Ten Years Later: A Look Back on the History of the Journal of Mathematics and Culture

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Abstract

Ten years and sixty manuscripts later, the Journal of Mathematics and Culture JMC celebrates the milestone of a tenth anniversary. To that end, a coding scheme was developed around the emerging themes from publications. This paper brings together a selection of these themes as a strategy to look back at the Journal’s history. Beyond the reference section, we include a bibliography of the corpus of published papers. The bibliography is a living document, in that it will be published with abstracts with each future edition of the Journal. While the authors are acknowledged as the “founding” editors for the Journal of Mathematics and Culture, the JMC is the accomplishment of many. We conclude with acknowledgements of the individuals that have made this tenth anniversary issue a reality.

Journal of Mathematics and Culture

The journal's contents examine the intersections between mathematics and culture in both western and non-western societies, and among both math professionals (such as university mathematicians, mathematics educators, and cryptologists) and non-professionals (such as carpenters, indigenous healers, and hair stylists). We define culture broadly, to include all scales: ethnic groups, nations, labor communities, religious traditions, professions, and so on. Particular aspects of culture examined might include broad social dynamics such as race and gender, or micro-practices such as dancing or computer programming. Mathematical practices include symbolic systems, spatial designs, practical construction techniques, calculation methods, measurement in time and space, specific ways of reasoning and inferring, ordering, classifying, and other cognitive and material activities which can be translated to formal mathematical representation. Of particular interest are educational studies which take the classroom setting into account, such as pedagogical applications of ethnomathematics.

Keywords: Ethnomathematics
Introduction

We don’t know if anyone planning for a journal such as this one sitting in the hotel lobby all those years ago would have believed that the JMC would celebrate 10 years, but here we are, indeed! The first decade is history. This has been a wonderful journey connecting ethnomathematics colleagues from around the globe. Today the Journal is truly international, accepting manuscripts in Arabic, English, and Portuguese.

We have been very fortunate with our editorial board, representing many countries and many educational institutions. Through the years members of the board have reviewed manuscripts from six of the world’s seven continents. In the year 1977, Professor Ubiratan D’Ambrosio at the Annual Meeting of the Association for the Advancement of Science (AAAS) brought the term “Ethnomathematics” to the audience of his colleagues (Mesquita, Restivo, and D’Ambrosio, 2011). D’Ambrosio’s 1985 article elaborated the meaning of this term. In the years since Professor D’Ambrosio brought this term, really, this concept, to light, we have seen shifts in attention to the scholarship identified with Ethnomathematics. The important work of mathematics (through a western view) of cultures continues to be an emphasis. We acknowledge tension exists amongst scholars about the “western view.”

Writing about the topic of cultural mathematics for readers with backgrounds primarily in Western mathematics brings one to a dilemma: On one hand, using Western terminology and notation to describe mathematics of non-Western cultures is inherently inaccurate because people in such cultures would not think of the mathematical content in the same way as it is perceived in Western culture. On the other hand, if the goal is for people of Western backgrounds to understand how cultural activities can be understood as mathematics, then one must speak to readers in familiar mathematical terms. (Gilsdorf, 2012, p. xii).
Looking Back

A quick count reveals that JMC has published nearly 60 manuscripts in our history. Included in this count is the focus issue of the International Congress of Ethnomathematics hosted by Dr. Lawrence Shirley. JMC published the abstracts of the ICEm hosted by our late colleague Dr. Paulus Gerdes. Unknowingly, the Journal has “previewed” work that has led to the publications of books, Gildsorf, 2012; Katsap and Silverman 2016; and Vandendriessche, 2015. A unique characteristic of our editorial board is the opportunity they have to mark the last question on the review form: “If you are not recommending “Accept”, would you be willing to work with the author(s) to get this manuscript into publishable form?” Checking “yes” on this space, our editorial board members have supported and mentored many of our colleagues. This academic altruism has led to a number of publications in the JMC that may otherwise have never been published nor certainly even read. We have been pleased to support junior colleagues, graduate students, and our senior colleagues, all who have chosen the Journal as an outlet for their important work.

Anniversary Edition Motivations

A motivation for this anniversary issue was forward thinking, an opportunity for our authors to reconsider their papers and reflect back. We encouraged the reflection to be inclusive of pedagogical considerations. We are told that ethnomathematics is part of the Brazilian national curriculum. In the United States we are aware of ethnomathematics courses occurring in higher education. We felt it was important for a moment of reflection to consider connecting our scholarship to our classrooms.
A second motivation for this edition is for us as a community to continue to look forward. Of late, the pioneering work of Ethnomodelling (Bassenezi, 2001; Rosa & Orey, 2013) has established a firm agenda for the Ethnomathematics community. New questions arise and expanding views of the scholarship are emerging as pioneering work from Brazil and the United States becomes available to our global community.

