

ETHNOMATHEMATICS AS MYTHOPOETIC CURRICULUM

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To their mutual impoverishment, the fields of mathematics education and curriculum studies have, in recent times, grown too far apart. One area where I propose that productive conversations may emerge is in thinking of *ethnomathematics* as *mythopoetic* curriculum (e.g. Leonard & Willis, 2008). This conceptualization is nowhere yet explicit in either literature. In this article, I develop some of the potentials I see for thinking about ethnomathematics in this way. I begin by discussing the current state of the field of ethnomathematics, highlighting some recent critiques. Next, I argue that despite the productivity of the field, it needs to be supplemented (alloyed and allied) with perspectives of other affiliated disciplines. I then offer a re-framing of ethnomathematics as participation in mythopoetic curriculum. Following the arguments of Vithal and Skovsmose (1997), while I use the term “ethnomathematics” I recognize the fact that it represents a problematic, contested, and polysemous concept. My goal is to gently “nudge” (Thaler & Sunstein, 2008) ongoing conversations in the field in the direction of another possible framing of what its projects might be about.

Changing patterns in a field

At present, ethnomathematical studies and critiques come from all parts of the globe and not only from previously colonized nations. [1] It is worth noting, though, that as a response to (ongoing) histories of physical, psychological, and pedagogical colonialisms and imperialisms (Bishop, 1990) the majority of research continues to be situated in these societies. Some researchers in former European colonizer nations who grapple with issues of multiculturalism, or those in countries receiving large numbers of immigrants, have also turned in recent times to ethnomathematics or culturally responsive mathematics programmes in an attempt to address or redress curricular inequities affecting various groups. I wish to highlight two recent discussions.

First, Pais (2011) has recently argued that “ethnomathematical research runs the risk of conveying an idea of culture where the Other is squeezed from its otherness” (p. 209). He draws particularly on Slavoj Žižek’s critique of multiculturalism within capitalism and his concept of a desubstantialized Other. Ethnomathematical projects, in referring to pedagogical practices in which cultural artefacts with mathematical significance are stripped and sanitized of all other cultural associations, become “just a way of teaching mathematics” (Pais, 2011, p. 224). Addressing directly those of us who work in or come from privileged societies Pais (2011) argues that:

[t]he power of capitalism to produce variety is at work in the educational applications of ethnomathematics

[...] This incorporation of ethnomathematical ideas into capitalist dynamics is made possible through the deployment of an ideological injunction where we are willing to accept the Other deprived of its otherness (Žižek, 1992). That is, we are willing to accept the Other as long as it fits into our symbolic order; as long as it is kept at a safe distance, the distance that prevents us from reaching its non-symbolic dimension. I love the Other (the poor, the indigenous) precisely because he is poor, oppressed, and utterly helpless, needing protective care. (p. 225)

In calling our attention to a tendency of desubstantialization, Pais reminds us of one of the field’s major ongoing epistemological issues: the conflation of the term “ethno” with the otherness that is represented by the terms “ethnic” and “indigenous”. This conflation means that ethnomathematics-informed curriculum projects sometimes involve no more than translating and inserting situated mathematical practices (Palmer, 2010) *into* classrooms, often from marginalized cultures into the dominant culture of school (see also Vithal & Skovsmose, 1997).

Pais (2011) also argues that “a problematization of society and the role of school in society is [...] a priority in a research program like ethnomathematics. But that is far from happening” (p. 219). In particular, he raises concerns about the co-option of the emancipatory potential of ethnomathematics by school practices when the situated knowledge and institutional cultures of the dominant models of mass schooling are not simultaneously considered. His argument resonates with some of the sentiments found in critical mathematics education in terms of questioning the formatting power of the mathematics taught in schools (Skovsmose, 1994) and of challenging those whose ethnomathematical work seeks to bridge different situations.

