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President’s Column

Elsie Holiday lives in southern Utah and is known for the beautiful Navajo baskets she produces. I met Elsie several years ago at an art show where she was demonstrating how she imagined and constructed her artwork. She taught us that there are a number of steps required in the process. The first is finding and collecting the right size and amount of supple sumac shoots to make the size of basket she has in mind. She knows well where the best shoots grow and is protective about letting others know where she finds the best shoots. After she cuts the amount she estimates will be sufficient for her current work, she begins to prepare the shoots for the actual weaving. Elsie’s front teeth are worn as she uses them to bite the tip of each shoot and to hold the end secure as she splits and strips each shoot in three or four thin strands. She then estimates the amount of supple strips she needs to dye in various colors to create her art.

Her inspiration for the baskets comes to her in various ways. Elsie explained that for some baskets she has worked with a graphic artist who used computer drawing programs to create vivid designs that she then followed. Other designs come from own impressions. She explained sometimes she ‘sees’ a completed basket in her mind before she begins weaving. She twists a certain number of sumac strips together, which become a core around which she begins to wrap, twist and weave as she creates a coil. The basket expands with each spiral of...
the coil. Her designs are created as she uses the color of the strip she needs to produce the design she has intended in the location planned.

When I spoke with Elsie after her presentation, I told her how impressed I was with her beautiful work but had one remaining question. I asked Elsie what math she thought of when she made her baskets. With a slight bit of resignation, she replied, “I do not use math because I don’t know how to do math. I dropped out of school in 10th grade!” I remember my surprise at her response and also the sadness I felt when I considered how she demonstrated such genius in applying mathematics yet did not realize she lacked only the ability to express it in the formal academic mathematical ways that we emphasize in schools. I pondered what her teachers had failed to do to help Elsie realize how the math they taught in school could be connected to her lived experiences on the “Rez” of her Native-American community. Ethnomathematics provides teachers opportunities for bridging such differences.

Elsie is obviously a very creative and highly intelligent human being whose mathematical gifts are illustrated in the art she produces. What could she teach us if we educators were able to help her express her artistic brilliance in mathematical terms used in the contemporary society? How much we could learn!

My purpose in introducing readers to Elsie Holiday is to challenge everyone to consider how many students we each have encountered who have untapped mathematical gifts and unlimited potential. Ethnomathematics as an evolving field of study provides us an avenue for better reaching and teaching our students as we strive to make connections in our math instruction to their experiences and insights.

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*Editorial Note from Rick Silverman:* Readers may want to follow up with Dr. Munir Fasheh’s article about his Palestinian mother’s weaving beautiful garments from discarded cloth materials. With his graduate degrees in mathematics and mathematics education from Florida State University and Harvard University, Dr. Fasheh for many years did not perceive his mother's expertise as having any mathematical value. After all, she was illiterate. Then he had an epiphany. He saw that his academic mathematics was insufficient to represent his mother’s handiwork practice of geometry and pattern. Her mathematics in practice falls within the purview of ethnomathematics. Her practice, like that of other equally skillful women of his culture, had enormous value and good in her life and that of those who benefitted from the clothing that she created. Where expertise in academic mathematics was insufficient to represent her accomplishments, ethnomathematics proved to have explanatory power. Perhaps today through the genius of Ron Eglash and his Culturally Situated Design Tools (www.rpi.edu/~eglash/csd.html), a real linkage may be possible between her sophisticated mathematics in practice, her ethnomathematics, that is, on the one hand, and academic mathematics, on the other, and furthermore, with school mathematics and street mathematics. For more information, please see the following reference:

Cultivating Empathy for English Language Learners in Mathematics: A Reflection

Dr. Lawrence M. Lesser, The University of Texas at El Paso

I am a founding editor of TODOS’ refereed journal *Teaching for Excellence and Equity in Mathematics*, which has published some papers on ethnomathematics (e.g., Ramirez & McCollough, 2012), papers on English language learner (ELL) issues, and other topics. In the fifth issue, one paper (Vomvoridi-Ivanovic & Razfar, in press) describes an innovative use of baseball to help pre-service teachers who are fluent in English but not in baseball gain empathy for students who are ELLs. Doing the lead editorial work with that paper inspired me to revisit both personal and professional connections I have to this realm.