We acknowledge and dedicate this anniversary edition to those that have allowed us to stand on their shoulders to see further: Ubiratan D’Ambrosio, Marcia Ascher, Beatriz D’Ambrosio, Sandy Dawson, Paulus Gerdes, Rex Matang, and Claudia Zaslavsky.

As the Journal of Mathematics and Culture continues we look forward to expanding our role to be inclusive and the representative of many global voices. In the words of our dearly departed friend and colleague Beatriz D’Ambrosio (personal communication, 2015):

The Journal of Mathematics and Culture has become an important outlet for work in ethnomathematics, mathematics for social justice, and political dimensions of mathematics teaching and learning. While still a relatively young journal, the high quality of the articles that have appeared to date are an indication that this journal will soon be ranked in the top tier in the country. The co-editors are responsible for recruiting authors of the highest quality…This initiative has made a huge impact on the field and opened a new outlet for researchers striving to participate in the knowledge production in mathematics education…This has been an enormous service to the field, while also being a significant contribution to the production of knowledge in mathematics education.

Emerging Themes

An emerging ethnomathematical theme through the years has been “calendar.” Bishop (1991) introduced six cultural activities that have served as a theoretical framework for many scholars working in Ethnomathematics, (see Figure 1).
These universal, every day, naturally occurring activities are interrelated, which is clear from Bishop’s (1991) work. When Shockey, Mitchell, and Barta considered Bishop’s (1991) framework, they highlighted that these activities are not mutually exclusive. In the ten years of JMC, authors have brought the concept of calendar (Bjarnadottir, 2010; Sharp, 2015) to the forefront. To that end, we are reconsidering the rendering of Figure 1 to “grow” from a hexagonal representation to a heptagonal representation inclusive of calendar, (see Figure 2). We must consider whether calendrical activities fall sufficiently within the domain of naturally occurring measuring behavior, or whether at their root they are more sophisticated than the existing behaviors within Bishop’s (1991) work.
We are suggesting that it may be worth considering Calendar as a stand alone activity as many activities have a time of year associated with them.

Fossa (2006) stated that: “Ethnomathematics is generally concerned with the resolution of practical problems” (p. 32). Practical problems or connections to everyday life have emerged as a theme through our history. Staats (2006) discussed her research on Ethnomathematics case studies for her students to “develop subjective, values based motivation to study mathematics” (p. 39). Palhares (2006) focused our attention on his findings from an after school program where “students worked on projects that connected mathematics to their lives” (p. 12). These connections explored through an
ethnomathematical lens are found in the African drumming work of Sharp and Stevens (2007).

As many of our authors have emphasized connections, which is a point we attempt to illustrate in Figures 1 and 2 that each of the categories is connected to the others. In the teaching of a course in ethnomathematics, many of us have worked with our students to bring out this interconnectivity. Another component of connections has to do with linking research to the classroom through motivations of being culturally responsive (Bonner, (2010); Barta & Shockey (2006); Diez-Palomar, et. al (2007); Ealey & Henzel (2012); Engblom-Bradley (2006); Harding-DeKam (2007); Katsap & Silverman (2008); Massarwe, et. al (2010)).

Another theme that has become prevalent is the “voices” we “hear” as readers of work that is occurring globally. Owens (2012) brings the voices of New Guinea to our readership, we hear Native American and First Nations voices in the works of Barta and Shockey (2006), Galindo et. al (2009), Engblom-Bradley (2006), and Ealey and Henzel (2012). Chahine and Kinuthia (2013) bring a Zulu voice to our pages, Adams (2012) brings the voice of weaving, Goetzfridt (2012) brings us the voices of the Caroline Islands of Micronesia, and Naresh (2012) shares the voices of India bus conductors. The stories and engagement that JMC has been privileged to be a part of are very rich. We hope that such stories and research continue to be shared through the Journal of Mathematics and Culture for many more years.
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We acknowledge all of our important reviewers from our origins through today. This journey would not have been possible without each of them.

References


This paper describes an adaptation of a methodology called ‘mutual interrogation’ to a study on Malay weaving. The interrogation was focussed on the weaving technique, framework construction and pattern formation. Mutual interrogation is a process of implementing a critical dialogue between two systems of knowledge. Using this approach, a three-cycle dialogue between several weavers and mathematicians was implemented, with the researcher playing the role of a mediator. The interactions between the concepts of the weavers and the conventions of the mathematicians have uncovered several interesting perspectives, which consequently dispute several critics of ethnomathematical research.


