

**DIGNITY, RECOGNITION, AND RECONCILIATION: FORGIVENESS,
ETHNOMATHEMATICS, AND MATHEMATICS EDUCATION**

DIGNIDADE, RECONHECIMENTO E RECONCILIAÇÃO: PERDÃO,
ETNOMATEMÁTICA E EDUCAÇÃO MATEMÁTICA

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In honor of Ubiratan D'Ambrosio

Mathematicians and math educators must accept, as priority, the pursuit of a civilization with dignity for all, in which inequity, arrogance and bigotry have no place. This means, to achieve a world in peace.

ABSTRACT

Ethnomathematics owes both its power and its limitations to its origins in the Western conceptual axioms of culture and mathematics. We explore potentially contradictory impulses inherent to ethnomathematics that prevent richer applications to mathematics education, as well as some ways through which these contradictions sometimes preserve forms of indignity and injustice. We then propose alternative foundations for the program of ethnomathematics grounded in post-colonial notions of dignity, recognition and reconciliation, connecting these ideas to forgiveness as both critical awareness of dispossession, and as refusal to allow dispossession and indignity to influence the present and future.

Keywords: Ethnomathematics; Mathematics Education; Dignity, Recognition and Reconciliation; Forgiveness.

RESUMO

A etnomatemática deve tanto seu poder quanto suas limitações às suas origens nos axiomas conceituais ocidentais da cultura e da matemática. Assim, exploramos os impulsos potencialmente contraditórios inerentes à etnomatemática e que impedem as suas aplicações mais valiosas para a educação matemática, bem como os meios pelos quais essas contradições, às vezes, preservam as formas de indignidade e de injustiça. Dessa maneira, propomos bases alternativas para o programa etnomatemática fundamentadas em noções de pós-coloniais de dignidade, reconhecimento e reconciliação, conectando essas ideias com o perdão tanto como consciência crítica de

desapropriação como de recusa em permitir que a desapropriação e a indignidade possam influenciar o presente e o futuro.

Palavras-chave: Etnomatemática; Educação Matemática; Dignidade; Reconhecimento e Reconciliação; Perdão.

1. Introduction

We have a tendency, when seeking an historical perspective on *ethnomathematics*, to inappropriately read history backwards, as progressively leading toward the present, and establishing a range of possible futures. It might appear now that ethnomathematics has always been grounded, perhaps implicitly if not explicitly, in the pursuit of social justice. Certainly, we can read an essay by Ubiratan D'Ambrosio (2007) as taking this history for granted, and cajoling us to center such pursuits in working for a particular and nuanced *world in peace*. In the present contribution, we explore the potentially contradictory impulses inherent to ethnomathematics from its early percolations, explore some ways in which these contradictions sometimes preserve forms of indignity and injustice, and then propose a stronger use of the concepts of dignity, recognition and reconciliation as a way of dwelling in the efficacy of solace. Such solace owes its appreciation to forms of *forgiveness* that owe their inspiration to Hannah Arendt.

Ethnomathematics carries with it the strengths and weaknesses of the variety of ethnoscience – those programs of practice and scholarship born of an appreciation for the cultural contexts of human experience. Applying the sensibilities of anthropology and cultural sociology, the ethnoscience make it clear that constellations of life practices and forms of knowledge and truth are at once constrained and enabled by the local forms of culture and power. In this way, ethnoscience belie their Western European biases by at first appearing to recognize the beauty and power of local traditions, while unfortunately maintaining the unequal power dynamics of colonialism – objectifying non-Western cultures as exotic, erotic, and others; at the same time, ethnoscience turn back on themselves, establishing the relative and serendipitous nature of Western European forms of knowledge and truth, creating the opportunity for self-critique and the potential for a reconciliation in a post-colonial world.

Ethnomathematics is less mature than other ethnoscience thanks to the (Western European) perception of mathematics as a culture-free knowledge (Bishop, 1988). This perception was so strongly established as common sense *truth* that it was not possible to exploit, until recently, undeniable anthropological research that had highlighted the relationship between Mathematics and Culture (Appelbaum, 1995). During the final decades of the twentieth century, the landscape of Mathematics *education* changed because of:

- The realization that a psychological approach to mathematics pedagogy was inadequate, necessitating a search for alternatives; and
- The repeated failures of attempts to apply a universal curriculum based on modern mathematics, particularly in developing nations and the global South.

Trying to teach mathematics uniformly throughout the entire known world failed mainly in developing nations and the global South, because it caused strong cultural and cognitive conflicts for local populations as they confronted a Western European collection of concepts and practices. Similarly, psychological approaches to individual

learners, another Western European collection of concepts and practices, were slowly found lacking for all learners in all cultures, as educators found value in those theoretical perspectives that took into account other relevant considerations beyond individual differences, and the ideal sequence of topics (Stathopoulou, 2005). Pinxten (2016, p. 6) poses a question, actually making a point: “What if the vehicles of learning formal thinking vary between groups and traditions, and are to a large extent culture specific?” The implication, for him, is that school curricula really ought to start with out-of-school knowledge and world-view of the local culture, rather than from the mathematical preconceptions of Western mathematicians.