Because I do not identify myself as an ELL (though I certainly keep learning more about the English language!), I am occasionally asked why I have made diversity and ELL issues a major part of my recent scholarship (e.g., Lesser & Winsor, 2009; Lesser, Wagler, Esquinca, & Valenzuela, in press; Lesser, 2010b) and professional service. Part of my answer involves acknowledging how ELL issues are becoming increasingly prominent considering that the percentage of ELLs in U.S. K-12 schools is projected to increase by 2030 to 25% (Goldenberg, 2008) or even 40% (Herrera & Murry, 2005). And because so much of the social order depends on having an educated public, I believe it is in everyone’s interest to support education for all students, whether or not one is an ELL, whether or not one has a child in public school, etc.

Another part of my answer involves connections with the access-and-excellence mission of my university, which serves a regional population with a substantial fraction of ELLs. A further part of my answer is more personal: the values of my faith tradition (e.g., Jacobs, 2012) to “remember the stranger” and to be sensitive to the experiences of any minority group who lacks or has lacked equal opportunities for access in society.

In this paper, I reflect on how my empathy for ELLs has inspired me to identify and implement strategies that may be effective in helping others cultivate empathy as well.

Making My Own Connections

Language issues gained immediacy for me when I (as a not highly knowledgeable/practicing Jew) married into a Modern Orthodox Jewish family. While this change blessed me with a richness of meaningful experiences, the new denominational culture presented me with a much higher density and speed of Hebrew language and shorthand during services and classes. My struggle to follow what was happening or being said during times I did not recognize words or phrases gave me tangible empathy for the experience of students who are ELLs and what a difference support can make.

For example, a traditional Talmud class might use a text that lacked not only English translation but also markings for punctuation or vowels. A more accessible Talmud class might use a book (e.g., Shefa Foundation, 2012) which unpacks what is a very dense text by, for example, not only translating into English but also filling in referents and phrases that are often implied but unstated in the terse original Hebrew text. I was also extremely grateful when I found linguistic support at religious services. Some (but not all) Orthodox synagogues regularly announce or display page numbers and keep on hand Hebrew-English prayerbooks that serve worshippers of varying Hebrew fluency. Prayerbook translations may be at the paragraph level, linear (line by line), or interlinear (e.g., Apisdorf, 2002) with a translation within each line of one or two words at a time. The latter gave me the opportunity to understand the meaning of what I was pronouncing word by word, and incrementally build my vocabulary. ELLs in my mathematics content and pedagogy courses are usually quite appreciative when I make them aware of glossaries and terms handbooks that include their language.
Because I already knew how to pronounce Hebrew (which is aided by the fact that each letter is always pronounced the same way – like Spanish, but unlike English!), people sometimes overestimated my Hebrew vocabulary. Regularly reading the same prayers from a prayerbook requires much less proficiency than, say, reading a Hebrew newspaper sans vowels. Later, I recognized the rough parallel that I had surely overestimated the academic language proficiency of many ELLs based on observing their solid proficiency with everyday English outside of formal academic discourse. Indeed, everyday language proficiency typically precedes academic language proficiency by several years (Cummins, 1992; Johnson, 2010).

A particular way my Hebrew proficiency has been overestimated is when someone with the well-meaning intention to make me feel included gives me the honor of publicly leading a prayer that I do not have the Hebrew proficiency to read smoothly. Those awkward experiences have helped me remember to make sure that what I ask of ELLs in class is sufficiently scaffolded (e.g., using techniques such as sentence frames; e.g., Wagler & Lesser, 2011) so that they can keep their main focus on the content, not feel put on the spot, and feel that they belong to and can contribute to our classroom community. My experiences of not having the raw speed to finish a particular prayer before the congregation moves on to the next one have often helped me remember to allow my students more time for questions and answers before I move on to a new topic and to insert signposts and multiple entry points so that students can reconnect to the flow of instruction even if there was something earlier that they did not understand.