The second contribution I will mention is Palmer’s (2010) report on Torajan architectural ornamentation. Palmer narrates the ethical dilemmas and struggle he experiences in interrogating his desire and eventual decision to return knowledge generated through academic mathematics – how to create a five-fold symmetry star – to practitioners:

...should I, as an outside researcher, communicate to them such a possibility? Among the issues that rush to mind are those related to the *colonization* of foreign countries and to the imposition of (external/foreign) mathematical (ways of) thinking on people [...] who are already able to do their jobs effectively and efficiently without access to such thinking [...] When I

returned home, I was *unsettled*, wondering if I might have *interrupted the development* of their vernacular mathematics by communicating my solution [...] Was my attitude a consequence of the *pleasure* I derived at having come across a solution, or was it perhaps rooted in a typical western haste? Mathematical research should, perhaps, be more patient, mindful of avoiding the sorts of developmental interruptions it has imposed in past times. (pp. 37-38, italics added)

For Palmer, “knowledge from non-academic practices should not be left to anecdotic oblivion but should be treated with academic respect” (p. 32) and in his article he seems to have successfully managed to accomplish this goal. The field needs more of this type of deep engagement with ethical concerns. However, the dilemmas he delineates also need to be engaged with, following Pais’s critique above, to problematize the ethnomathematical practices of *privileged* school systems. This is the next turn that I believe ethnomathematics needs to explicitly take: to examine the specific, yet diffuse and abstracted mathematical practices in the networks of powerful and privileged elites across diverse societies. Given recent global events we need to examine the situated mathematical practices involved in, for example: BP’s 2010 Gulf of Mexico Deepwater Horizon oil spill disaster (e.g., risk analysis, economics, engineering, modeling, simulations) or the global economic meltdown and housing bubble collapses (e.g., derivatives, games, speculation, investment strategies) as specifically *ethnomathematical research* projects.

Using Pinxten and François’s (2011) analogy of ethnomathematics as the “car repair department of mathematics education” (p. 7), this turn towards the uses of mathematics in privileged societies is a deliberate political intervention meant to directly engage the absence of any consideration of what happens in the car design and car sales promotion program of mathematics education in which many of us participate (p. 7). However, while sympathetic to Pinxten and François’s concerns, I cannot go as far as they do in proposing ethnomathematics as the “generic category of all mathematical practices, with academic mathematics as a particular case” (p. 4). The term and its composite parts (ethno + mathema + tekne) are neither innocent nor neutral (Vithal & Skovsmose, 1997) and the difficulties raised by Pais’s critique are not so easily resolvable in practice.

Until the frameworks in the field are used to frame and investigate *ethnomathematical* practices that are closer to home, the term will continue to index that which is Other to “traditional” mathematics and obscure the behind-the-scenes working of global-capitalism. In perusing the contents of *For the Learning of Mathematics*, for example, anthropologically themed articles that explicitly refer to ethnomathematics are skewed towards aspects of “native” and “indigenous” cultures, while the term “critical” is more frequently reserved for mathematical practices in privileged societies.

In the next iteration, ethnomathematicians will have to address less visible mathematical practices, albeit practices that are more familiar, in which they are deeply implicated, from which they derive benefits, and which demand their complicity if not compliance. These powerful mathematical practices

increasingly structure the patterns of negotiations, transactions, dispersals and disposals of the modern world. Ethnomathematicians will have to recognize the political dimensions and implications of their work, proceeding like urban ecologists (Zimmer, 2011) by doing intensive fieldwork closer to home. What are needed are juxtapositions and hybridizations with other fields of inquiry. In the rest of this article, I propose mythopoetic curriculum as one possible alignment.

Framing ethnomathematics as mythopoetic curriculum

Myths are both narratives and signs. Marderness (2009) articulates a complementarity between narratological and semiological formulations of myth arguing that a given myth takes on “distinctive significations depending on how it is read” (p. 31). In mythical readings, for example, a myth is a truth; cultural readings take myth as a cultural convention; in extramythical readings a myth is an enigma; and finally in mythological readings myth is an artifice (Marderness, 2009, p. 127). It is mythological readings that I am concerned with in this article.

Mythological reading foregrounds the meaning of myths and their interpretations and begins by acknowledging that “myth is motivated” (Marderness, 2009, p. 98). Such readings attempt to decipher myth by “approaching it from outside the myth itself” (p. 99). Deciphered myths may be revised and reinterpreted and may again come to function as myth. These two processes are central elements of mythopoiesis where they are referred to as “demythologizing” and “remythologizing”.

