experience."


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Building that environment begins from day one, when she reads from the book *Who Belongs Here: An American Story* by Margy Burns Knight and Anne Sibley O'Brien. After reading the story, Lopez invites the children to talk about where they come from and where their roots are. She then sends them home with an 8x10 piece of construction paper and instructions to have their parents help them create a picture describing their history and who their ancestors were, including any personal stories or historical facts. "I've had some beautiful artwork turned in on those little pieces of construction paper," she notes. "As the students bring them in, we use a three-hole punch and actually piece them together, like a quilt. That becomes our display out in our hall, so that everyone can see who we are and where we came from."

In addition to this "culture quilt," Lopez and her students make a variety of different quilts throughout the year and use them to learn patterning, colors, and other activities. The quilts can easily be integrated into many instructional settings, and the children enjoy the fact that the focus is on them. "The children are my natural resources," Lopez relates. "We use our selves as the theme of whatever topic we're writing about. Whenever possible, I try to get Polaroids of them-I've found that any time you can get a picture of children in their interactions, it always makes for a lot of discussion." She laughs, "I have a small fortune invested in Polaroid!"

Modeling Success in Math and Science

Not only do the children see reflections of themselves in the many photographs taken of them, but they also have the opportunity to see themselves in the role models Lopez brings in from the business and professional community. "I intentionally seek out people of color or ethnic minority, so the children can begin to envision a possible future for themselves," she says. "When I bring in the role models, I specifically ask them to tell the kids how they use math or science in their everyday job, and some of the obstacles they had to overcome in order to pursue their career goals."

The end result of these visits is that children no longer ask Lopez why they are being asked to participate in math and science activities. They no longer wonder when they are going to use the skills they are being taught, because they now have a frame of reference as to how that knowledge can have practical application in the real world-by people who look like they do.

One of the most exciting results of using a multicultural approach in math and science is the increased level of respect and collaboration between students. Lopez has noticed that the children have begun to assume responsibility not only for their own learning, but have also been taking a more collaborative role in the learning of others. "I think that any time you can validate to children who they are, what talents they possess, what knowledge and information they have to share, it enhances everyone's learning," Lopez notes. "That's how we build mutual respect. The more we can show children that we respect and honor the talents they have, the better off we all are."

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In the Classroom with... Clara Southerland

Multicultural Education: Not Just a Fairy Tale

*by Julia L. Harris**ENC Publications Team*

At first glance, Yale, Oklahoma, may not be the kind of place that comes to mind when the issue of multicultural education is raised. Nestled between the larger cities of Tulsa and Stillwater, Yale is a rural community with a population of approximately 1,500; its elementary school serves a largely white student body, more than half of which qualifies for free or reduced price lunches. The whole question of multicultural education might even seem irrelevant for these children-except, perhaps, to third-grade teacher Clara Southerland.

"It's so important to have some basic understanding and respect for different cultures," she says. "Students need to have exposure to the differences among people, and to celebrate those differences. They need to know that, while we are different, there are so many things about us that are basically the same: family, the things we value as a culture."

Cinderella Goes to School

Southerland meets the challenges posed by her non-diverse classroom by taking something with which all of her students are familiar-the Cinderella story-and showing how this myth is treated around the world.

"Every culture in the world has some sort of a Cinderella story," she notes. "What I do is read the stories with the children and then we discuss what is the same and what is different."

The oldest story, it turns out, originated in China, while the one many people think of -the "Disney version"-actually comes from France. In all the stories, the theme remains fairly constant: there is a main character who is basically good but who is gravely mistreated by those around her, and who in the end is identified and rescued through some sort of magical item, such as a ring or a shoe. There are even Cinderella stories, such as the one from Ireland, where the main character is a boy rather than a girl-a fact that Southerland's male students particularly enjoy. "It amazes my students-and it amazes adults when I do presentations to teacher and parent groups-about how many different Cinderellas there are in the world," she laughs.

Building on the interest generated by the multicultural Cinderella stories, Southerland has created a unit she calls "Cinderella: The Clue in the Shoe," in which the children bring in shoes from home and use them in a variety of math and science activities. The types of shoes the students bring in can vary-some bring in baby shoes, while others bring track shoes-but all the shoes have a story to tell, and the children sit in a circle and share those stories with one

another.