In the early years of the twenty-first century, increased attention to the effects of globalization, international economic and cultural proliferation, and a surge of migration and immigration leading to ever-diverse communities, has buttressed interest in cultural contexts of education in general, and mathematics education in multicultural communities in particular. Lerman (2000) dubbed this the *social turn*. We note, however, that 40 years of scholarship in mathematics education informed by this social turn has led to little more than a surface suggestion that culture might be relevant to explore the nuances and complexities of mathematics and mathematics education as culturally constructed, embedded in cultural contexts, or as a component of socio-political institutions of power and authority.

The relatively small community of ethnomathematicians is both heavily responsible for promoting the social turn, and has remained as *keepers of the flame*, so-to-speak, maintaining a vanguard and marginal status that continues to search for its purposes and for forms of community building consonant with its aims. We can trace ethnomathematics back to at least the 1984 statement from D' Ambrosio (1985) "as the way different cultural groups mathematize (count, measure, associate, classify and draw conclusions). This is done using practices; knowledge, dialects and codes vary from culture to culture" (p. 45). In the 1990s, Appelbaum (1995) called for a *creolized interculture* characterized by the poetry of Aimé Césaire and the emerging discourses of Anthropology as cultural critique (Marcus & Fischer, 1986).

In the past several decades, researchers have approached ethnomathematics through a variety of points of view: as a research activity (Gerdes, 1994); as a subject of study (D' Ambrosio, 1985); as a way of behavior (Zaslavsky, 1994); as a form of expression (Borba, 1990); as a language of communication (Borba, 1990) with the notion of culture to permeate all of them. Unfortunately, this early phrasing of ethnomathematics, consistent with the anthropological understanding of culture as defining difference, was not yet influenced by the discourses of cultural critique, nor by the post-colonial concepts of creolized interculturalities, and instead re-established indigenous mathematical and pedagogical traditions (those not included in the standardized, normative, Colonialist curriculum) as inferior and less sophisticated than those set by developed nations as *universal*.

Ethnomathematics was often side-tracked into an isolated focus on establishing sophistication and elegance, reinscribing through practice criteria for legitimation consistent with the notions of truth and knowledge formed by centuries of global dominance by Amero-Euro-nations. Nevertheless, as we observed at the opening of this article, there has been a parallel and long-standing interest in Ethnomathematics as a force for social justice. After a brief genealogy of Ethnomathematics as increasingly

wrestling with its origins in taken-for-granted concepts, we discuss the specific example of the notion of culture - as a resource and as an obstacle - as an entry into the political dimension of ethnomathematics' colonialist legacies. We conclude with suggestions for ways to build on the postcolonial concepts of dignity, recognition and reconciliation. We dream of a new pedagogical imaginary within which ethnomathematics changes how we enact mathematics and mathematics education via forms of forgiveness that deny dispossession to play a role in the present or future action, beyond its varied manifestations in contemporary social contexts.

2. From Ethnoscience to the Ethnomathematics Program

The term *ethnomathematics* was first used, together with *ethnoscience*, in 1978. Ubiratan D' Ambrosio was speaking at the annual meeting of the *American Association for the Advancement of Science*, in the section, *Native American Science*. He used both the terms to “designate scientific and the mathematical knowledge and practice of the Native American cultures. These words were mainly focusing extant practices of peoples marginalized by the colonial process” (Scott, 2013, p. 243).). Both terms were inspired by the idea and the need to speak about inequalities created in a colonial framework, through the valuing of their own practices. Although the focus was on mathematical ideas embedded implicitly within such practices, neither *culture* as an analytical category for understanding the fact that mathematics knowledge is connected to culture, nor the connection of ethnomathematics to social justice issues, were explicitly present in the articulation of this work.

Some years later, at the 1984 ICME 5 in Adelaide, D'Ambrosio formally introduced the term ethnomathematics as “the mathematics which is practised among identifiable cultural groups such as national-tribal societies, labour groups, children of a certain age-bracket, professional classes, and so on” (D'Ambrosio, 1985, p. 45) and later as “Ethno [culture] + mathema [explaining, understanding] tics as the way different cultural groups mathematize (count, measure, associate, classify and draw conclusions)” (D'Ambrosio, 1989, p. 211). Ethnomathematics can be characterized as the art or technique of explaining, knowing, and understanding diverse cultural contexts (D'Ambrosio, 1990). We might even say, looking back on this moment in the development of ethnomathematics, that this presentation was a clarification of what had perhaps always been present – that ethnomathematics did not yet express for itself a project of social justice initially, but had always, from the early origins in study of local mathematical practices, meant to recognize and appreciate the importance of cultural practices otherwise made invisible by a dominant set of universal assumptions about Western mathematics. Even more recently, D'Ambrosio has discussed ethnomathematics as “the representations of the real that humans construct trying to give explanations of myths and mysteries, that are organized as arts, techniques, theories, systems of knowledge, with the aim of explaining and dealing with facts and phenomena” (D' Ambrosio, 2006, p.17).