Mythopoetics

In North American curriculum scholarship, the term *mythopoetic*, whose two roots (*mythos* + *poiesis*) mean “myth-making”, is traced to the work of James B. Macdonald and his 1981 essay “Theory, practice and the hermeneutic circle”. In that work, Macdonald parsed methodological approaches to curriculum theorizing into three genres: scientific-rationalist, critical and mythopoetic. For Macdonald (1981), the mythopoetic is a type of imaginative thinking, identified and associated with the work of humanistic and holistic educators who rely upon insight, visualization, and imagination (p. 179). The redemptive project for Macdonald is translated into a vision of curriculum theorizing as “a prayerful act” in which all three methodological approaches (science, critical theory and poetics) are reconciled. Curriculum methodologies are seen as participating in and contributing to greater understanding and “a more satisfying interpretation of what is” (p. 180) in education. Specifically, “‘technical and utilitarian control’ are offered through scientific technique; ‘emancipatory praxis’ is made possible through critical reflection, and [...] ‘aesthetic, moral and metaphysical meaning’ is available through poetics” (p. 182). Mythopoetics, then, “offers a way of synthesizing the best of the progressive and critical approaches to education in post-Industrialized contexts” (Leonard & Willis, 2008a, p. 8). Its goal is to “re-establish imagination to a central place in the curriculum” (Leonard & Willis, 2008b, p. 265).

Many curriculum theorists, however, draw too fine a

boundary that, in effect, sidelines mythopoetic scientific writing on education. Such theorists ignore the fact that science and mathematics have their own poetics and construct powerful mythologies. They also overlook their role in demystifying and demythologizing powerful cultural truths and in positing alternative ones. Perhaps it is difficult to conceive of the language of mathematics (or mathematics education) as *also* a poetic language. It may be difficult to believe that such poetry is capable not only of resisting the mythic models that reign upon the world (some of which were identified in the first section), but also of restoring and reconciling the wounded grounds upon which we have trodden, and not so lightly. As such, it is not surprising that mathematics is nowhere explicitly represented in the literature on mythopoetics in education and mythopoetics is nowhere explicitly referenced in the literature in mathematics education.

It is my claim that the emergence, evolution, and development of ethnomathematics has been a mythopoetic endeavour involved in demythologizing and demystifying dominant discourses of mathematics and mathematics education and that there are some advantages in explicitly acknowledging this relationship. The work of Ascher, Bishop, D'Ambrosio, Gerdes, Powell & Frankenstein, Zaslavsky and others has functioned to demythologize some of the myths of mathematics education, while Lakatos' *Proof and Refutations* is perhaps the most well regarded example in both mathematics and mathematics education. More recently Hersh and John-Steiner (2010) demythologize some of the myths of mathematical life. These authors, among many others, can be considered as performing mythopoetic work that could be foundational for imagining, designing, and enacting mythopoetic curriculum in mathematics education.

Some of the advantages I see in framing ethnomathematics as mythopoetic curriculum are that: it does not necessitate a desubstantialization of the Other; it opens mythopoetic systems (whether described as "mathematical" or not) of all societies to inquiry; it requires an understanding of situatedness and embodiment understood in their widest ecological senses; and it reduces (but does not completely resolve) some of the tensions between ethnomathematics and critical mathematics education. It also invites dialogue with scholars outside of mathematics education who may have similar concerns.

The framing of mythopoetics that comes closest to ethnomathematics is that of Bishop (2008), who explores the potential of imaginal pedagogies [2] in pursuing a difficult reconciliation agenda amidst the complexities of painful postcolonial contexts and settler societies. Bishop views the role of imaginal pedagogies as integral to "re-mythologizing] western systems of knowledge" (p. 33). In Bishop's framing, this re-mythologizing is a form of decolonizing praxis of language and of the imagination. While the field of ethnomathematics (as well as critical mathematics education) has done much to demythologize some aspects of mathematics, future work will need to actively re-mythologize mathematics education and mathematics across *all* levels of society. Much work on indigenous knowledges (e.g. Archibald, 2008; Castagno & Brayboy, 2008; Denzin,

Lincoln & Smith, 2008) and decolonial thinking (e.g. Mignolo, 2007) is likely to be of benefit in imagining an ethnomathematics reframed as a mythopoetic curriculum project.