Students practice sorting their shoes

"Then I have them put the shoes in a pile and one of the children sorts them by attributes," Southerland says. "We create Venn diagrams with them, and they measure with them and graph them. We trace the shoe on 1-inch graph paper, find its area, and look for different shapes and forms that would have the same approximate area. We also find the proportion of approximate shoe lengths to the student's height."

The Cinderella theme reaches into science learning as well. Students read Karen Louisa Batt's book *On Your Feet*, which talks about how the kinds of shoes people wear are determined in part by the work that they do and by the resources available to them. The class also takes a look at animal tracks, determining what the tracks indicate about the kind of animal that made them.



Finding shapes with the same area as their shoe prints

For older children, as well as for the teacher workshops she leads, Southerland

has developed a mystery based on shoe prints. "I leave footprints around the room and tell them that someone broke in and stole something," she explains. "The only clues they left behind are their shoe prints and a shoe. They try to determine if the person was walking or running, how tall the person was, things like that. A lot of them put their own feet over the footprints and decide how tall the person was by comparing it with themselves, which is 'using prior knowledge' and all those skills you want children to develop."

Passport to a Bigger World

Southerland takes many opportunities to explore multicultural themes in her teaching. Earlier this year, her class was interested in studying volcanoes, so she introduced them to the volcanoes of Hawaii and the cultural legend of Pelee, the goddess whose anger was believed to cause the mountains to erupt. Future plans for the class include a unit on the Pacific Rim, an area her class seemed interested in after the school's annual multicultural open house.

As a result of incorporating multicultural themes into many areas of the curriculum, Southerland says she has noticed a greater sensitivity in her students, particularly in how they interact with one another. "It happens in many small ways," she muses, describing a situation in which a student brought in Halloween candy for the class and made special allowances for a classmate who was a Jehovah's Witness. "The treats were in decorated bags, so he took the candy out of the Halloween bag and put it into a plain one so that this girl could have it."

In another example, she cites how the students bring a broader cultural perspective to their reading: "I hear them making connections, saying 'Look how those people felt in that situation,' and how they were made to feel less of themselves as humans-and how they rose above that."

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This teacher's guide, developed for secondary grades as part of the TEACHER'S GUIDE WORLD RESOURCES series, contains seven lessons that help students

examine global trends in urbanization. Each book in the series offers a multidisciplinary unit that draws on skills and knowledge from geography, civics, social studies, science, mathematics, and global or multicultural studies.

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2. Linking your Y with the world : an instructors guide for global environment and development education

Date: 1993 **Grade(s):** 5 - 12 **Cost:** \$15.00**ENC#:** 008560

This curriculum guide, developed for K through 12 instructors at resident outdoor environmental education centers, is designed to tackle tough issues through

familiar and realistic outdoor teaching formulas. It is divided into two sections, one covering cultural awareness and the other concerned with issues about developing countries, and provides lesson plans and activities that attempt to incorporate international ideas, critical thinking skills, and problem solving experiences into already existing programs.

<http://www.enc.org/resources/records/0,1240,008560,00.shtm>
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3. Learning activities from the history of mathematics

Date: 1994 **Grade(s):** 9 - 12 **Cost:** \$25.95**ENC#:** 006337

This book is intended for use by teachers hoping to incorporate in their classroom mathematics with its history. It is not comprehensive, but is meant to serve as a guide of ideas that teachers can use or modify for their particular needs.

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4. **Multicultural mathematics : interdisciplinary, cooperative learning activities**



Date: 1993 **Grade(s):** 5 - 9 **Cost:** \$21.95

ENC#: 003787

This reproducible blackline master book of 55 multicultural activities for mathematics is designed as a supplement and enrichment for the mathematics curriculum of the middle and secondary grades. The authors propose to expose students to the mathematics practices of other peoples of the world; to show students how mathematics is applied in science, social studies, art, and sports; and to develop the critical thinking skills of students.

<http://www.enc.org/resources/records/0,1240,003787,00.shtm>
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5. **Creating culturally responsive classrooms**



Date: 1997 **Grade(s):** K - 12 **Cost:** \$17.95

ENC#: 011169

This book, developed for K to 12 teachers as part of the Psychology in the Classroom series, explores the different cultures, learning styles, and styles of behavior of students who are identified as African American, American Indian, Mexican American, and Hmong. The series seeks to integrate theory and practice by having an academic and a practicing teacher coauthor each book.