Estimation is a learned skill that supports learning and applications in measurement as well as other quantitative contexts. Estimation is an important skill to learn in that it provides a foundation for measurement – it helps one determine the most appropriate tools for measuring specific items. Estimation is equally important as it helps one determine whether or not an actual measurement obtained is reasonable for a given context. It can be beneficial for learners to explore the application of estimation so that they have context and motivation for learning to estimate. The authors engaged with selected professionals during the course of their work to obtain information about when they use estimation, how they use estimation, how they determine if estimation is helpful and when they decide not to use estimation. The authors share estimation activities of the professionals, which result in “estimation declarations” and suggestions for the teaching of estimation.


Ethnomathematics is a research program that focuses on the relationships between mathematics and culture. What impact does this vision have on mathematics education? We approach this question from two points of view that require: 1) some substantial methodological changes and 2) some changes on how to approach the content. We wish to focus here on teachers training in primary education in Argentina. We present a way to integrate methodology and content: the Microproject and we report an experience with Argentinian pre-service teachers.
In 930, at the close of the settlement period in Iceland, a week-based calendar was adopted. Observations of the solar cycle soon revealed errors of the calendar, which were cleverly amended. In the 12th century, the week-based misseri calendar was adjusted to the Roman calendar used by the Christian Church. It remained in common use for secular purposes until the 19th century, and detailed guides to it were written. Special occasions related to it are still celebrated.

The ancient culture of the island of Great Canary relegates an archaeological pieces of high symbolic value for the islander population, known like “pintaderas canarias”. His designs, entirely geometric, lead us to the search of a method that allows us to interpret them from a mathematical point of view for his later introduction in the education as a real cultural resource.

Culturally responsive pedagogy is one way that teacher educators and teachers can address the unique sociocultural and cognitive needs of learners from diverse backgrounds while shifting away from traditional school practices and mathematics teaching methods. This article describes a teacher educator’s inquiry project that aimed to encourage and enhance culturally responsive thoughts, discussions, understandings, and actions among pre-service mathematics teachers in a mathematics methods course for elementary school teachers. Results show that in constructing meaningful in and out of class experiences that focus explicitly on culture, pre-service teacher understandings of culturally responsive mathematics teaching are enhanced and deepened.

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The purpose of this paper is to highlight the role of ethnomathematics as a model for translating and interpreting mathematical structures inherent in existing indigenous technologies used by South African indigenous people as means of survival and adaptation in a variety of environments. The present study focuses on the riches of two indigenous technologies as media for transmitting specialized mathematical knowledge produced and disseminated by the Zulu culture, namely beadwork and basketry. We argue that prospective work that investigates other indigenous technologies with underlying ethnomathematical ideas can be highly enlightening and reflect major breakthroughs in the field of indigenous mathematical knowledges.


This article describes an experience of teaching and learning mathematics in an after-school program based in a southwestern city, in which the students worked on projects that connected mathematics to their lives. In the project that we describe, the students discussed and solved problems about their school, their neighborhood, and immigration from a critical perspective. The pedagogical approach of our “Math Club” is grounded in socio-cultural approaches, from a critical point of view. This experience highlights the connections between mathematics and everyday life that are brought out when emphasizing culture, language, and dialogue among mathematics learners. Implications are made for drawing on student agency through mathematics learning.


This paper introduces a new inclusive theoretical model, integrated multicultural instructional design (IMID), and discusses its potential for application within undergraduate mathematical thinking courses for nonmathematics majors. The guiding principles of IMID build upon the constructs of multicultural education, ethnomathematics, and universal instructional design (UID), a model for inclusion of
students with disabilities in higher education. The paper addresses how IMID is compatible with research and practices promoted by international and national mathematics organizations by maximizing equity, access, and success for all learners. The international goal of increased mathematical literacy necessary for all to achieve effective global citizenship and participation is addressed.


Academic and educational success for all students has become an international focus. In Alberta, Canada, there is concerted effort to increase high school completion rates, specifically within First Nations, Métis and Inuit (FNMI) populations. To this end, FNMI content and perspectives are being infused into all curricular areas to ensure the educational engagement of FNMI students and others. This paper traces the journey of the contextualized infusion of FNMI content and perspectives into the resources produced to support the Common Curriculum Framework for Grades 10—12 Mathematics, Western and Northern Canadian Protocol, January 2008


This paper is about the use of mathematics in Yup’ik navigation strategies, as practiced by Fred George of Akiachak, Alaska. Fred George travels by snow machine over snow covered frozen lakes and tundra in the Yukon-Kuskokwim Delta. In day light, he uses the position of the sun and time of day to determine his direction. On clear nights, he uses the position of the Big Dipper and time of night to determine his direction. In addition, he observes the frozen grass, isolated trees, and/or snow waves to reinforce his direction. The sun, Big Dipper, frozen grass, isolated trees, and snow waves function as natural compasses for Fred George.