The mythopoetic imagination in Bishop (2008) is tempered with a "reconciliation imagination" that is often completely absent or understated in the ethnomathematics literature. Such a reconciliation imagination is concerned with:

the difficult challenges faced in a double process of acknowledgement and forgiveness, of grief and trauma alongside hope and healing; the complexities of acknowledging different ways of knowing, valuing, and experiencing in an inter- or trans-cultural dialogue; the struggle to re-imagine memory, responsibility, shame, grief, land, identity, and place; how to heal the imagination in the face of tragedy; how to imagine hope and transformation; plus how imagination itself functions in the struggles for such things [...] the capacity to [even] imagine the scale of injustice and oppression, in all its myriad detail. (p. 33)

Grief, trauma, forgiveness, hope and healing –these words seldom appear together in the ethnomathematics literature or, if they do, they are presented in a sanitized and anaesthetized language in which excesses of emotion and traumatic experience are safely annealed. It is to such difficult dialogues and re-mythologizing that I believe the field of ethnomathematics, and mathematics education more generally, must now turn.

The language is the thing...

As Barthes (2009) suggests, "the best weapon against myth is perhaps to mythify it in its turn, and to produce an *artificial myth*: and this reconstituted myth will in fact be a mythology" (p. 161). Methodologically, this implies that ethnomathematics as mythopoetic curriculum is a (re)turn to the poetic power of languages, stories and narratives to represent difference neither as exotic, nor as a desubstantialized Other, nor within a sterile singularity of sameness. It is instead to participate in myth-making, with an awareness that this is what the work might really be about.

The language of the mythopoetic reveals its close affinity with the aesthetic and imaginative dimensions of human life. Holland and Garman (2008) describe mythopoetic texts as having, "an intriguing resonant quality, conjur[ing] up visions of eloquent language and elegant ideas, provid[ing] the linguistic form and melody of hermeneutic expression" (p. 13). This synaesthetic quality of mythopoetic works is articulated by artist-educator Leroy Clarke in describing his own work "playing with the word until I find the juices, the oils in them [...] beating [3] words until they give off flavour and scent" (in Boyce-Davies, 2007, p. 4). There is a distinctive orality and aurality – perhaps even flavours and scents – to mythopoetic texts.

Mythopoetic curriculum texts attempt to revivify curricula. They disturb the silences that usually prevail between ethical and political life-worlds and curriculum. As an example, consider this mythopoetic account of trauma in teachers' mathematical autobiographies:

The teaching/learning autobiographies I read from my final year B. Ed students, as well as my own, all speak to a long history and a more than passing acquaintance with violence in mathematics at all levels of their educational experience. [A teacher's] biographical statement, for example, relating her earliest memories of mathematics: "My first introduction to arithmetic and the first resources I interacted with were a copy-book, a pencil and a ruler. The ruler was not for measuring," is stark and clear in its understated brutality. The others recount similar brutalities, even at the tertiary level. It is amazing that they have survived, bruised, battered but hopeful [...] Others though do not make it. Why are their narratives filled with stories of contempt, attempts to dominate and humiliate? Why do we allow teachers, including ourselves to wield such mathematical power without making them aware of their/our overwhelming capacities for brutality?

[...] Our bodies are palimpsests, written on, over and over again, by so many scribes, poets, lovers, armies; we always bear their traces, they ought never to be written off, written out or forgotten in history's exiles. That is a path that leads to genocide. We must read and write, witness and testify, honor and hallow these markers.

What can we read from the bodies of the students in our mathematics classes and mathematics education courses? What stories of violent encounters are already being written over and over again? Are we the scribes? Dare we write differently and teach them to write their/our bodies responsibly? (Khan, 2010, final section)

In this excerpt I have used the evocative power of reflection as part of my critique of the ethnomathematical practices of home, school and university mathematics education in the colonial and post-colonial period. This critique challenges the myth that students' bodies are an unproblematic site of learning mathematics and offers an invitation to imagine differently and begin the process of re-mythologizing or re-enchanting relationships with mathematics *through* education. This article, too, is part of that work.