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6. **Science timelines, a multicultural resource. Set A.**



Date: 1997 **Grade(s):** K - 3 **Cost:** \$39.00

ENC#: 011079

This kit, suitable for students in grades K to 3, contains a series of colorful posters and a matching big book designed to help children recognize and value the contributions that different cultures have made to the science and technology that we use today. The materials also highlight many of the experiences and achievements that have made each culture unique, and provide a tool for linking science with other curriculum areas.

<http://www.enc.org/resources/records/0,1240,011079,00.shtm>
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7. **Mathematics from many cultures. Level A.**



Date: 1993 **Grade:** K **Cost:** \$81.99 **ENC#:** 011167

This kit, developed for grade K as part of the MATHEMATICS FROM MANY CULTURES series, integrates multicultural studies and mathematics by encouraging children to describe and compare the attributes of a variety of familiar objects from around the world. Each kit in the series uses a Big Book and related activities to reinforce mathematics concepts and to help children see how these areas connect with a diversity of cultural backgrounds and

experiences.

<http://www.enc.org/resources/records/0,1240,011167,00.shtm>

(For more details, see [ENC Record](#).)

8. Science for all cultures : a collection of articles from NSTA's journals



Date: 1993 **Grade(s):** K - 12 **Cost:** \$16.50

ENC#: 003666

This book, designed for grades K through 12, consists of a collection of articles that provide the readers with a basic understanding of multicultural science education, its scope, implications for teacher education, individual and natural well being, and suggestions for using such an approach as an instructional process. The articles address the phenomenon of underrepresentation of female, Hispanic, Native, Asian, and African American students in science and the need to implement multiethnic and multiracial curricular instructional practices.

<http://www.enc.org/resources/records/0,1240,003666,00.shtm>

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9. Afterwards : folk and fairy tales with mathematical ever afters, Grades 3-4



Date: 1997 **Grade(s):** 3 - 4 **Cost:** \$13.95

ENC#: 009720

This workbook, for grades 3 and 4, contains nine multicultural collections of fairy tales and folk tales, along with related math activities that involve thinking skills. The tales allow children to visit every continent.

<http://www.enc.org/resources/records/0,1240,009720,00.shtm>

(For more details, see [ENC Record](#).)

10. Teaching physical science through children's literature : 20 complete lessons for elementary grades



Date: 1996 **Grade(s):** 1 - 4 **Cost:** \$19.95

ENC#: 010989

This book, developed for grades 1 to 4, offers 20 lesson plans for teaching hands-on, discovery-oriented physical science in the classroom using children's fiction and nonfiction books as an integral part of that instruction. The lessons are grouped into three sections based on the Physical Science Content Standard for Grades K to 4 from the NATIONAL SCIENCE EDUCATION STANDARDS (1995): Properties of Objects and Materials; Position and Motion of Objects; and Light, Heat, Electricity, and Magnetism.

<http://www.enc.org/resources/records/0,1240,010989,00.shtm>

(For more details, see [ENC Record](#).)

11. Keepers of the Earth : Native American stories and environmental activities for children



Date: 1989 **Grade(s):** K - 6 **Cost:** \$9.95 - \$22.95

ENC#: 000457

This book and its companion teacher's guide, developed for grades K to 6, provide a program of study on the topics of ecology and natural history. The book is a collection of Native American Indian stories and hands-on activities

that promote understanding and responsible action toward the Earth, including its people.

<http://www.enc.org/resources/records/0,1240,000457,00.shtm>

(For more details, see [ENC Record](#).)

12. **Keepers of the night : Native American stories and nocturnal activities for children**

Date: 1994 **Grade(s):** K - 6 **Cost:** \$15.95

ENC#: 000458



If followed carefully, stories and activities in this book for grades K to 6 provide a complete program of study in the important concepts and topics of astronomy, nighttime weather, and other aspects of the night sky as well as nocturnal plants and animals from habitats throughout North America. The preface provides insight into how some traditional Native American cultures perceive and relate to the world of night.

<http://www.enc.org/resources/records/0,1240,000458,00.shtm>

(For more details, see [ENC Record](#).)

13. **Keepers of the animals : Native American stories and wildlife activities for children**

Date: 1991 **Grade(s):** K - 12 **Cost:** \$9.95 - \$16.95

ENC#: 000586



This book and accompanying teachers guide, written for grades K to 6, was developed as part of the KEEPERS OF THE EARTH curriculum series that addresses topics of ecology and natural history through a collection of Native American stories drawn from the native cultures of North America, such as the Inuit, Zuni, Hopi, and Cherokee. The 24 stories are arranged under broad topical headings that include creation, celebration dances, adaptations for vision and survival, and fur, feathers, scales and skin.