Originally mentored by his father when he was a boy, Fred has continued to develop his navigational skills on the tundra for over 60 years to hunt and fish for his family of eight children and many grandchildren. He passionately wants to pass his navigational skills on to the young people in Akiachak. He knows young people are no longer being mentored by their families to navigate. Yet many young people drive snow machines, and many become lost on the tundra.

To help Fred George with this mission, this paper was written for the teachers in Akiachak and other native villages. The paper contains descriptions and explanations of
the mathematics in navigation practices used by Fred George, plus appropriate classroom activities, which facilitate student understanding of natural compasses, available on the tundra. This valuable knowledge will help young people find their direction when they venture out on a snow machine over frozen lakes and snow covered tundra. In addition, the connection of mathematics to navigation and subsistence supports the cultural knowledge of Yup’ik students, and will contribute to their successful transition into adulthood throughout West Central Alaska.


Ethnomathematics is generally concerned with the resolution of practical problems and thus it is natural to investigate how this new science can be combined with cooperativism in order to foster sustained economic development. It is maintained that one way of developing this kind of investigation would include some business mathematics, informal logic and practical ethics. A project, implemented in a rural area of the Brazilian Northeast, is described in terms of both research into the community's ethnomathematical knowledge as well as pedagogical situations in which this knowledge and academic knowledge are taken into account.


This paper considers the field of enquiry called ethnomathematics and its role within mathematics education. I elaborate on the shifted meaning of ‘ethnomathematics’. This “enriched meaning” impacts on the philosophy of mathematics education. Currently, the concept is no longer reserved for the so called ‘nonliterate’ people, but also includes diverse mathematical practices even within Western European classrooms. Consequently, mathematics teachers are challenged to handle people’s cultural diversity occurring within every classroom setting. Ethnomathematics has clearly gained a prominent role, within Western European curricula, becoming meaningful in the exploration of various aspects of mathematical literacy. I discuss this enriched meaning of ethnomathematics as an alternative, implicit philosophy of school mathematical practices.


Given the flow of global policy and educational reform, a number of countries are approaching junctures on issues of equal access and opportunity. This study begins with the major role supplemental mathematics education plays in Japan. Research was conducted as a visiting scholar at the University of Tōkyō, and supported by classroom experience. The contextual background then leads to a discussion on sector relationships in the U.S., where a culture has emerged of relying on privatized education such as
academic tutoring and test preparation. Although educators in both countries question the impact of growing sector disparities, the reality is that they have just begun to address issues of equity and accessibility to ensure education is provided as a public good.


In an effort to bridge policy and practice in diverse populations, research was conducted at U.S. higher educational institutions (Harvard, UCLA, University of Hawai‘i) in the field of ethnomathematics. Ethnomathematics addresses first, how cultural values affect teaching, learning, and curriculum; and second, how mathematics education affects schooling process dynamics. A macroperspective provides a foundation for exploring the policy framework that will be bridged by ethnomathematics to explore practices at the school level (equity and quality education, building successful partnerships, mentoring in diverse populations). This has been accomplished primarily through the Hōkūle‘a, a voyaging canoe internationally renowned for rekindling the Pacific tradition of celestial navigation to locations such as Tahiti, Rarotonga, Micronesia, Japan, and the U.S., and is preparing for a worldwide voyage in 2013 of which the author will be participating in. It is a vehicle to explore real-world mathematics applications in global communities, and represents resourcefulness, inventiveness, wisdom grounded in the past, and hope for the future.


While many studies report dismal American Indian/Alaska Native dropout rates, this paper provides insights from American Indian/Alaska Native teachers, Shoshone-Bannock Tribal members, and University staff on a successful education paradigm for Shoshone-Bannock students. Our students are finding success in projects that join traditional knowledge and respect of the Shoshone-Bannock people with scientific guidance from a local university. Our goal is to strengthen the links between science and math programs at the Shoshone-Bannock High School and Idaho State University, and to use this relationship to draw students from secondary schools into the university setting. The newly established Portneuf River Ecosystem Project (PREP) is but one example of a research focus for the component of this partnership. In 1998, two Shoshone-Bannock students were interested in higher education. In the years (2003, 2004), ten students applied to institutions of higher education. A question was asked by an Elder from the Shoshone-Bannock Indian Reservation located in Southern Idaho, “Of all the things you are teaching in science and math, are you teaching the most important subject of all...compassion for all that live on and with Mother Earth?"

This document relates to the role that should have the Ethnomathematics in teacher training in Costa Rica. Starting with a brief overview of some aspects multicultural social de Costa Rica, we discussed the importance of introducing in the training of teachers of mathematics knowledge implicit in the living cultures of this country. We show some conclusions of the consultation which took place with a group of specialist about Ethnomathematics and teacher training of Costa Rican as part of the Final Master Work presented at the Department of Mathematics Education at the University of Granada, Spain, in September 2009.