Ultimately, the challenges include culture as well as language. Philologos (2011) quotes a representative passage which includes 13 different words which would be “incomprehensible to any non-Jewish speaker of English, as well as to a great majority of non-Orthodox Jewish speakers.” While there are many lexicons of Jewish terms (e.g., Eisenberg, 2008; Eisenberg & Scolnic, 2006; Olitzky & Isaacs, 1992), some researchers have gone further to include more comprehensive analysis and resources (e.g., Benor 2009, 2012; Weiser, 1995) that decode the distinctive cultural and linguistic patterns used by native-born Americans who are Orthodox Jews. In addition to rabbinic Hebrew words and phrases (e.g., yotzei, assur, etc.) often inserted in otherwise “regular English” constructions, this also includes Yiddish-influenced idiomatic use of common English words. Benor (2009) gives examples of the latter such as “Are you eating by [at the house of] Rabbi Fischer?” and “If you hold by [accept, believe in] Reb Aron….” This made me more sensitive to the idea that my ELL students could assume they knew each word of a phrase used in mathematics or statistics class (e.g., “in the long run”) but yet not understand how the phrase is being used as an intact whole.

Challenging in a different way is having one’s capabilities underestimated. I have had people assume I could not handle any conceptually-rich discussions of Jewish text or ideas based on a quick assumption or perception of my familiarity with language and convention. This helps me remember that students can understand more of a language (including mathematics) than they can generate and not to assume that someone is incapable of higher-order thinking in mathematics just because they may struggle to express their understanding in academic English. More generally, this helps me remember to avoid the pitfalls of deficit models, and know that each person has knowledge and experiences in her/his background that can be a valuable resource (e.g., Khisty, 1997). This could be something as specific as being more readily able to recognize a word (e.g., because of cognates, a student whose first language is Spanish may be more likely than a native English speaker to comprehend English words like felicity, edifice, and facile) or having a culture or community that makes it easier to relate to the particular context of a mathematics problem. In the case of an Orthodox Jewish study setting, I frequently am (or at least feel like) one of the few in the room whose education does not include Jewish day school or yeshiva, but I have sometimes surprised people by how much I can nevertheless participate or contribute, drawing from my strengths in logic and reasoning (thanks to my degrees in mathematics and statistics), my having taken university courses in philosophy (including philosophy of religion), and my having studied connections (e.g., Lesser, 2006, 2013) between Judaism and my area of secular expertise (mathematics education).
Motivating other Educators

Using a Different Language

Many educators have found that empathy for ELLs in the US can be cultivated with experiences such as a study abroad program (Marx & Pray, 2011) or sustained field experiences (e.g., Luft, 1999). Because most in-service or pre-service teachers may not have the opportunity, time, or money for such experiences, there is a need to identify opportunities of shorter duration that may have a high bang-for-the-buck. Many educators speaking on ELL issues to broader audiences are finding it makes a memorable impact to open presentations with examples that are interactive or experiential. For example, Asturias (2011) presented a PowerPoint slide with a mathematics word problem in Filipino (Tagalog) and invited participants to turn to their neighbors and try to solve the problem, or at least understand the question. Next, he showed a slide that simply added a picture. He then asked “How did it feel? Did you feel you had access to the problem?” Then he modeled strategies such as identifying cognates and then finally showed the problem in English.

Wagler, Lesser, Monárrez, and Salazar (2012) opened their presentation to statistics educators with some experiential examples for attendees. First, attendees were given a minute to try to understand what they could of a six-sentence excerpt (in German) from Sorto, White, and Lesser (2012), a translation of Sorto, White, and Lesser (2011). The excerpt consisted of a description (in German) of two tasks accompanied by a scatterplot with axes labeled in English. Cognates were identified such as Kriterium (criterion), Studenten (students), Graphen (graphs), beste (best), and Daten (data). Attendees experienced how much or how little this enabled them to feel like they understood the entire excerpt, especially given that some words were false cognates, such as könnten meaning “compute,” not “contain.”

The impact of such demonstrations is arguably even greater when the language chosen does not use letters from the English alphabet. Washburn (2008) and Anhalt, Ondrus and Horak (2007) discuss the impact of an unannounced guest teacher giving a mathematics lesson in Chinese to pre-service teachers and middle school in-service teachers, respectively. In the post-lesson debriefing, students reported feeling confused, frustrated, lost, stupid, and overwhelmed during the lesson, even though they knew there were no consequences for not understanding. As a way to get the best of both worlds, other educators have found it powerful to present a mini-lesson in a language such as Chinese and then again in a language “closer to English” (where some cognates can be found), and then again in a language even closer to English, before using English itself. Finally, the second language can also simply be the quirky language of an unfamiliar context such as baseball (Vomvoridi-Ivanović & Razfar, in press).

