

Singing Blocks, Talking Shapes, and Dancing Numbers: Mathematical Connections for our Native American Students

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Can numbers tell stories? Do shapes sing songs? Can blocks teach us important mathematical concepts as we patiently listen to them? I am starting to believe they do.

For several years now, I have been working on a project I call “Dancing Numbers” to design culturally sensitive and pedagogically responsive mathematics instruction for Native American students. Dancing Numbers describe relationships involving Native American cultures, their ways of knowing, beliefs and values, and mathematics. Dancing Numbers describe students learning to see themselves as bright and capable math learners in relation to their cultural identities. Students do not have to forget who they are as Native people when they dance with numbers.

Native students continue to lag all other ethnic groups in our national assessments. Clark (1994) reports,

“Indian people have been badly miseducated, have not progressed educationally, and, as a result are at the bottom of the barrel among the country’s ethnic minorities and socioeconomically disadvantaged groups.” (p. 11).

Eric Jolly (2003) suggests that some Native children are penalized in our schools for not being privy to the cultural nuances of the westernized teacher and their curriculum. Eric speaks of “missing bricks” in the foundation of the child’s education. These are areas of knowledge we erroneously presume we all see and experience similarly. Rosemary Christensen (2003) describes the necessity of the “3 Rs” or principle behaviors that fit successful tribal education. These include respect, reciprocity, and relationships. Respect involves humility in the learner and the teacher, a gratitude for what is to be learned, and an honoring of the knowledge and of those who are willing to share it. Reciprocity includes flexibility and spontaneity between the teacher, the learners, and the understanding that is being individually and collectively constructed. Relationships describe the connections situated within what is being taught and its purpose and place in the lives of our children. Sadly, it has been my experience that these characteristics are seldom seen in many of our public classrooms. If our Native children are indeed confronted with missing bricks of knowledge and if their education is lacking in respect, reciprocity, and relationships, then is it too much to suggest that the curriculum they are provided is toxic to teacher and learner alike?

Shirley Reeder (Kiowa/Dine’), a former student and current elementary teacher described her early experiences in mathematics,

“When I was in school, teachers never discussed my people and certainly not in math

class. Although most of my classmates were just like me, teachers did not tell stories of our people. I grew up thinking that there was something wrong with my people and me. As a child, I thought our people did not know anything about mathematics and seldom used it.” (Personal communication, June 25, 1997)

It is apparent that students can learn as much from what teachers do not tell them as they do from what is expressed. Students who see their stories included in the curriculum are often able to better understand the usefulness of what they are learning. While the inclusion of these culturally relevant examples appears to be conducive to enhancing mathematics education for Native children, I believe it is only a part of what is necessary to make our instruction more appropriate and effective for students. Native students can struggle in our traditional public educational programs because of the cultural mismatches that may occur between the worldview of the teacher and his or her curriculum and the worldview held by the student, his or her family, community and/or Nation. Not only may few pertinent cultural examples be presented but even when they are they typically carry with them a western influence or paradigm.

Inherent in any instruction is what I call a worldview impression. This impression is typically invisible to the teacher or the learner and often goes unquestioned. The impression is an expression of how one has learned to “see their world” as a result of the enculturation process. Each community and every society functions under this set of rules for how one functions socially and psychologically as a successful member in that community or society.

It is not my intention to provide now in great detail a description of either a western or an indigenous worldview paradigm. However, a short explanation of each is germane to this discussion. My understanding of each comes from my studies, my experiences on reservations and teaching Native teachers and their students, and from my Native friends who tolerate my endless questions.

Characteristics of the western worldview include:

- The Western Worldview teaches us to think in straight lines.
- The Western Worldview emphasizes knowing the world mainly through the mind in a setting organized in time and space.
- The Western Worldview describes the world in terms of dualities of either/or and where only human beings are “really” alive.