This article is about the mathematics of the cultural group known as the Otomies, of present day central Mexico. In particular, I discuss the Otomi number system and a comparison of that system with Aztec counting, Otomi art and decoration, mathematical symbols that appear in some Mesoamerican codices, and the Otomi calendar.


Contrasting geographic features that are evident between atolls and islands in Micronesia and in large Pacific land masses, particularly those of Papua New Guinea, have historically compelled indigenous peoples to apply distinctive linear systems related to distance, place, and ancestral origins. In the Caroline Islands of Micronesia – particularly on the islands of Puluwat and Satawal – traditional land finding techniques have applied linear approaches to the rising and setting of stars as they relate to specific sea routes between home islands and target islands. While linear concepts used in the culturally nuanced, earth grounded sand drawings in the Melanesian nation of Vanuatu are unique in their own right, linear based mnemonic systems for the recollection of ancestral origins and prestige granting cultural knowledge at sea in the Caroline Island and on the ground in Melanesia have interesting similarities. A greater academic concentration on the rich ethnomathematics of the Pacific could yield a trove of revelations in comparative cultural practices.


Ethnomathematics is a term that has been coined to elucidate that everyone uses and can learn mathematics. This manuscript demonstrates how a college Mathematics Methods Course at a Doctoral Intensive University in the Rocky Mountain Region can implement the idea of using the culturally diverse background of students as a foundation to teach children learning second languages and children of diverse cultures. This includes one year of quantitative and qualitative research about prospective elementary teachers who were instructed on how to teach children learning second languages during their Mathematics Methods Course. These prospective teachers then applied these methods
while completing their student teaching.


This article describes the benefits of service-learning for undergraduate preservice teachers, specifically through the example of an international partnership between education students at a liberal arts college in central Pennsylvania and primary school teachers of children with disabilities in the country of Burkina Faso, West Africa. Four undergraduate college students studying mathematics, education, statistics, and art wrote and illustrated a children’s counting book that is culturally appropriate in a French West African context. Through this project, the student team learned firsthand about issues of language, culture, mathematics, literacy, and special education. The partnership, which has since expanded in scope and involvement to school library development and robotics, is rich in connections to diverse learning environments and provides meaningful resources and motivation for preservice teachers on multiple levels.


In this study researchers investigated the effects of the use culturally relevant word problems on second graders’ mathematics achievement. The participating elementary schools were in one of three groups: control, word problems, or culturally relevant word problems. A pre- and post-test design measured the effectiveness of the interventions. The two intervention schools taught problem solving for 15 minutes twice a week. The culturally relevant word problem group used modified problems based upon a home survey while the word problem group used textbook problems. Findings from this study suggest further research investigating the use of culturally relevant problem solving instruction is warranted.


This article documents maguey bag production by two Mayan elders and presents an emergent analysis of the Mayan ethnomathematics involved in the procedure. Maguey bags are created using the vigesimal system, which provides continuity to a process transmitted orally and by example since the time of the ancient Maya. This method, handed down by Mayan elders to their grandsons, offers a glimpse into the role of mathematics in strengthening the identity and political resistance in autonomous rural communities in Chiapas, Mexico.


Mathematics prospective teachers (MPT), Jewish and Bedouin alike, who came together in the Ethnomathematics Program (EP) in the Kaye College of Education (Israel), explored, identified, and learned naturally occurring mathematics in the cultures of their own people. They developed projects based upon their explorations and shared them in class. The MPT participated in collaborative discussions and formed intercultural understanding within a purposefully conducive classroom atmosphere. In particular, they shared with one another classroom activities for their classmates, plans for transferring their accomplishments to school children, ethnomathematics activities derived directly from cultural experiences, as well as mathematics content and pedagogy. This case study investigated and documented the intentional integration of two people’s cultures, traditions, and their ethnomathematics, on the one hand, with mathematics content, history, and pedagogy, on the other. The MPT learned ethnomathematics in the cultures of their own people and came to perceive mathematical concepts as a mix of two significances: one meaning stemming from their abstract courses in academic mathematics, a focus preeminent in western culture, and the second, stemming from comprehension of practical math concepts rooted for both Jews and Arabs in their cultures of the East. The following perception arose during class debates, discussions, and sharing of projects: that there is some common religious knowledge (e.g., that of the number seven in passages in the Torah and in the Koran) and common ritual (e.g., Jewish and Muslim religious women must cover their heads) in both lines of the descendants of Abraham. However, the big take-away point is that just an exposure to mathematics rooted in socio-cultural settings of their own people was not sufficient to have altered the standpoints of the class members toward the way in which mathematical concepts should be seen. Inquiry into situations where mathematical practice actually occurs was necessary.