Conclusion

D'Ambrosio's (2010) plea that "outside" knowledges be given "more than token presence in the curriculum" (p. 16) as well as his choice of examples ranging from *The Epic of Gilgamesh*, Fritz Lang's movie *Metropolis*, Euclid's *Elements* to James Cameron's *Avatar*, is a challenge to the field to engage more fully with the mandate of ethnomathematics. It is a mandate not only to demythologize mathematics through mathematics education but, just as importantly, to remythologize, to open spaces for the complex realities and unrestricted imaginations of fiction (p. 16). At the same time, we must also heed Pais's (2011) reminder to attend to the dangers inherent in presenting ethnomathematics in a folkloric way.

In my own mythopoetic critique of ethnomathematics, I *imagine* that any acceptable category for what might eventually come to be construed as mathematical practices will not even have the word "mathematics" in it. Instead, it will

have found some way to mourn the colonial complicities, the fresh memories of genocidal traumas and the spectral ancestral presences that persist in haunting the word "ethno". A productive reframing will shift our attention away from "ethno", with its orientalist concerns, towards a consideration of ethnomathematics as a specifically *human* genre. One of the pressing tasks for ethnomathematics is to collect fragments scattered under critical mathematics education (*e.g.*, Skovsmose, 1994), mathematics for social justice (*e.g.*, Gutstein, 2006) or sustainable mathematics education (Renert, 2011) and situate them in relation to ethnomathematics or, more cautiously, *as* ethnomathematics, without necessarily having to make ethnomathematics a superordinate category.

Coming from the Caribbean with its ongoing histories of the repeated traumas of physical, psychological and pedagogical colonialisms, I see my work as a mathematics educator as a mythopoetic task. This task is to enable the resurgence and reinvention of the music of living mathematical and curricular landscapes. The goal is not to break the mathematical spine of the modern world (d'Ambrosio, 2010, p. 3) but to show how what is taken to be static, fixed, normal and immutable might be transformed by subtle shifts in conditions and emphases. Mathematics and mathematics education are deeply implicated in colonialism, slavery, capitalism, modernity and ecocide. Ethnomathematics, as part of the anthropological and cultural turn in educational research, has reminded us of that. At the same time, however, mathematics education is yet to meaningfully engage with the pressing issues of grief, trauma and reconciliation in a coherent and consistent manner. It is yet to fully embrace its potential for and role in decolonization, liberation, justice and sustainability. Ethnomathematics is necessary for us to "probe deeply into the kind of world we inhabit" (Harris, 1999, p. 76). The field must find allies and alloy itself with disciplines and perspectives in which the imagination is central if it is to address or redress some of the inequities and injustices of the present. Framing ethnomathematics as mythopoetic curriculum may be the beginning of one such alignment.

Notes

[1] I acknowledge the partiality of my commentary in that I engage with the literature that has been published or translated into English. There exists, however, a significant corpus of work in other languages. I do not claim that the patterns described here are to be found in the ethnomathematics literatures of languages other than English, although such a claim also needs to be investigated.

[2] Bishop follows Corbin (1972) in taking the "imaginal" as "a form of imagination that is far more profound than just a faculty of individual creativity" (p. 31).

[3] "Beating" is used in the Trinidadian vernacular as in "beating pan", a reference to the way in which early steel drums were formed into musical instruments, itself a poetic act (see also Khan, 2008).

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allowed me to study the beat of my own drum (Khan, 2008) and share in his bibliomaniac pursuits – enjoy your retirement Bill.

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MH: How many is two and one more?

Patrick: Four.

MH: Well, how many is two *lollipops* and one more?

Patrick: Three.

MH: How many is two *elephants* and one more?

Patrick: Three.

MH: How many is two *giraffes* and one more?

Patrick: Three

MH: So how many is *two* and one more?

Patrick: Six.

[...] There was a noticeable suggestion of defiance in the way Patrick looked me straight in the eye as he gave his final answer 'Six.'

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