Although the above definitions of ethnomathematics do not explicitly underscore socio-political dimensions, nor educational implications, D'Ambrosio and most other scholars of ethnomathematics describe their interest in these areas of concern in a number of articles. For example about the same time as introducing the term of ethnomathematics in his paper, *Ethnomathematics and its Place in the History and Pedagogy of Mathematics*, D'Ambrosio argues for a potential, crucial role of ethnomathematics in

mathematics teaching/learning, particularly regarding the content of mathematics curricula in developing nations and the global South:

Ideology, implicit in dress, housing, titles (...) takes a more subtle and damaging turn, with even longer and more disrupting effects, when built into the formation of the cadres and intellectual classes of former colonies, which constitute the majority of so-called Third World countries. We should not forget that colonialism grew together in a symbiotic relationship with modern science, in particular with mathematics, and technology (Scott, 2013, p. 243).

We see this current article as encouraging all of us in ethnomathematics to take this very seriously.

Is Ethnomathematics research or practice? D'Ambrosio (2007) sees it as a *program* - it arises from research, but contains practices beyond such a narrow scope. Because ethnomathematics as a program justifies the research in a dialogic manner, in terms of curriculum innovation and development, teaching, teacher education, policy making and the effort to erase arrogance, inequity and bigotry in society, it is in this sense something more than a mere science or application of theory; it has therefore become more appropriate to name it a *program*.

Critics of ethnomathematics sometimes misidentify the program as merely a field of research; such critics dismiss ethnomathematics as political correctness gone too far. It is certainly challenging for many scholars to confront the realities of mathematics, as well as educational institutions, as the arms of a political and ideological posture. Ethnomathematics requires this, nevertheless. As D'Ambrosio (2007) asked, "If proposing a pedagogical practice which aims at eliminating truculence, arrogance, intolerance, discrimination, inequity, bigotry and hatred, is labeled as going too far, what to say?" (p. 32).

3. Discussing the Notion of Culture¹

This section uses the notion of culture to introduce a discussion of the contradictions within the grounding anthropological tools and discourses of ethnomathematics. There is no ethnomathematics without a conception of cultural contexts that are understood as constraining and enabling forms of knowledge, truth, interpretation, social change, and pedagogical theory, practice, transformation or evaluation. Culture as a theoretical frame is responsible for the ancillary concepts of enculturation and acculturation, and because of this, the political nature of culture constructs pedagogical practices as inherently political. We are not arguing against culture or condemning Ethnomathematics with this discussion, but rather raising the need for a critical self-awareness of the implications of the origins and fantasies of Ethnomathematics.

3.1. Culture as a Resource

On the one hand, Alan Bishop's perspective from the 1980s offers mathematics educators a useful notion of *Mathematical Enculturation*: he suggested a broad, universal, set of intellectual practices that could be taken as *mathematical*, independent

¹Data for this paper is taken from the project, «Education of Roma children in the Epirus, Ionian Islands, Thessaly and Western Greece», 2010-2013 (E.U. Lifelong Learning, action code: 304263).

of the particular social context: counting, measuring, locating, designing, playing, and explaining. The apparent universality of mathematics results, according to Bishop, from the universality of the adaptive, human goals that define these six types of activities, rather than the *a priori* nature of mathematical principles. Bishop assumed a universality of the activities, but emphasized the diversity found in symbolic mathematical technologies produced by the activities within varying cultural contexts. Similarly, Cimen (2014) quotes D'Ambrosio from 1985 as inserting culture as an unexamined axiom of ethnomathematics: "the mathematics which is practiced among identifiable cultural groups such as national-tribe societies, labor groups, children of certain age brackets and professional classes" (p. 524).

Culture as an undefined but necessary term from what appears to be common sense both makes ethnomathematics possible and qualifies its scope and limitations. Ferreira suggested, "By giving precedence to the cultural context surrounding such practices, this theoretical field brings to light the issues of alterity, the value of difference, and cultural and social relativity" (Ferreira, 2010, p. 371). And it follows from this notion of ethnomathematics that mathematics *education* would be practices of enculturation and acculturation that negotiate the interaction of cultures. Ethnomathematics might in this way have applications to mathematics education, even as it is possible that mathematics education practices could themselves be understood from an ethnomathematics perspective as a subset of cultural practices. Perhaps this possibility is related to the strong focus of ethnomathematics research on the exploitation of informal knowledge in mathematics education (Favilli, 2002; Rosa, Orey, 2011; Stathopoulou 2005).

At the same time, ethnomathematics might create a sensibility that attends to the ways in which mathematics education is a tool of power, in the sense that educational experiences curate forms of knowledge and exclusion, function as processes of normalization and epistemicide (Paraskeva, 2015), and structure the identification of differences across teacher, student, family and community cultures represented in a school environment. Culture provides a lens for comprehending what and how to attend to such variations, as well as a theory for what and how to attend *to*, external to mathematics but impacting upon the experiences of teaching and learning mathematics that are taking place in an educational encounter. One product of culture as a productive term is the identification of a *Multicultural Classroom*, a pedagogical situation defined by a variety of cultures mixing without blending, creating hybrid identities, epistemological and linguistic conflicts, and structures for valuing or devaluing the academic subject named mathematics.