Little is known about the ancient calculating device of the Incans la yupana. It was a tablet upon which stones, grains, or beans were placed and manipulated to perform calculations. This paper critically examines the little information available on la yupana and proposes a new interpretation, taking into consideration both mathematical and cultural factors. The conclusion reached is that la yupana is an abacus that directly correlates with the quipus, performs addition, subtraction, multiplication, and division in base ten, can be used to decompose numbers, and reflects linguistic principles of the
Aymara language. A better understanding of the Incan abacus could lead to further insights about the civilization.


This paper presents two case studies that examine an approach to teaching geometry through an ethnomathematics exercise in analysis and construction of culturally meaningful ornaments. The exercise was given to students from the Arab sector high schools in Israel. The studies indicated that the students perceived the practice of constructing geometrical ornaments and discovery of their mathematical properties as a meaningful and enjoyable learning experience. This experience inspired emotions, lively discourse, and learning motivation. It arose into a geometrical and socio-cultural inquiry, reflecting the students' thirst for practical use of the acquired mathematical knowledge and their awareness of cultural identity.


This paper reports our study which was conducted in Israel in the framework of the ongoing project "Joymetry - Learning Geometry and Culture through Joyful Activity of Analysis and Construction of Ornaments". The project aims to raise students' and teachers' awareness of the interplay between geometry and culture as a lever for geometry and multi-cultural education, through the engagement of secondary school students, and teachers in ethnomathematical activities rooted in their own and other cultures. We present the core of the project, a new course "Issues in Ethnomathematics: Teaching Geometry in Socio-Cultural Context" that we have delivered to pre-service and in-service teachers at the Technion annually, since 2007/08 academic year. The course is given and is directed towards developing competence of teaching multi-cultural groups. It culminates in a workshop, where each student teaches analysis and construction of ornaments from a specific culture to a diverse group of Jewish and Arab school pupils. Our study indicated that the course helped the students to significantly enhance their content and pedagogical content knowledge in geometry, and to understand the importance of ethnomathematical learning activities related to the pupils' own and other cultures.

Drawing on experiences from Māori immersion schools in New Zealand, this paper examines the impact of language when ethnomathematical practices are discussed. The inclusion of ethnomathematical perspectives into the mathematics education of indigenous students is often described as being beneficial. In New Zealand, it is also perceived as supporting the revitalisation of the Māori language, te reo Māori. This paper will argue that cultural practices including ethnomathematical ones cannot be separated from the language in which they were developed. Changing the language or the linguistic register in which the practices are discussed will have an impact on how the practices are perceived by students. This could result in a loss in the fundamental values that would normally accompany the practices. Without proper consideration of this issue many of the benefits aligned with using these practices may be nullified.


This paper aims to discuss the description of a practice within ethnomathematics from a contemporaneous point of view, without separating describer from a practice described. For that, instead of looking for mathematics in a practice, we defend the idea of describing a practice mathematically. Besides that, we point out what would be the ethnomathematics researcher role within this vision, and a methodological path based on Alangui’s Mutual Interrogation methodology.


Although over the past 15 years, mathematics education research has begun to explore the nature of the mathematics used in different workplaces, the research field of workplace mathematics is still in its infancy. Guided by the desire to add to the mathematics education research in India, the general aim of this study is to develop a better understanding of the mathematics used in everyday situations. To this end, I focused on the workplace mathematics of bus conductors in Chennai, India. More specifically, the purpose of this study is to observe, understand, analyze, and describe the mental mathematical practices of the bus conductors in their workplace and examine what this knowledge can add to the study of everyday mathematics.


Vedic mathematics, based on sutas from ancient Hindu texts, was rediscovered in the early twentieth century by Bharati Krishna Tirthaji (Stemn & Collins, 2001). Vedic
mathematics deals mainly with mentally carrying out tedious arithmetical operations. While studying a particular Vedic algorithm and its connections with standard arithmetic operations, the authors discovered connections to a nonstandard multiplication algorithm, the finger algorithm, found in a mathematics textbook for preservice elementary teachers. These connections provided justification for why the finger algorithm works. This paper discusses a justification of the Vedic algorithm and how it led to justification of the finger algorithm.


In this article, the authors discuss ethnomathematical concepts that were found useful in the interpretation of assertions and challenges faced by the Ethnomathematics Program for teacher professional development, as described by D’Ambrosio. The authors share the student’s teaching-learning process, and for mathematics education in our ongoing work in Brazil and the United States. The discussion begins with a brief examination of where ethnomathematics stands today in respect to the process of teaching and learning of mathematics.


This paper presents some aspects of Indigenous mathematics in Papua New Guinea in order to establish its value for Indigenous people and their education. It also points out the value of research into Indigenous mathematics to strengthen mathematics education in general. It provides richer perspectives and understandings of mathematical relationships and language. The paper complements previous work undertaken on counting systems based on work by Glen Lean (Glen Lean Ethnomathematics Centre University of Goroka, 2003; Owens, 2000, 2001) and focusses on recent research in the space and geometry and measurement aspects of Papua New Guinea Indigenous mathematics.