Filling in the Blanks

Another type of experiential example involves taking an excerpt from an English textbook, but with blanks inserted for each “K1 word” (i.e., words from the 1000 most commonly-used English words), adapting the idea of Nation (1990) cited at http://www.lextutor.ca/research/rationale.htm. Rather than asking students to imagine being a second language learner themselves (as in the preceding examples), this approach asks students to imagine what an ELL in their class right now might experience. To illustrate, consider this not atypical exercise from a mainstream published statistics textbook, where numbers in parentheses represent words that are not K1 words:

“A (1) (2) association believes that the mean (3) of fresh (1) (4) by people in the U.S. is at least 94 pounds per year. A (5) (6) of 103 people in the U.S. has a mean (3) of fresh (1) (4) of 93.5 pounds per year and a standard (7) of 30 pounds. At α = 0.02, can you (8) the association’s claim that the mean (3) of fresh (1) (4) by people in the U.S. is at least 94 pounds per year?”
After reflecting on whether the above exercise was comprehensible, reflect upon that same exercise below with the eight distinct non-K1 words filled in using green, blue, and red to denote words that are K2 (i.e., in the second thousand most frequently used words; see West, 1953), AWL (Academic Word List; see Coxhead, 2000), or Off-list words (not K1, K2 or AWL), respectively:

“A citrus grower association believes that the mean consumption of fresh citrus fruits by people in the U.S. is at least 94 pounds per year. A random sample of 103 people in the U.S. has a mean consumption of fresh citrus fruits of 93.5 pounds per year and a standard deviation of 30 pounds. At \( \alpha = 0.02 \), can you reject the association’s claim that the mean consumption of fresh citrus fruits by people in the U.S. is at least 94 pounds per year?”

Note that this exercise includes two two-word phrases (“standard deviation” and “random sample”) where one word is “common” and the other is an AWL word, a situation which may make it difficult for a student to remember to treat the phrase as a single entity. Also challenging is the phrase “at least” (Nolan, 2002), which a student (especially an ELL) may use a “key word” approach (e.g., Clement & Bernhard, 2005) to incorrectly operationalize as “less than.” Other issues are created by the fact that the words “mean” and “association” each are K1 words that can also be used as statistics terms, but in this particular exercise, “mean” is used as a statistical term, while “association” is not. Finally, we note that off-list words such as “citrus” may make it difficult (compared to words like “fruits” or “oranges and grapefruits”) for students to feel they sufficiently understand the real-world context for the exercise.

Final Thoughts

By having had my own concrete experiences with navigating culture and language, I have more awareness and understanding of some dynamics faced by my ELL students and have gained increased motivation to give other educators experiences that will invoke further empathy in them as well. As Howard (1999, p. 2) notes, “Diversity [of the students we teach] is not a choice, but our responses to it certainly are.” More generally, I believe that cultivating empathy for this significant subgroup of my students has been humanizing and has increased my desire and ability to connect with other subgroups as well. As a member of society’s historically privileged groups in terms of gender and skin color, I have found it helpful to use my experience as a religious minority (not to mention having “non-native” status within a minority subgroup of my minority religion!) to help sensitize myself more fully to the experiences of those whom I mentor and teach, as my “privilege checklist” score (McIntosh, 1989) is certainly different “as a Jew” than “as a White person.” I enjoy finding and sharing parallels between our cultures (e.g., Lesser, 2010).