The experiences of Romani pupils in the Greek educational system can serve as a case study of embracing culture as an important term in educational policy. The recent National Curriculum (NC) and Cross Thematic Curriculum Framework (CTCF) of the Greek Primary Education System shifts official discourse from earlier policy documents in which diversity was to be concealed or minimized toward an explicit respect and celebration of cultural and linguistic diversity. Analysis of the national curriculum documents identifies, from an ethnomathematical context, limitations that construct multiculturalism as essential to a contemporary conception of the nation, yet within a conception that freezes particular cultures in stereotyped ways. In particular, the direction of the NC and the CTCF within this model of intercultural learning informed by cultural perspectives is founded on a static definition of culture and cultural differences, which works against its broader goals by promoting the reproduction of a

stereotyped perception of the *other(s)* (Govaris, 2015).

Romani pupils in Greek schools highlight common cultural expectations of a *normal* student through contrasts with the strengths and weaknesses that Romani youth bring with them into learning experiences. Teachers describe and demonstrate that they act upon expectations of a *normal* student who brings certain knowledge, skills and ways of interacting with others that make it possible for them to participate successfully in organized learning processes. Successful participation requires the ability of individual performance, which is constructed by and in turn constructs ongoing evaluation of the learning process of each student. Outcomes of this interaction include attempts by teachers to make sense of students as individuals, for example, about the strong influence of family background on students' school performance.

Terms such as *family background* might at first appear to hide concepts of culture, which, when applied, could work in favor of teachers appreciating differences as something other than individual differences that undermine their efforts to teach individuals. Yet, when these implicit cultural concepts function in combination with the dominant perception that Romani students come from families with deficient cultural and linguistic capital, teachers in recent research studies (Stathopoulou, 2015) translate the individual differences into different cultural backgrounds. This deprives Romani students of the ability to be carriers of a 'normal' knowledge capital, skills and attitudes that a student needs to make a career without any problems at school; but it also reinscribes power differentials, at the cultural as well as individual level. Teachers appreciate the Romani students' performance skills as lower than their non-Romani peers, therefore cultivating reduced expectations in terms of school success.

So we can see that ethnomathematics rests on two undefined terms that are assumed to be universal: culture and mathematics. Ethnomathematics immediately sets up both the possibility of cultural relativism and mere cultural differences that can reinscribe prior power hierarchies of colonialism within a new discourse of culture. If we start from the premise that there are particular and unique ways of being mathematical, and imagine that ethnomathematics can identify a variety of such ways, then we can appreciate two kinds of school mathematics experiences; the first is one of enculturation, in which youth are supported in becoming mathematical members of a particular culture over time; the second, acculturation, recognizes power relations between those who are more or less sophisticated and experienced, and those whose identity is more closely affiliated with the dominant school mathematical culture (and thus have advantages in these power relations); or both.

In other words, *learning* is a common term for enculturation, acculturation, or both. However, this way of thinking crystallizes cultures into static groups of people with common characteristics. It does not enable us to understand individuals, families, and communities as evolving, mixing, blending, and influencing each other, and so on. Instead, it makes possible the normative use of a particular and fixed (majority or dominant) subculture of the broader community as the measure of other cultures, because it can function in ways that determine what is accepted as legitimately mathematical or not, *more mathematical* rather than less, *good mathematics*, and so on.

Greek teachers in our project - referred above - interacting with Romani children tried to be *multiculturally-aware* teachers, and in this way they can be helpful for understanding

such productions of the term *culture*. These teachers, through ethnographic work, knew of their students' culture of origin, and, in this way brought into the school experience specific assumptions (stereotypical or not) about what Roma culture *is*, and how this culture affects their learning potential. Thus, *the* Roma culture - as a resource or as an obstacle - occurs in relation to teachers' images of the relationship between culture and student learning, that is, what teachers expect from the concept of culture itself. Meanwhile, teachers usually understand *mathematics* as the collection of concepts and procedural and factual knowledge contained in an assigned school curriculum.

These teachers, supported by us in the project, embrace Romani culture as likely to support mathematics learning, because they have learned that trade is at the heart of Romani life, and they also believe that trade practices share much in common with the kinds of skills and concepts that compose the assigned curriculum. Here culture produces a set of ways that teachers begin to interact with Romani students, and how they respond to individual students actions in the classroom. It is also empirically evident that many Romani students demonstrate characteristic behaviors of *stereotype threat*: their achievement is often negatively influenced by their perception of themselves as representatives of all Roma, and thus of the potential of any Roma student to be successful in school. We could say that culture might be a (harmful) resource for these learners, as stereotypical representations of non-Roma in ways that affect their perceptions; however, it becomes more of an obstacle for these youth, who tend to create their own sense of self as a learner in general, and as a learner of mathematics in particular, within a particular school and cultural context.