<http://www.enc.org/resources/records/0,1240,000586,00.shtm>

(For more details, see [ENC Record](#).)

14. **Keepers of life : discovering plants through Native American stories and Earth activities for children**

Date: 1994 **Grade(s):** K - 9 **Cost:** \$9.95

ENC#: 008194



This book and accompanying teachers guide, written for grades K to 9, is the third in the KEEPERS OF LIFE SERIES, which is based on Native American life and contains the two earlier titles KEEPERS OF THE EARTH and KEEPERS OF THE ANIMALS. This book encourages students to be field botanists as well as ecologists.

<http://www.enc.org/resources/records/0,1240,008194,00.shtm>

(For more details, see [ENC Record](#).)

15. **Reaching all students with mathematics**

Date: 1993 **Grade(s):** K - 12 **Cost:** Out of Print

ENC#: 008513



This book is a collection of stories by precollege mathematics teachers in which they relay their attempts to reach all students. The collection was published in response to the conviction of a National Council of

Teachers of Mathematics (NCTM) task force stating that reaching all students is difficult and requires extraordinary efforts.

<http://www.enc.org/resources/records/0,1240,008513,00.shtm>

(For more details, see [ENC Record](#).)

16. Multicultural and gender equity in the mathematics classroom : the gift of diversity



Date: 1997 **Grade(s):** K - 12 **Cost:** \$29.95

ENC#: 011153

This NCTM 1997 Yearbook presents a vision of how research and classroom practices related to multicultural diversity and gender equity can enhance mathematics programs for all students regardless of their gender, race, ethnicity, or socioeconomic situation. The book contains 45 articles that provide a variety of perspectives and diverse voices that address relevant issues and offer models that exemplify the vision.

<http://www.enc.org/resources/records/0,1240,011153,00.shtm>

(For more details, see [ENC Record](#).)

17. Children of the river



Date: 1993 **Grade(s):** 6 - 9 **Cost:** \$19.95

ENC#: 001134

This series of videos, developed for broadcast on PBS, focuses on the research of several new explorers who are on the cutting edge of scientific discovery, extending the frontiers of science, nature, and environmental conservation. The goal of this series is to introduce students to science as a career possibility for their own lives.

<http://www.enc.org/resources/records/0,1240,001134,00.shtm>

(For more details, see [ENC Record](#).)

18. Native American students : including Indians



Date: 1996 **Grade(s):** K - 12 **Cost:** Out of Print

ENC#: 009981

This video and accompanying resource book, part of the MATHEMATICS AND SCIENCE FOR ALL series, are designed to show why mathematics and science education for Native Americans needs to be reformed and how Native American students would benefit from proposed changes. The series consists of three books and three videos that document the collaboration of seven mathematics and science education reform projects in Montana.

<http://www.enc.org/resources/records/0,1240,009981,00.shtm>

(For more details, see [ENC Record](#).)

19. The scientist within you. Volume 1, Experiments and biographies of distinguished women in science.



Date: 1996 **Grade(s):** 3 - 8 **Cost:** \$21.95

ENC#: 003618

This book highlights women's achievements in science and mathematics from the first century AD to the present. Included are paleontologists, geologists, astronomers, mathematicians, chemists, physicians, an entomologist, and atomic physicists from European, African

American, Native American, Mexican American and Asian cultures.
<http://www.enc.org/resources/records/0,1240,003618,00.shtm>
 (For more details, see [ENC Record](#).)

20. **Multicultural education**



Date: 1994 **Grade(s):** K - 12 **Cost:** \$328.00 - \$398.00
ENC#: 011150

This kit, developed for administrators, teachers, parents, school board members, and corporate and community leaders, is a video-based staff development program designed to provide participants with a vision of the content and importance of multicultural education. The kit comprises a videotape, a facilitator's guide, and an accompanying book entitled TEACHING WITH A MULTICULTURAL PERSPECTIVE.
<http://www.enc.org/resources/records/0,1240,011150,00.shtm>
 (For more details, see [ENC Record](#).)