In comparison, an indigenous worldview includes:

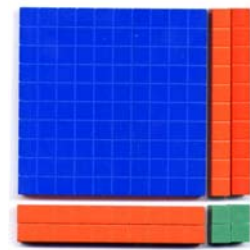
- The Indigenous Worldview has us thinking in circles rather than lines.

- The Indigenous Worldview emphasizes us knowing the world through the mind and our heart in time, space, place, and spirit.
- The Indigenous Worldview describes the world in terms of relationships and where everything has life.

The student who functions from an indigenous paradigm benefits from a curriculum that fosters illustrating and seeking of multiple relationships within the learning while embracing the development of a cognitive and spiritual understanding what is being studied. From this perspective it is not only possible but also useful to consider that the objects with which the student interacts have their own “life” and stories to tell.

When numbers dance, the objects or models tell us their stories if we have the ears to hear and the eyes to see. I suggest that we may be able to enhance our mathematics instruction particularly for our Native American students by purposefully acknowledging the “life” of the objects we use when teach.

Let’s consider the stories that the following a combination of Base 10 blocks can tell. It “knows” these things before we ever begin to listen to them. Our model tells us of its quantity, both total and distributed. It sings of its perimeter and area, its volume, its color, texture, weight, and density. The models so often seen as inanimate can become teachers for our students as these children learn to interact with them in the ways just described.



Recently while attending a conference for mathematics and science educators of Native American students I spoke with a math and physics teacher named Joe Aragon of the Acoma Pueblo in New Mexico. He considers himself to be a Native person that goes between the two worlds (western and indigenous) and he giggled at his self-description that such a blend has caused him to be a “controlled-Schizophrenic.”

I asked him what Dancing Numbers meant to him and if he thought it was were possible to hear the stories of objects and entities we come across in our daily activities. Joe stated that the responses he provided me were not his personal thoughts but rather thoughts he is expressing for the Elders who have taught him during his life about such things. Joe stated, “There are some old ones of my people who live entirely in the world you just described. To them all things have a story.” Joe continued, “Dancing Numbers are ways that students can make meaning of the math that they are taught. With my people, the Acoma, dance is often sacred. Through a dance people can connect to the deeper spiritual meanings of what being a member of our people means.”

In speaking of the life of objects Joe explained,

Objects already know their names, their purpose, and their culture. I am not sure that

they (the objects) are obligated to tell us their stories, but some do. At one time we all spoke the same language and even though now there are many languages spoken we can still communicate with each other at some level. We are all part of the same thing; we all come from the same place. We are no different.

Human beings are the only beings that have to go to school to know who they are. Plants, animals, rocks, etc. know what they are from the beginning. Human beings must constantly search for who they are and work hard to stay right with who they were meant to be. It is becoming harder for our students to know who they are as they are pulled to what contemporary society prizes; Things like big houses and nice cars. It is easy for our young ones to forget the ways of their people, which have sustained the people through centuries of hardship and challenge. (Personal communication, November 20, 1997)

Dancing Numbers offer teachers opportunities for adapting their instruction to align with a Native way of knowing. As such students learn important mathematical concepts and principles while also learning critical aspects of what it means to be a member of a Native community. The dance will begin for students when they are guided to making their own personal and spiritual meanings of numbers and mathematical concepts embedded in instruction that includes connections to who they are as Native people. We must seek to build bridges of understanding that connect from the students' worlds to the concepts we teach. Native cultures and traditions provide countless opportunities.

Native Elders must play a significant role in this education process as they share their wisdom concerning traditional activities, beliefs and values. Culturally situated instruction connects not only with the activities and traditions of the people for whom it is designed but also reflects community values and beliefs. Dancing Numbers focus on allowing us to see the math that lives within an activity or action. It illustrates multiple connections between math and the world in which the child lives. Our Native students should not, in fact they must not, be asked to forget who they are as Native people to be successful in the world at large. The students' greatest contributions to society will occur not in spite of their Native identities and wisdom, but because of them.

References:

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