Almost all of my students are preservice or inservice teachers, and they have (or certainly will have) ELLs among their students in this part of the country, and some of my students are (or have been) ELLs as well. This is not surprising because my university’s population reflects the population of the Paso del Norte region and UTEP is the largest university (and the only doctoral research university) in the country with a majority Mexican-American student population. Therefore, even when I teach “content classes,” I try to share support resources and model ELL-friendly best practices for instruction (e.g., Lesser, 2011), and it turns out that almost all ELL-friendly strategies are appreciated by non-ELL students, too! And so I continue making transfer to my professional role as a mathematics educator from my own personal experiences as a minority within a minority. My journey of empathy is ongoing, continuing to evolve over my lifetime. And it is only one of several contributions identified by Howard (1999) that can be made to the healing process in our increasingly multicultural society.
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References


Vomvoridi-Ivanović, E., & Razfar, A. (in press). In the shoes of English language learners: Using baseball to help pre-service teachers understand some complexities of language in mathematics instruction. *Teaching for Excellence and Equity in Mathematics*


North American Study Group in Ethnomathematics
Yearly Business Report

Prepared for the 2012 NASGEm Business Meeting in Philadelphia, Pennsylvania
By Jim Barta

President – Jim Barta

• Jim reports NASGEm has experienced a successful year with the publication of two newsletters and an issue of the *Journal of Mathematics and Culture*. Our membership numbers have dropped after the upswing at last year’s ICEM Conference. I wish to once again thank all of you who served NASGEm in any capacity, especially those who are leaving the Board. You have each carried the message of equity and access through ethnomathematics to those you lead and teach.

• In the upcoming year we must pool our thinking on ways to invigorate the organization. I fully understand that with each year comes my work and obligations. As numbers dwindle, those of us remaining get called on for even more. I look forward to working toward renewing our energy and particularly target those newer to our organization for that may help move us forward.

1st VP of Programs–Chadd McGlone

• Chadd has been working to grow our membership among teachers through presentations and his work with World View at the University of North Carolina – Chapel Hill. He has developed a series of workshops for that organization to help teachers meet the North Carolina state requirements to illustrate world and cultural issues in their mathematics lessons. He is currently working to develop a network of teachers who share their culturally-based lessons and reflections about their experiences delivering them.

• Chadd developed a set of culturally connected lessons he shares with 2nd through 12th grade students and teachers throughout the state. He delivers the instruction to the students and asks the observing teacher to prepare a follow-up lesson and reflect on the students’ experiences with them.

• Chadd presented a condensed version of the lessons mentioned above at the annual NCTM meeting, proposed two NASGEm-related presentations for annual NCTM, and prepared one presentation for the annual NCSM meeting.

2nd VP of SIGS – Luis Ortiz-Franco

• Luis recruited last year Natalia de Bengochea from Mexico to be the NASGEm representative in Mexico.

• Luis remains an active reviewer for our *Journal of Mathematics and Culture*
3rd VP of Membership - Blidi Stemm

- Blidi reports we currently have 10 NASGEm members. Recruiting at the ICEM–4 Conference last year was effective gained new members but seemingly have not been able to retain them. Blidi suggests that the newly elected membership person send renewal reminders to members who have had their membership lapse. Thomas and Blidi have been using DropBox to share files and information related to membership and the treasury.

4th VP of Communication & Outreach – Ron Eglash

- Ron continues to provide support for our web presence.

Secretary – Claudette Engblom–Bradley

- Claudette served as the Editor of our newsletter Notices of the North American Study Group on Ethnomathematics (NASGEm News) and with the collaboration of Rick Silverman developed and published two well-completed issues this year!

Treasurer – Tom Gilsdorf

- Thomas maintained financial records, conducted the usual treasurer activities, such as depositing membership payments and keeping track of a current list of active members. (Please see the attached yearly financial report).

At-Large Canada – Dawn Wiseman

- Dawn has temporarily stepped back from her NASGEm duties while she is successfully pursuing her Ph.D. at the University of Alberta under the mentorship of Florence Glanfield.

At-Large México - Natalia de Bengoechea

At-Large USA – Jenni Harding–DeKam

NCTM Representative – Rick Silverman

- Rick has been instrumental in working diligently to support (often behind the scenes) multiple efforts throughout NASGEm including NASGEm News, Journal of Mathematics and Culture, and conference presentations.

NCTM Rep Alternative – Bill Collins

- Bill has graciously agreed to lead the 2012 Business Meeting in my absence and Rick Silverman organized the ‘call in’ so that members not physically present can attend.