3.2. Culture as an Obstacle

On the other hand, *Culture* is a conceptual tool born of colonialism, and because of this, it drags along with it political implications. Anthropology was an epistemological project of a colonial world, in which culture classified groups of people as others and thus made it possible to interact in unequal ways. Mathematics is also a category of knowledge with a similar history. While there are ways in which many people around the world understand mathematics as universal and even believe that mathematics defines fundamental truths that are independent of cultural contexts, it is also the case that mathematics stamps the world with a conception of the colonial powers as constructing truths for others. The expectation of universality at some level carries with it some elements of the Western, ideological framework of mathematics as neutral and distant from culture, so that an analysis on this macro level creates continuity with that perspective, rendering local variations across less significant or seemingly irrelevant cultures and subcultures. Ethnomathematics has understood from its inception that mathematical knowledge is not historically - and culturally - embedded in Western mathematics.

Some ethnomathematicians have, however, measured and defined cultural traditions by comparing them to the kinds of traditions that are labeled *mathematics* in Western cultures (Eglash, 1999), and, in this way, they maintain a hierarchy of mathematics cultures through the use of a norm. Within mathematics education, mathematics itself is often constructed as the alien culture into which learners must enter, a process of epistemicide that curiously erases the possibility of ethnomathematical, cultural relativism. In more politically nuance terms, mathematics is seen as a particular cultural construct within the Western, European colonialist enterprise (Appelbaum, 1995;

Barton, 1996; Davis & Hersh, 1986).

D'Ambrosio has noted a "common criticism of ethnomathematics as not sufficiently helping students learn mathematics" (D'Ambrosio, 2007, p. 33). It might be more accurate to say that the concept of culture has functioned more as an obstacle to learning, whereas ethnomathematics has hardly found ways to insert itself into school curricula in substantial ways. It is also the case that ethnomathematics has no obligation to aid in a colonialist enterprise of privileging Western traditions over others. What mathematics education and ethnomathematics share perhaps is an ethical stance toward the world, the obligation to recognize each student not only as an individual but also as a human being with membership in multiple and overlapping cultures, communities, dreams, and fears.

The cultural perspective emphasizes how intercultural experiences are always bound up in unequal power relations that serve important roles in the experiences of those involved. We might say that school mathematics serves, through acculturation, important functions in social and cultural reproduction, contributing to the development of *reasonable* people who reason in particular ways, and who are also able to be governed by systems of power and established authorities (Appelbaum, 1995; Cline-Cohen, 1982; Walkerdine, 1987). On the other hand, an awareness of the special vocabulary of school mathematics, and the idiosyncratic ways of working as a student of mathematics that help learners succeed in such a context, offers useful ideas for supporting learners of mathematics who are not yet demonstrating mastery of the material. The particular kind of cultural approach discussed in this context, in this paragraph, distinguishes between the subject knowledge of a course in mathematics and the norms and expectations that teachers of mathematics might have for learners in the course (Appelbaum & Stathopoulou 2015).

It is common in a Greek classroom, for example, that the teacher does not know what sorts of knowledge Romani children bring with them from everyday life into school. In this way, teachers who have not collaborated with us in our project on Romani children cannot legitimate or exploit the funds of knowledge of Romani children through the school curriculum. We can say that teachers do not recognize students as fully members of a community, and that such teachers deny these students the dignity that they might otherwise be accorded. Findings from previous research have indicated that Roma students were capable of solving complex problems with mental calculations related to their oral language community and their experiences working in markets; teachers typically ignored such skills as irrelevant to the procedures they were expected to teach. This created conflicts, both in terms of what could be legitimized and extending through school experiences, and also in terms of the ways that students were expected to learn later concepts and procedures unrelated to the methods that they had learned outside of school; there was a simultaneous de-legitimation of student skills and knowledge and a deskilling of students as the curriculum did not accept this prior knowledge as meaningful for learning.

Students who did not write numbers and algorithms on paper in the ways that were expected of them were deemed failures rather than human beings capable of understanding mathematical questions in alternative forms. A cultural analysis of school experience highlights in this respect the ways that school mathematics does not authorize Roma children's strengths and weaknesses, making them both invisible to

those participating in the school curriculum and to the children themselves. Perhaps an ethnomathematics perspective can change this, by encouraging processes of reconciliation that accept this colonialist history of mathematics and mathematics education and moving forward with the ethical stance that adheres to human dignity. We would ask, *How can school mathematics support the dignity of each student and their families?* rather than, *How can we raise mathematics achievement?*.

In our own recent research, in the framework of the project on Roma children education, we specifically examine the funds of knowledge that these children bring into the school; curriculum designed with these funds of knowledge in mind becomes far more effective in terms of student learning outcomes. Field work identifies funds of knowledge, and the classroom becomes a *third space*/hybrid space (Moje et al. 2004), where students are encouraged to speak about their knowledge of language and mathematics; the children make connections between everyday life experiences and school mathematics concepts, and inform the general understanding by all students, Roma and non-Roma, of mathematical concepts, through their everyday knowledge (Stathopoulou, Govaris, Appelbaum, & Gana, 2014). Legitimizing funds of knowledge is one form of recognition; without such recognition, students would be dispossessed of knowledge, dignity, and potential.