21. **The dreamkeepers : successful teachers of African American children**



Date: 1994 **Grade(s):** K - 8 **Cost:** \$18.95
ENC#: 011192

This book, written primarily for teachers of grades 1 to 6 but applicable to most grades, is a study of how eight experienced teachers function effectively in their classrooms of primarily African American children. The study consisted of in-depth interviews and weekly classroom observations over a period of two years.
<http://www.enc.org/resources/records/0,1240,011192,00.shtm>
 (For more details, see [ENC Record](#).)

22. **Who's endangered on Noah's Ark? : literary and scientific activities for teachers and parents**



Date: 1992 **Grade(s):** K - 12 **Cost:** \$22.00
ENC#: 002884

This book, developed for students of all ages, concerns ten of the animals that are or have been threatened: wolves, bears, elephants, tigers, leopards, California condors, northern spotted owls, bald eagles, whooping cranes, and alligators. Each section includes a folktale and folklore about the animal and discussion of its description, behavior, habitat, historic range, current distribution, and status as an endangered species.
<http://www.enc.org/resources/records/0,1240,002884,00.shtm>
 (For more details, see [ENC Record](#).)

23. **Of bugs and beasts : fact, folklore, and activities**



Date: 1995 **Grade(s):** K - 12 **Cost:** \$23.50
ENC#: 002885

This book, designed for all grades, provides profiles of nature's least liked animals (reptiles, bats, slugs, and other creatures) and reveals their beneficial qualities and vital roles in the ecosystem. Grouped in sections of general habitat (air, water, and earth), the 15 chapters cover a variety of animals from insects to mammals.
<http://www.enc.org/resources/records/0,1240,002885,00.shtm>
 (For more details, see [ENC Record](#).)

24. **Cultivating a child's imagination through gardening**

Date: 1996 **Grade(s):** K - 6 **Cost:** \$24.00

ENC#: 008702



This book, written for grades K to 6, is organized around a theme of gardening and uses children's literature to introduce students to multicultural literature, ecology, and the impact of plants on the environment, world economics, and politics. The book contains 45 lesson plans, each of which focuses on a specific book about gardening and offers a variety of activities designed to enhance creativity and build literacy skills.

<http://www.enc.org/resources/records/0,1240,008702,00.shtm>

(For more details, see [ENC Record](#).)

25. **Agnesi to Zeno : over 100 vignettes from the history of math**

Date: 1996 **Grade(s):** 9 - 12 **Cost:** \$26.95

ENC#: 006398



This book is written to expose students to the cultural, historical, and scientific evolution of mathematics and to emphasize communication in the classroom, concepts addressed by the National Council of Teachers of Mathematics (NCTM) CURRICULUM AND EVALUATION STANDARDS (1989). Activities emphasizing communication include writing, in depth research, and class discussion.

<http://www.enc.org/resources/records/0,1240,006398,00.shtm>

(For more details, see [ENC Record](#).)

26. **Celebrating our nation's diversity : a teaching supplement for grades K to12**

Date: 1994 **Grade(s):** K - 12 **Cost:** Out of Print

ENC#: 002867



This teaching supplement is designed to expose students to the diversity of the United States. Students work with real world statistical data taken from the 1990 Census of Population and Housing.

<http://www.enc.org/resources/records/0,1240,002867,00.shtm>

(For more details, see [ENC Record](#).)

27. **Math around the world : teacher's guide**

Date: 1995 **Grade(s):** 4 - 8 **Cost:** \$25.50

ENC#: 006462



This teacher's guide, developed by the Lawrence Hall of Science (LHS) Mathematics Education Program as a part of the LHS Great Explorations in Mathematics and Science (GEMS) program for upper elementary and middle school grades, provides instructions, designs, activities, background information, built in assessment strategies, and literature connections for nine mathematically educational games played throughout history across many continents. Instructions provided for teachers suggest activities that build on students' game playing experiences to help students develop and analyze mathematical concepts related to: game theory, logic, probability, mental math, network and graph theory, and pattern recognition among others.

<http://www.enc.org/resources/records/0,1240,006462,00.shtm>

(For more details, see [ENC Record](#).)

28. Multiculturalism in mathematics, science, and technology : readings and activities



Date: 1993 **Grade(s):** 8 - 11 **Cost:** \$17.95 - \$24.95

ENC#: 001354

This book is designed to help infuse multicultural education into high school science and mathematics classrooms. The book is intended to provide mathematics and science materials that help fulfill the vision of a global, multicultural education; to provide role models that inspire all students to study mathematics and science; to increase the mutual respect, pride, and understanding that come from the knowledge that all cultures have contributed to mathematics and science; to help teachers respond to requirements in many states that mandate multicultural education; to improve instruction by relating high school mathematics and science to real world situations; and to provide materials that help teachers integrate mathematics and science.