NASGEm News: Claudette Engblom–Bradley
Director of Development for NASGEm News – Rick Silverman

*Journal of Math and Culture*: Editor Tod Shockey  
(Associate Editors – Sue Staats, Larry Lesser, Rick Silverman, & Jim Barta)

- In 2010-2011 the *JMC* continued to attract manuscripts from around the world. Volume 5 issues one and two were published in 2010. For the ICEM-4 meeting we agreed to organize a focus issue and that work is underway.

- Tod reports that he is always in need of reviewers. Please volunteer or nominate individuals that you feel would support the Journal. For members working in higher education we encourage you to suggest the *JMC* as an outlet for your graduate students.
Teaching Ethnomathematics in a Mathematics Methods Course
Jenni Harding-DeKam, University of Northern Colorado

Ethnomathematics helps children learn mathematics by incorporating real world connections building on authentic mathematics experiences brought from students’ homes and cultures. Students see mathematics in other contexts, subjects, and circumstances, allowing them to create meaningful understanding of mathematics. Ethnomathematics is a “broader view of how mathematics relates to the real world” (D’Ambrosio, 2002) that facilitates understanding of mathematics content, including specific connections to experiences outside of the classroom. The mathematics education course for prospective elementary teachers gives a platform to introduce ethnomathematics, discuss equity, and examine classroom resources.

First, prospective elementary teachers watch a presentation explaining the Equity Principle (NCTM, 2000), equitable learning environment (Gutiérrez, 2008), classroom equity (Gutiérrez, Bay-Williams, & Kanold, 2008), ethnomathematics (D’Ambrosio, 2002), and how to gain home and cultural knowledge of your students. Then they explore Ron Eglash’s Culturally Situated Design Tools website (http://csdt.rpi.edu) to consider ways that ethnomathematics might be used to teach math concepts with connections to Africans, African-Americans, Native Americans, Latinos, the Youth Subculture, etc.

Elementary preservice teachers use ethnomathematics resources to create a reference resource chart with websites, children’s literature, and curriculum information.
These prospective teachers continue in an online discussion by answering the following questions and responding to their peers:

1. Why is equity important for mathematics in the (K-6) elementary classroom?
2. How can ethnomathematics be used in the (K-6) elementary classroom?

Their discussions are thoughtful, reflecting upon the mathematics teaching they are observing in their elementary school classrooms, how they might integrate equity and ethnomathematics (theory and practice) into their teaching, and connecting to the larger picture of mathematics content, standards, curriculum, etc.

Next, the evaluation of classroom resources gives exemplars of how to teach ethnomathematics concepts in an elementary classroom. Here are images from resources the preservice teachers use (Irons et al., 1993).

Weavers use patterns and designs, ethnomathematics in practice (Irons, et al, 1993)
Native American baskets and cloth making to demonstrate mathematics (Irons, et al., 1993)

The prospective teachers analyze culture-rich curricula such as Building a Fish Rack: Investigations into Proof, Properties, Perimeter, and Area (Adams & Lipka, 2003) and Mathematics from Many Cultures (Irons, Burnett, Wong Hoo Foon, 1993). Next, they analyze children’s mathematics literature books such as Emeka’s Gift: An African Counting Story (Onyefulu, 1995), Ten Little Rabbits (Grossman & Long, 1991),
Grandfather Tang’s Story: A Tale Told With Tangrams (Tompert, 1990), If the World Were a Village: A Book About the World’s People (Smith, 2011), and Gabriela’s Beautiful Carpet (Thompson & Thompson, 2007). In pairs, these students use a cultural lens creating a chart of what the book is about, math concepts taught, ethnomathematics concepts taught, how equity is used, academic standards used, and overall thoughts. The charts are then shared with everyone in the course to create a reference resource list.

These course inquiry-based experiences contribute to a foundational understanding of what ethnomathematics is as well as how to teach using it in the elementary classroom.

References


Smith, D. J. (2011). If the world were a village: A book about the world’s people (2nd ed.). Tonawanda, NY: Kids Can Press.


I’ve been teaching mathematics at Oglala Lakota College on the Pine Ridge Indian Reservation in South Dakota since 2004. Opportunities to embrace the cultural relevance of all academic subjects present themselves all the time; in fact all teachers and faculty on the reservation are strongly encouraged and often required to operate fluently within the culture and across generations. I am fortunate to be able to teach in such a place, and I have learned a lot.