3.3. Culture as an Analytic Tool

As a tentative conclusion, we suggest using the term *culture* to refer to aspects of cultural contexts, and more specifically, aspects of culture related to learning and knowledge, rather than to speak of *culture* in general. We do this to avoid the discontinuity that appears at school through dichotomies of formal and informal learning, distinguished by the role of a designer or evaluator of learning experiences not present in the learning context that is necessary for *formal* learning to take place. Culture, more broadly, is both “an historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic forms by means of which men communicate, perpetuate, and develop their knowledge about and their attitudes toward life” (Geertz 1973a, p. 89), and those “webs of significance people themselves spin” (Geertz, 1973b, p. 5).

Culture for mathematics education is a collection of bricks, stones, and tiles randomly thrown (Stathopoulou & Appelbaum, 2015; Appelbaum, Stathopoulou, Govaris, & Gana, 2015), so that, after the fact, we can see some mosaics and patterns and walls and buildings and surfaces and works of art that seemed to have been created from somewhere, but are, in the sense of Michael Polanyi (1974), a mere happenstance of our human qualities of perception: the tiles, stones and bricks come from the legacies of dominant cultures, colonialism, and local traditions; the magnificent works of art are created by the humans who pick up the pieces and place them in juxtaposition. It is in this way that we can describe *culture* as a discourse of knowledge, power, and identity, privileging some people, and excluding others, assigning dignity to some and failing to recognize others as full members of humanity with the same rights, privileges and obligations.

Approaches to mathematics education via culture establish forms of reality and common sense through the application of distinctions, often without any clear attention to these distinctions. In this way, these approaches create implicit - sometimes explicit -

assumptions, and construct dichotomies that are applied as if they are fundamental principles of reality. Examples of such dichotomies include in-school and out-of-school learning, formal and informal education, teaching and learning, mathematics and culture, student or teacher identity and mathematics, and so on. Educational practices constantly re-establish dichotomies as truth. If we attempt to make school mathematics more meaningful and relevant to some students in the classroom by noting that they are members of a non-mainstream subculture, we are reducing the uniqueness of each individual to a set of stereotypical assumptions from a generic caricature of this subculture. Each individual may or may not fit this set of assumptions. Indeed, most of the learners in this situation are members of multiple subcultures at the same time, and are in any given moment having experiences that resonate with cultural habits and dispositions from more than one of these subcultures, including diasporic cultures that cross national and regional boundaries.

As researchers, mathematics educators wish to use categories based on cultural distinctions to analyze situations, because this seems like the only reasonable, common-sense way for us to make sense of the setting and the people in it. Yet, as soon as we use these distinctions, we are already aware of the variations within any given group that seem more extreme than differences between groups. And as soon as we try to take into account the variations within any given group, we are already aware of the ways in which these variations are inadequate to capture the variations within any one individual within that group. That is, borders between categories are permeable, so that, to keep this simple, say, a Catholic, Latina girl in a Chicago classroom may or may not be having an experience consistent with what her teacher might expect of a learner recently relocated from New Jersey with her Cuban-American, Jewish father, working in a small group with her Chicano best friend and a recent immigrant from Albania who listens to music sent to her from her cousin living in Indonesia. In other words, each learner is determined to some extent by the cultural contexts that are part of their life; yet, as individuals, learners have a repertoire of behaviors and ways of making meaning out of experience that are specific to them.

One approach to avoiding a direct application of culture as a concept is to focus more specifically on knowledge, power, and identity. Rochelle Gutiérrez (2010), for example, describes three ways that this can be done by analyzing social discourses, understanding of mathematics education in all of its social and cultural forms, but also working in such a way that contributes directly to the transformation of mathematics education to privilege more socially just practices. The first of her examples is critical mathematics education, which intentionally ascribes a critical competency to students and teachers. The second, growing out of the North American context where social justice studies often obscure a direct reference to racial inequality, is the combination of *critical race theory* and *Latcrit theory*, which privilege the voices of scholars of color and the experiences of students and teachers, and which work against popular discourses that suggest such experiences are subjective, illegitimate, or biased.

Critical race theory and Latcrit theory use counternarratives and storytelling to make experiences of marginalized subcultures clear; the stories capture uniqueness as overcoming racial inequality instead of as cultural difference (Leonard & Martin, 2013; Martin, 2000, 2009; Téllez, Moschkovich, & Civil, 2011). There have not been many publications using critical race theory or Latcrit theories in mathematics education, yet those that do draw on these frameworks offer convincing claims about the value of

deconstructing race and racism in particular as a means to highlight whiteness as property and its relation to *normality*, to value the strategies and strengths of people of color, to highlight community wealth, and to challenge commonly held beliefs about a racial hierarchy or a neutral society (Gutiérrez, 2010; Tate, 1997).