<http://www.enc.org/resources/records/0,1240,001354,00.shtm>

(For more details, see [ENC Record](#).)

29. Strategy challenges. Collection 1, Around the world.



Date: 1996 **Grade(s):** K - 12 **Cost:** \$69.95

ENC#: 004699

This CD-ROM is designed to help students in grades 3 to 8 to build strategic-thinking and problem-solving skills that are useful in and out of the classroom. As they play games, students discover patterns and sequences and break problems into smaller parts that can be solved individually.

<http://www.enc.org/resources/records/0,1240,004699,00.shtm>

(For more details, see [ENC Record](#).)

30. The multicultural math classroom : bringing in the world



Date: 1996 **Grade(s):** 1 - 8 **Cost:** \$26.00

ENC#: 008965

This teacher resource book includes eight chapters of lessons that introduce a multicultural perspective to the elementary and middle grades mathematics curriculum.

The book begins with a rationale for multicultural mathematics education, then describes the works of mathematics educators who are bringing multicultural perspectives into their classrooms.

<http://www.enc.org/resources/records/0,1240,008965,00.shtm>

(For more details, see [ENC Record](#).)

31. Waterdrum science : science through American Indian arts and culture



Date: 1994 **Grade(s):** K - 6 **Cost:** \$34.00

ENC#: 006230

This activity book provides resources for teachers so they can incorporate American Indian science, art, and culture into their lessons. Included are integrated hands-on activities in life, earth, and physical sciences from a Native American perspective.

<http://www.enc.org/resources/records/0,1240,006230,00.shtm>

(For more details, see [ENC Record](#).)

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Web sites

1. The Arctic National Wildlife Refuge : a special report

**ENC Digital Dozen Site****Date:** 1996 **Grade(s):** 5 - 12 **Cost:** Free**ENC#:** 001818**URL:** <http://arcticcircle.uconn.edu/ANWR/>

This World Wide Web (WWW) site describes the controversy surrounding the development and oil exploration in the Arctic National Wildlife Refuge (ANWR) to assist the viewer in deciding what action should be taken in shaping the future of the ANWR, and by whom. The site describes the Refuge and issues that affect its future through a series of illustrated essays that describe the natural resources within the ANWR, the native people living in the refuge, historical background of oil exploration, and issues of controversy and debate from multiple perspectives.

<http://www.enc.org/resources/records/0,1240,001818,00.shtm>

(For more details, see [ENC Record](#).)

2. Mancala, v2.0

**ENC Digital Dozen Site****Date:** 1996 **Grade(s):** 5 - Post-Sec. **Cost:** Free**ENC#:** 004050**URL:** <http://imagiware.com/mancala/>

This World Wide Web (WWW) site is a computer version of the ancient game Mancala, also known as Kalaha. The game board has 12 playing pits, each containing 3 seeds.

<http://www.enc.org/resources/records/0,1240,004050,00.shtm>

(For more details, see [ENC Record](#).)

3. NITI, National Indian Telecommunications Institute

**ENC Digital Dozen Site****Date:** 2004 **Grade(s):** K - 12 **Cost:** Free**ENC#:** 009992**URL:** <http://www.niti.org>

This Internet site is the home page of the National Indian Telecommunications Institute (NITI), a Native founded and Native run organization located in Sante Fe, New Mexico, whose goal is to employ advanced technology to serve American Indians and

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Alaska Natives in the areas of education, economic development, language and cultural preservation, tribal policy issues, and self determination. The Education section of this home page contains lists of sites relating to science, math, and general education.
<http://www.enc.org/resources/records/0,1240,009992,00.shtm>
(For more details, see [ENC Record](#).)

4. **Multicultural pavilion : resources and dialogues for equity in education**



ENC Digital Dozen Site

Date: 2004 **Grade(s):** K - 12 **Cost:** Free

ENC#: 011209

URL: [http://curry.edschool.Virginia.EDU/go/](http://curry.edschool.Virginia.EDU/go/multicultural/)

[multicultural/](#)

This World Wide Web (WWW) site, developed for K to 12 educators, offers resources about multicultural education and provides a forum for online exchanges about multicultural issues and education. The site features an article that describes the concept multicultural education, including a working definition, components, and goals; a Teacher's Corner that provides online resources for teachers, including reviews of children's music, multicultural activities, and online literature archives; and a Research and Inquiry department that provides multicultural research resources such as statistical data archives, online article archives, and links to online libraries, electronic journals, and research organizations.