This paper presents some policies and practices that occur in Papua New Guinea and Australia. It is argued that school systems must recognise cultural mathematics and teachers need to establish dialogue with communities, especially Elders, in order to provide a socially just education for Indigenous students. Several recent policy recommendations are provided as examples but there is still much more to be done to provide adequately for Indigenous mathematics education. One aspect needing development is the making of links between culture and school mathematics in order to maintain and develop a richer mathematics. Several examples are provided.

En este documento se abordan detalles referidos a la capacitación en Etnomatemática que se concretó con la construcción de Proyectos pensados como materiales formativos y derivados del contexto donde los participantes del curso ejecutan su acción docente. En los Proyectos elaborados se exploró la Matemática usada fuera de la escuela en función de la construcción y uso de objetos ancestrales de su cultura, encontrándose que allí subyacen abundantes contenidos matemáticos que sirven de insumo para la concreción de actividades escolares sustentadas en tales contenidos. Se concluye que es importante que estos docentes no solo reconozcan la diversidad cultural correspondiente a su comunidad sino que valoren, analicen y promuevan la construcción de Proyectos que emerjan de las prácticas matemáticas desarrolladas por los diferentes grupos culturales, tomando en cuenta aspectos tales como los sistemas simbólicos involucrados, los métodos y sistemas de conteo, cálculo y medición, las formas específicas de razonamiento e inferencia y otros referentes que pueden traducirse a representaciones de la Matemática formal.


The mathematics education research community has been discussing the issue of the connections between mathematics and culture. This is the main concern underneath this work, as it tries to reveal everyday life mathematics of a fishing community in Câmara de Lobos, Madeira, Portugal. The study followed a qualitative approach based on an ethnographic model. In order to collect data the researcher remained during long periods of time in the field, using participant observation, interviews, photographic and video registers and document collection. Data analysis was of an interpretative nature. We focus here on the mathematical notions of ratio and fraction and how they are used within the community, especially by one caulker living there.


Preparing pre-service teachers (PSTs) to work with culturally relevant mathematics and family math learning events (FMLEs) in mutual settings are important goals. This paper promotes these important teacher preparation goals as implemented in an after school program by a university math content faculty along with other FMLE support faculty. To
illustrate, this paper focuses on a culturally relevant mathematics activity based on the popular social event known as the Quinceañera (the 15th birthday party for a young lady) presented at FMLs by PSTs and which explores the customs of the Hispanic culture coupled with linkages to mathematical connections.


Dice games were a common feature of Native American culture at the turn of the century. This essay reports on my examination of 40 Native American dice games described by James Culin (1992) in his two-volume 1907 work on Native American games from the point of view of discrete probability theory. I provide some initial answers to the question of whether or not the point values assigned to the outcomes of these games reflect the a priori probabilities of the outcomes.


The implementation of a culturally relevant pedagogy in the mathematics curriculum helps to develop students’ intellectual, social, emotional, and political learning by using their own cultural referents to impart their previous knowledge, skills, and attitudes. A culturally relevant pedagogy provides ways for students to maintain their identity while succeeding academically. In this context, there is a need to examine the embeddedness of mathematics in culture by drawing from an ethnomathematical perspective that takes on the cultural nature of knowledge production into the mathematics curriculum. Ethnomathematics and culturally relevant pedagogy-based approaches to mathematics curriculum are intended to make school mathematics relevant and meaningful as well to promote the overall quality of students’ educational experience.


There is much to be relearned about mathematics by seeing it from a viewpoint of a particular society. This paper describes measurement concepts by illustrating how the
ancient Hopi used them to actively mathematize their environment, building a calendar for celebrations and festivals necessary for their societal mission. The core mathematical concepts are: size, standard unit, zero-origin, tiling, continuousness, and part-whole. The Hopi calendar is presented in terms of the importance and development of the moon, as a counting unit. Ultimately, a 13th moon helps explain the Hopi calendar and further clarifies the mathematical concepts.


Aside from being its own field of study, algebra has long been a servant to upper division courses and arguably to productive citizenship. Algebra plays a key role in courses like chemistry and trigonometry, which are the kinds of upper level courses required of high-tech, usually high-paying, occupations such as engineering. Keeping learners out of upper division courses also means limiting their potential for active citizenship in society and economic success (Povey, 2003). Many (see Burton, 2003) argue more philosophically that access to and knowledge of mathematics leads to an empowered populace, making it a key to social justice. Unfortunately, algebra can appear to be a tool of injustice when it protects upper division mathematics courses from potential students. Intentions are understandable since success in those courses requires algebraic thinking. Under-prepared students often fail. But, the net result has been to preclude students from those courses rather than to ensure students are prepared for those courses. Robert Moses (Moses & Cobb, 2001) suggests that algebra must move beyond its role as a pre-requisite hurdle. He refers to algebra as a civil right, suggesting that all learners have the right to know algebra. Viewing algebra in this manner elevates its justice status, allowing all students greater opportunity to economic success.