Gutiérrez clusters researchers and theorists who attend to *discourses* as an entry into many of these *poststructural* issues, her third example of the sociopolitical turn. In such approaches to mathematics education, learners, teachers, and researchers are both results of and producers of discourses. Because discourses are inherently social, political, historical, and connected with the construction of meaning, these approaches share much with those ways of thinking about mathematics education that are connected to a concern with culture. In this subfield, however, meaning, reasoning, knowledge, action, learning, and so on, are products of discourses, not characteristics of culture, and are also constantly renegotiated in social and cultural contexts, finding their meaning in the outcomes of actions and interactions moment by moment (Appelbaum, 1995, 2008; Walshaw, 2007).

In other words, meanings that people make of themselves and their world are forever being created in and through interactions with others, in larger social and political contexts, with discourses that are themselves renewed and modified through these experiences and events. Discourses are sometimes confused with paradigms, since they connote taken-for-granted ways of interacting and operating, and because they are part of what comes to be expected and experienced as *normal*. The importance of understanding discourses in this way is that they produce common sense *truths*: rather than reflecting some clear sense of reality, they structure reality for people.

As an example of how attention to discourse can address what might otherwise be considered a *cultural* issue, we can consider Gutiérrez's example of specified algorithms being required in a school curriculum. When learners are asked to *show their work*, this practice can lead to immigrant students discounting the knowledge of their parents who have learned mathematics in other countries (or, more generally, in other communities or other cultural contexts even if those *foreign* algorithms are correct. Of course, we might go even further with our analysis: Such practices define some algorithms and forms of knowledge not only as correct, but as foreign, despite the fact that their very presence in the community belies their exoticism and demonstrates their presence in the multicultural society. In this latter sense, culture has become a tool of ignorance, whether it is perpetuating a lack of personal awareness or disguising knowledge.

4. Dignity, Recognition and Reconciliation: A Proposal

It is not so much that culture is a tool of ignorance or a discourse of colonialism, but rather that we want our uses of culture, acculturation, enculturation, and so on, within the ethnomathematics program, to be outside of the colonialist/anti-colonialist/neo-colonialist/post-colonial paradigm. We propose that ethnomathematics pursue recognition and dignity in opposition to dispossession. There is a need for self-critique as a component of ethnomathematical practice, so that: (a) research and educational practices contribute directly to the dignity and recognition of all people in and out of a local community, so that (b) any possibility of dispossession correlating with the enacted ethnomathematics of that community, however remote from the community

under scrutiny, calls the practices into question due to ethical, social justice failure. For example, if a local school mathematics curriculum marginalizes indigenous people on another continent, then such a curriculum should be unacceptable. To take another example, it is often the case that official policy declares that it knows better than the families of certain children what these children should or should not learn (Butler, Ng-A-Fook, Vaudrin-Charette, & McFadden, 2015).

Battiste (1998) calls this educational model “cognitive imperialism” (p. 17); this fragmented accumulation of knowledge builds on Eurocentric strategies that maintain their knowledge is universal, that it derives from standards of good that are universally appropriate, that the ideas and ideals are so familiar they need not be questioned, and that all questions can be posed and resolved within it. The children and their families are on the periphery of the curriculum; indigenous cultures are included, but in simplistic and tokenistic ways; non-Western traditions of counting, measuring, locating, designing, playing, and explaining are erased into dispossession; the *add-and-stir* approach to multiculturalism (Battiste, 1998) avoids disruption of the central Eurocentric assumptions that govern the educational system.

Ethnomathematics has consistently confronted cognitive imperialism from its inception, by problematizing Western definitions of mathematics and knowledge, and by placing mathematical activity in shifting and fluid locations. As D’Ambrosio (2009) noted, “ethnomathematics should become a key component of school curricula “in order to demystify a form of knowledge (mathematics)” (p. 33). The location in which this takes place makes a difference in terms of how and why ethnomathematics and mathematics in school can and should recognize students and the variety of their communities. In the settler contexts of former colonies, one can center the mathematics and ethnomathematics curricula on the land, once populated primarily by members of certain communities who have subsequently suffered generations of colonialism (Butler et. al., 2015).

In other contexts, immigration and refugee migration patterns following in the aftermath of colonialism have led to different historically established forms of hierarchy and privilege related to the land. Still other sites have featured creolized cultures as controlling land and status. And yet others identify through nomadic communities that relationship to the land is dynamic and complex. It might be appropriate, nevertheless, in each case, to bring together elders of various communities to discuss varieties of ways that school can be the site of dignity for all. If ethnomathematics is called forth in these projects of community construction, it would be important, following our ruminations here, to shift the discourse from one of culture as determining difference toward one of discourse constructing dignity and recognition through reconciliation.