<http://www.enc.org/resources/records/0,1240,011209,00.shtm>
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Videotapes

1. Spirits of the yellow leaf people



Date: 1992 **Grade(s):** 5 - Post-Sec. **Cost:** \$175.00

ENC#: 004888

This series of videotapes help viewers learn about Southeast Asia. This program, designed for junior high school grade levels and up, documents the lifestyle of a nomadic tribe of people living in the diminishing rain forest of northern Thailand; also it shows how modern technology and greed are extinguishing this culture by destroying their habitat.
<http://www.enc.org/resources/records/0,1240,004888,00.shtm>
(For more details, see [ENC Record](#).)

2. Tram Chim : pearl of the Mekong Delta



Date: 1996 **Grade(s):** 7 - Post-Sec. **Cost:** \$175.00

ENC#: 008364

This video, developed for grade 7 and up, focuses on a conservation effort to save Tram Chim, a wetland area in the Mekong Delta in Vietnam that was devastated by chemical and hydrological disturbances during the Vietnam War. The video, which emphasizes the interdependency of human and natural communities, examines the natural resources at stake in Tram Chim.
<http://www.enc.org/resources/records/0,1240,008364,00.shtm>
(For more details, see [ENC Record](#).)

3. The sun dagger



Date: 1982 **Grade(s):** 7 - Post-

Sec. **Cost:** \$250.00 - \$295.00 **ENC#:** 004326

This video, designed for grades 7 to adult, documents the extraordinary celestial calendar created by the Anasazi Indians over a thousand years ago. The calendar accurately marks the seasonal passage of the sun; and marks the maximum and minimum extremes of the moon which are only reached every 19 years.
<http://www.enc.org/resources/records/0,1240,004326,00.shtm>
(For more details, see [ENC Record](#).)

4. Haida Gwaii, the Queen Charlottes : islands in the web of life

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Date: 1989 **Grade(s):** 7 - Post-

Sec. **Cost:** Out of Print **ENC#:** 004348

This video is designed to educate about the Haida people who inhabit British Columbia's Queen Charlotte Islands. The video

describes how the Haida people have enjoyed the mountains, a temperate rain forest, excellent fishing, and scenery present on the island for thousands of years.

<http://www.enc.org/resources/records/0,1240,004348,00.shtm>

(For more details, see [ENC Record](#).)

5. **Kings of the jungle**



Date: 1992 **Grade(s):** 10 - Post-Sec. **Cost:** Out of Print
ENC#: 004383

This video, created for grades 10 and up, focuses on the Amazonian rainforest and its inhabitants. The program retraces the expedition of Brazilian explorers Claudio and Orlando Villas Boas, who entered an unexplored region of the Southern Amazon in order to build a web of airstrips, connected by roads, in order to open up the jungle.

<http://www.enc.org/resources/records/0,1240,004383,00.shtm>

(For more details, see [ENC Record](#).)

6. **Blowpipes and bulldozers : the story of the Penan Tribe and Bruno Manser**



Date: 1988 **Grade(s):** 9 - Post-Sec. **Cost:** \$49.00
ENC#: 004396

This video developed for students in grades 9 to adult tells the story of the Penan, a unique tribe of rain forest nomads living in Sarawak, Borneo which is part of Malaysia. After 40,000 years of living at one with the jungle, the tribe is being logged out of existence.

<http://www.enc.org/resources/records/0,1240,004396,00.shtm>

(For more details, see [ENC Record](#).)

7. **Still life for woodpecker?**



Date: 1992 **Grade(s):** 5 - Post-Sec. **Cost:** Out of Print
ENC#: 004427

This video, developed for grades 5 to adult, is designed to incorporate an ancient native myth into the study of forest ecology. In the native myth, Yamakpah, the pileated woodpecker, was sent to the Earth to watch over and protect the human species.

<http://www.enc.org/resources/records/0,1240,004427,00.shtm>


(For more details, see [ENC Record](#).)

8. **River spirits**



Date: 1995 **Grade(s):** 7 - Post-Sec. **Cost:** \$49.00
ENC#: 004430

This video developed for students in grades 7 to adult is designed to educate the viewer about conservation biology and the importance of preserving intact ecosystems. The video takes place in the Purcell Wilderness Conservancy of southeastern British Columbia and begins with the story of two world class kayakers who take a journey of more than



60 miles through undivided wilderness, which is inhabited by moose, grizzly bears, elk, and vegetation.