In 2006, I was teaching a Secondary Math Methods course at our attendance center in the small town of Allen, SD. There were Lakota Star Quilts decorating all the walls of the classroom building, and the students, their families, and the staff identified very strongly with them. The quilts are created and displayed to honor people and special events. They are given as gifts at weddings, graduations and births; they are displayed at funerals, and they are given in honor of loved ones who have passed away. Most of these quilts have 8-fold rotational and 8-fold mirror line symmetry. I began to relate many of the algebra concepts we were exploring to these colorful quilts. It felt very natural.

Here is an example of one of the Oglala Lakota College, Allen College Center Star Quilts:

The first time we really worked with the quilt image, we were studying the Cartesian Plane. If we consider the center of the star to be the origin with coordinates (0,0), we can explore distances and relationships between points that are equidistant from the origin. We can also look at the eight points of the star, and talk about similarities and differences between the coordinates that they would have. Before we even superimposed a grid on the star image, we talked about the Quadrants, we estimated distances and areas, and ordered pairs corresponding to similar images on the quilt.

This discussion led to an investigation of right angles and perpendicular and parallel segments. We had some friendly arguments about right angles, and the fact that some of the right angles in the image look more obvious than others. We talked about different ways that you can prove two line segments to be perpendicular, and why these methods work. We also tried to discover why it is less apparent that two segments form a right angle when both the segments are oblique.
As we progressed through basic geometry concepts and methods, using protractors to measure angles, a straight edge, drafting tools, finding a perpendicular bisector, a circumcenter, areas and attributes of polygons, etc., I noticed that a Cartesian Grid system would help reinforce and extend some of the concepts we were working on. Combining algebra with geometry and Star Quilts would bring more power to our explorations, by making more connections that would make sense to my students and their future students as well.

At the time, I used overhead transparencies of the regular rectangular grid system, along with a coloring book template of the Star Quilt, which the Lakota women use for creating their designs, to create an overlay that we could work with. I also incorporated some real color copies of star quilts from that classroom center. Here is an example of the coloring book template, and a blank rectangular grid:

I have since then learned that some Lakota people design their Star Quilts differently. Here is an image of a quilt design in progress, created by Gerald One Feather (pictured below) who was a participant at our OLC Summer Math Camp last year:

Notice the difference in orientation, the incorporation of circles and the use of a compass. This opens up a whole new world of circle explorations that I have not yet expanded upon with my own students, but plan to. The circle image is very pervasive and meaningful in Lakota culture and spirituality.

Recently, for my 2011 NCTM Conference presentation in Indianapolis, I had a quilt image built by a graphic artist, so that it would fit together with a Cartesian grid more easily. This is the image I used for my more recent teaching and the one off of which we worked at the presentation:
From this image, we can easily move to plotting points, calculating distances using the Distance Formula; finding slopes with the Slope Formula, and other graphing activities. Here is one of my slide images, including some ordered pairs and showing their similarities and differences:

In my next article, I will use this image to discuss mirror symmetry in much more depth, along with other isometrics and some abstract algebraic basic group theory. For now, I will conclude this article on Cartesian connections with an extension into Calculus that might give a taste of some further possibilities. The shaded finite triangular region of the Star Quilt below is bounded above by the line \( f(x) = x - 3 \), and below by the line \( g(x) = 0 \), from where \( x = 3 \) to where \( x = 9 \). Thus, we can use a definite integral to determine the exact area of the enclosed region:

\[
\int_{3}^{9} (x - 3) \, dx - \int_{3}^{9} 0 \, dx
\]

\[
= \left[ \frac{x^2}{2} - 3x + C \right]_3^9 - [C]_3^9
\]

\[
= \frac{81}{2} - 27 - \left( \frac{9}{2} - 9 \right)
\]

\[
= 18 \text{ square units}
\]
I have been incorporating Ethnomathematics in my college level math teaching since 2001. I find it to be one of the most effective pedagogical methods for long term student retention, extensions, and deeply meaningful comprehension. I have noticed that students who see math through their culture do not forget the underlying mathematical concepts that were explored; especially if they develop, analyze and discuss their own culturally relevant designs in a mathematical context. I have also seen how students literally light up when they connect math and culture! Even the most apathetic students become interested. When I return to my doctoral studies, I plan to further explore this phenomenon, for I feel that in our richly diverse society, Ethnomathematics is an essential aspect of successful mathematics education.