What we are advocating is a subtle yet important attention to nuance, always aware of the dangerous history of ethnomathematics as grounded in the two Western concepts of culture and mathematics, and thus always needing to be cautious in how we may inadvertently perpetuate the colonial legacy that these terms and seemingly neutral concepts carry. For example, we urge the program of ethnomathematics to maintain a central commitment to dignity, as promoted, for example, by D’Ambrosio and D’Ambrosio in their 2013 article entitled *The Role of Ethnomathematics in Curricular Leadership in Mathematics Education*. Yet, we would like to tweak the notion of *restoring cultural dignity* to become reconciling dignity of each person, since cultures

are not static colonialist categories that define people; from a post-colonial perspective, cultures are clusters of commonalities across groups of people that we can label after the fact. Similarly, we join with D'Ambrosio (1999) and Lal (2014) in calling for the program of ethnomathematics to pursue peace in its various possibilities. However, we would like to tweak the common assumptions that people make about mathematics as “the *most universal mode of thought*” (D'Ambrosio & D'Ambrosio, 2013, p. 20) or that “it does [teaches us] that every problem has a solution” (Lal, 2014, p. 47).

As we have noted above, it is only a Western ideology of mathematics that claims universality of mathematics and/or Western mathematics. And surely a more nuanced understanding of mathematics would accept that mathematics does not claim every problem can be solved: some problems have been shown to be unsolvable, some questions in mathematics lead to paradoxes and ambiguity, other problems can never be solved within lifetimes or generations, rendering them unsolvable for all practical purposes, and so on. While we embrace dignity, we are a bit anxious about declaring “survival with dignity (...) *the most universal problem* facing humanity” (D'Ambrosio & D'Ambrosio, 2013, p. 20), and wonder if dignity is the goal of a linear solution, or whether dignity, recognition and reconciliation are a related cluster of goals and practices that may be the focus in any given moment. To paraphrase a well-rehearsed statement from the Quaker tradition, *there is no way to peace; peace is the way*. Likewise, there is no *way* to peace, dignity, recognition, or reconciliation; these terms are both dreams and practices, both hopes and methods.

5. Creolized Intercultures

The work in Greece with Roma youth can again serve as an initial entry into these final points about foregrounding dignity, recognition and reconciliation, while of course not ignoring culture and mathematics. In retrospect, as we explore the potential of ethnomathematics to positively improve mathematics education, we can now see that reconciliation can be carried out in terms of the hybridity of youth who live in and out of multiple and evolving cultures, and thus create in their lives an unfolding and transformative *interculture* (Appelbaum, 1995). The project with Roma youth placed the students in a position of experts about their own experiences, which made it possible to implement a *bottom-up* curriculum, encouraging teachers to exploit students' knowledge for mathematics and language teaching. Roma students, due to their familiarity, were willingly involved, and gained *voice* in the classroom.

During the negotiation of particular activities, the Romani students significantly modified the learning process and the forms of classroom interaction among teachers and among their peers. It seemed that the association of extracurricular activities, compatible with an ethnomathematical perspective, in conjunction with the strategic support of every communicative resource available (mixing of languages and other types of semiotic resources as the design, music etc), created the hybrid learning space that supported the students' involvement in the learning process. On the one hand, *accepting and validating* what students considered as their *own* improved their self-image and supported the renegotiation of their identity as equal participants in classroom interaction. On the other hand, these experiences would be more suitably described as forms of recognition grounded in the dignity of the youth, who led processes of reconciliation, and thereby created new hybrid forms of identity that traveled in and out of their Romani families, Greek neighborhood, school classrooms,

and beyond.

Our attempts to respond to the situation at hand – legacies of centuries of privilege and power, cultural authority and school-based deligitimation practices –addressed both community and classroom. The knowledge we acquired through fieldwork in the community clarified how and why inequalities are constructed through discursive practices, so that the inclusion of Romani student’s and other marginalized inclusion is more a surface rhetoric rather than a social transformation; more importantly, however, we want to claim that we chanced upon such transformative opportunities mainly because our *methods* and *goals* were one and the same: dignity, recognition and reconciliation. Colonial discourse might name the methods continuous and egalitarian dialogue with the members of the community, and further name the project as one of co-existence. Nevertheless, what resonates more fully with the project for us, given our long-standing identification with the ethnomathematics program, is the opportunity for Romani youth to demonstrate dignity by expressing their own *voices*, and the ways that these youth renegotiated symbolic boundaries - more strong than the geographical ones - within the broader community, i.e., the ways that these youth led processes of reconciliation. There is a significant difference in orientations: giving voice responds to dispossession from a position of morality, whereas processes of reconciliation are grounded in practices of capability (Pinxten, 2016).

The ethnomathematical perspective, together with the exploitation of funds of knowledge, informed our practices/interventions in the schools, whereas the ethnomathematical *program* was enacted in our broader project by youth who led the processes of dignity, recognition, and reconciliation. One might also say that ethnomathematics gave the floor to *critical* voices, to other minority voices, and to different voices in mathematics education (Gilligan 1982; François & Van Bendegem, 2007). However, we find it more generative for the *program* Ethnomathematics to consider how the pursuit of dignity, recognition and reconciliation are forms of *forgiveness* – not in the common sense notion of acceptance, but rather in Hannah Arendt’s framework of maintaining awareness of violations and dispossession while refusing to allow these violations and dispossession to affect our present or future (Arendt, 1963/2013; Biesta, 2013; Knott, 2011). These reflections lead us to invite others to frame their own contributions to the program Ethnomathematics as embracing dignity and recognition through forms of refusal that enact forgiveness.

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