<http://www.enc.org/resources/records/0,1240,004430,00.shtm>

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Childrens Books

1. Tree of life : the world of the African baobob

**Date:** 1989 **Grade(s):** 1 - 5 **Cost:** \$5.95 - \$14.95**ENC#:** 007491

This book is written for students in grades K to 5 as an introduction to the African ecosystem. The book focuses on the story of the African baobob tree.

<http://www.enc.org/resources/records/0,1240,007491,00.shtm>
(For more details, see [ENC Record](#).)

2. The Sierra Club book of weatherwisdom

**Date:** 1995 **Grade(s):** 4 - 6 **Cost:** \$15.95**ENC#:** 007703

This book, published by the Sierra Club for grades 4 to 6, shows young readers how to predict the weather by paying close attention to weather signs, such as wind, clouds, and animals' behavior. The author uses dramatic stories, pencil illustrations, and hands-on activities, as well as conversational informative text, to explain how the earth's rotation and its orbit around the sun are linked to the seasons and climate; how atmospheric pressure is measured and what it can tell us; and how storms develop.

<http://www.enc.org/resources/records/0,1240,007703,00.shtm>
(For more details, see [ENC Record](#).)

3. Why the sky is far away : a Nigerian folktale

**Date:** 1974 **Grade(s):** K - 6 **Cost:** \$4.95**ENC#:** 009699

This picture book retells a traditional Nigerian folk tale. The story takes place long ago, when the sky was so close to the Earth that anybody who was hungry could reach up and take a piece of it to eat.

<http://www.enc.org/resources/records/0,1240,009699,00.shtm>
(For more details, see [ENC Record](#).)

4. The boy who dreamed of an acorn

**Date:** 1994 **Grade(s):** Pre-K - 3 **Cost:** \$15.95**ENC#:** 007525

This book, written and illustrated for grades preK to 3,

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is based upon a Native American rite known as the spirit quest. The story begins when three young Chinook boys climb the slopes of a great mountain.

<http://www.enc.org/resources/records/0,1240,007525,00.shtm>
(For more details, see [ENC Record](#).)

5. **Amazon diary : the jungle adventures of Alex Winters**

Date: 1996 **Grade(s):** 3 - 8 **Cost:** \$15.95

ENC#: 010282



This book, suitable for grades 3 to 8, is a fictional diary of a grade 6 boy who spends two weeks with the Yanomami tribe in the Amazon jungle. The book is richly illustrated with drawings and color photographs featuring the Yanomami people and their life in the rainforest.

<http://www.enc.org/resources/records/0,1240,010282,00.shtm>
(For more details, see [ENC Record](#).)

6. **The story of money**

Date: 1994 **Grade(s):** 1 - 4 **Cost:** Out of Print

ENC#: 001294



This illustrated book traces the historical evolution of money. Topics include bartering, the use of precious objects for money, the first coins, minting coins, countries without money, the evolution of paper money, modern banks, business and profit, taxes, distribution of wealth, and future uses of money.

<http://www.enc.org/resources/records/0,1240,001294,00.shtm>
(For more details, see [ENC Record](#).)

7. **Native American scientists : Fred Begay, Wilfred F. Denetclaw Jr., Frank C. Dukepoo, Clifton Poodry, Jerrel Yakel**

Date: 1996 **Grade(s):** 4 - 8 **Cost:** \$23.93

ENC#: 010083



This book, designed for grades 4 to 8, presents short biographies of five Native American scientists, including Frank C. Dukepoo, the first Hopi to earn a doctorate in science.

<http://www.enc.org/resources/records/0,1240,010083,00.shtm>
(For more details, see [ENC Record](#).)

8. **In the heart of the village : the world of the Indian banyan tree**

Date: 1996 **Grade(s):** 1 - 5 **Cost:** \$16.95

ENC#: 008505



This picture book for grades 1 to 5 tells a story centered around the banyan tree, a species that grows in many tropical areas of the world, including India, Indonesia, Hawaii, Florida, and the Caribbean. From the trees center, broad branches extend outward, sprouting aerial roots that hang down.

<http://www.enc.org/resources/records/0,1240,008505,00.shtm>
(For more details, see [ENC Record](#).)

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