If such equity is a desirable goal, the mathematics education community should develop teaching strategies that resonate with all learners. For algebra teachers to provide teaching and learning opportunities that promote access for more students, we need insightful pedagogical knowledge and deep algebra knowledge. Practicing culturally relevant pedagogy is an approach that may require teachers to develop these kinds of knowledge. By posing problems that are relevant (Hart, 2003) and that allow students to respect, appreciate and/or celebrate other cultures (Boyer, 1990) teachers’ pedagogical knowledge may become stronger. Driscoll (1999) suggests that a useful strategy to support efforts to deepen algebra knowledge is to provide teachers with experiences learning algebra in new ways and in unexpected settings. Together these kinds of knowledge impact teachers practice. In this paper, we describe an atypical context, African/Afro-Cuban drumming that has the potential to connect teachers’ knowledge about pedagogy and algebra by stimulating algebra learning.

This article outlines a “socially contextualized” approach for integrating ethnomathematics into undergraduate classes. In this approach, students engage issues associated with an application or case study, that are significant socially and anthropologically in tandem with the mathematics lesson. The ethnographic backgrounds of well-known ethnomathematics case studies, Tschokwe lusona and Vanuatuan nitu sand drawings, are used to develop examples of these anthropologically significant issues; a case study on the mathematics of theories of race is outlined as well. By engaging social issues associated with ethnomathematics case studies, students can develop subjective, values-based motivation to study mathematics.


The author was a Fulbright Professor of Mathematics in Monrovia, Liberia, when he had the opportunity to travel upcountry and talk with informants from the villages of Dayala, Graie, Ziah, Zontuo, Zoulay, and Zwutuo, and from the towns of Karnplay, Tappita, and Towehtown. From market women and zo (powerful female medicine makers) to village elders and chiefs, the Dan tribal members showed tremendous pride in their heritage and an openness to discuss most aspects of their culture including how mathematical concepts are expressed in their language and embedded in their activities. It is unclear how this pride and openness have been affected by the recent civil war in Liberia in which half the Dan population were displaced and over ten percent were killed.


The authors argue for a broad mathematical literacy, and explore mathematical practices which concern personal finance and social justice issues. They base their claims on a review of literature that looks at connections among these three areas. Postulating the intersections among these areas, the authors claim that by understanding the connections among mathematics, financial literacy, and social justice, mathematics teachers may revitalize mathematics teaching and learning, such that it develops students’ broad views of social issues, and it realizes their capacity for initiating social change.


This study examined the effect of math history lessons (which focused on the accomplishments of Latin American, African, African-American, and Middle Eastern individuals) on the attitudes of fifteen students enrolled in an Algebra 2 class at a predominantly African-American high school. Qualitative data taken during interviews with the participants showed some important subtle changes in the way they viewed their success in math, the usefulness of math, and the role of race in determining mathematical
success. The effect of the lessons was analyzed according to three pedagogical theories: situated cognition, role model development, and culturally relevant pedagogy.


String figure-making is a procedural activity carried out in many societies of oral tradition. It consists in producing geometrical forms using a string knotted into a loop. In 1988, an American mathematician, Thomas Storer (1938-2006), published a long article in which he developed several formal approaches of string figure-making. One of these is the Heart-sequence. Passing the string around a finger forms a "loop". The point is then to focus, during the process, on the movements of the loops without taking into account the way the fingers operate to make these loops, and to convert these movements into a mathematical formula. This mathematical approach to string figures allows a new reading of string figure procedures which makes it possible to classify them and is a promising way to carry out a comparative study of string figure corpora. This paper concentrates on string figure algorithms leading to "double-sided lozenge" final figures. Although various different methods in forming such a "double-sided lozenge" can be found in geographically and culturally distant societies, only two classes of heart-sequences will be identified.


Minority Access to Revolutionary Instructional Extensions (MATRIX) is a two-part supplemental elementary mathematics curriculum based on six games coupled with a focus on parental involvement and advocacy. One curricular goal incorporates student’s culture into its design to show mathematics comes from many cultures and is an evolving discipline in which students can be active participants. The article data comes from a larger pilot study conducted in a rural African American community. This article speaks specifically about the ethnomathematical games in the curriculum in addition to discussing the “lessons learned” by the researchers for the opportunity for teachers to be leaders in incorporating community cultures into classroom practice.