Please feel free to contact me with questions, comments, suggestions, or for further information and ideas about Ethnomathematical classroom connections. My email address is jrobin@olc.edu and my phone number is 308-430-2995.
Announcements

1 -- Grant: Integrating Computer Science into High School Art Classes:

Audrey Bennett, Associate Professor of Communication and Media at RPI, received a grant from the Google Corporation for her work integrating computer science into high school art classes.

Titled “CS4HS@rpi” (http://cs4hs.rpi.edu/), the program trains art teachers in the use of Culturally-Situated Design Tools (www.csdtrpi.edu), a suite of online applets developed at RPI to help students investigate the computational structure of traditional cultural arts through simulations, and create their own algorithms and designs. Bennett’s project takes this a step further by guiding students in moving from the virtual designs on-screen to a physical, artistic rendering of their work. The finished pieces are on display in an exhibit titled “Algorhythms” in the Dean’s Lounge of the School of Humanities, Arts and Social Science at RPI.
On August 20, 2012, art teachers from Troy, Albany, and Schenectady high schools learned computational art concepts with Culturally-Situated Design Tools in the CS4HS@RPI workshop (cs4hs.rpi.edu) taught by C&M Associate Professor of Graphics Audrey Bennett and STS & Computer Science Professor Ron Eglash. Between September-December 2012, the art teachers, in turn, relayed what they learned to their high school art students—including those who are ethnically underrepresented in computer science.

CSDTs facilitate the simulation of a wide variety of cultural arts on the computer screen, from cornrow hairstyles and breakdance to kente cloth and drum patterns using concepts shared between computer science and art. In the examples for this exhibit, students used both the Virtual Beadloom and Cornrow Curves CSDTs to simulate what they saw reflected in a photographic representation of either Native American or African-American culture. They then used the CSDT creatively to design a freestyle, artistic pattern. Finally, student participants took their art and computing fusion a step further by physically crafting their virtual designs in the real world, using hands-on, art and design media.

The CS4HS@RPI workshop and this culminating exhibition are funded by Google’s CS4HS grant program. CS4HS (Computer Science for High School) is “an initiative sponsored by Google to promote Computer Science and Computational Thinking in high school and middle school curricula [around the world].”

2 -- Artist Display, “Nowhere Differentiable”:

Five artists display work at Stonybrook’s Simons Center for Geometry and Physics, which explores “the intersection of African Fractals and Afrofuturism”: http://scgp.stonybrook.edu/archives/6042

3 – Research Presentations in South Korea, Brazil, England, Cambodia, and Columbia.

Daniel Orey and Milton Rosa have presented research on Ethnomodeling in congresses at ICME-12 in Seoul, South Korea; CNEm-4 in Belém, Brazil; at the meeting of the Royal Anthropological Society in London, England; the 2nd International Conference on Mathematics and Technology in Mathematics Education in Phnom Penh, Cambodia; and the VII Encuentro de Matemática do Caribe Colombiano em Barranquilla, Colômbia.
Publications

1 -- Special issue of the journal Critical Interventions on “Fractals in Global Africa”

The journal Critical Interventions has published a special issue of articles responding to the work of RPI professor Ron Eglash. The contributions come from a truly global array of locations—Asia, Africa, Europe and the US—and include textile artist Judy Bales on fractals in African American quilt patterns, ethnomusicologist Martin Scherzinger on self-similarity in mbira music, and architect Xavier Vilalta on contemporary African buildings inspired by fractal design. These and other articles from the special issue are available for download at:


2 -- An article: The Field of Research in Ethnomodeling: Emic, Ethic and Dialectical Approaches

Milton Rosa and Daniel Clark Orey published an article entitled The Field of Research in Ethnomodeling: Emic, Ethic and Dialectical Approaches by Revista de Educação e Pesquisa (Journal of Education and Research) of Universidade de São Paulo (USP), Brasil. The article can be found at:


3 – Book Chapter: In Seeking a Holistic Tool for Ethnomathematics: Reflections on Using Ethnomodeling as a Pedagogical Action for Uncovering Ethnomathematical Practices

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