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Actionable Mathematics Education Via Dystopia

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We suggest that Mathematics Education theory and practice can find new directions through recognizing their dystopic characteristics, and embracing them as both the source of challenges and method of response. This contrasts with the generally utopic approach of most scholarship. We offer critical ethnomathematics education as a model for such an approach, since it has its own origins in lingering dystopic legacies of colonialism. A perpetual hopelessness and disempowerment is one implicit curriculum of contemporary mathematics education, where the mathematics once learns might help to describe things, yet hardly assists in transforming the reification of power and agency in society. Embracing dystopia rather than trying to circumvent it helps us see that it is more crucial to re-think curriculum than pedagogy.

Keywords: Critical ethnomathematics, curriculum studies, ethnomathematics.

An Introduction

We began our study with the recognition that school mathematics does not necessarily prepare society to respond to the most pressing crises of our epoch: severe weather and climate change, refugees from war and climate change, human trafficking and global economic injustice, etc. In early 2019, the world seemed unprepared for the COVID-19 pandemic, whether individually or via social policy. In particular, the situation created by the pandemic transformed many aspects of social reality globally (Možgin, 2020), as well as school reality (Bond, 2020; Niemi & Kousa, 2020), spreading fear and insecurity, and making people feel unprotected. In general, we live in a time of acceleration (Virilio, 2012; Rosa, 2013), with precarious scenarios of evolution; yet the daily experience of the COVID-19 pandemic, in and out of school, leapfrogged doomsday pronouncements away from mythology or Revelation, and into a visceral idea of the end of the world. The focus on the pandemic can also be understood as a primarily “first world problem,” in the sense that there were and continue to be far more urgent crises outside of the highly industrialized nations, in what is sometimes referred to as the “global south.” This aspect of crises helps us to think simultaneously about whether school mathematics prepares humanity for anticipating and responding to global crises, and at the same time whether it enables humanity to recognize the legacies of colonialism that influence what is even appreciated as a crisis in the first place.

We apply strategies from “critical ethnomathematics education” for understanding parallel concerns of equity (opportunity and outcome) and curricular content choices. We do this because critical ethnomathematics has already demonstrated techniques for educators to theorize paradoxes of global crisis. “Critical ethnomathematics education” makes sense of mathematics education, both for preparing people to anticipate and respond to global crises, and for practicing pedagogies that

address seemingly insurmountable, “dystopic,” crises in our environment, geopolitics, and the future of our planet as ever-present yet necessarily livable.

Social and Political Mathematics Education as Context

Ole Skovsmose (2021) proposes three types of relationship between mathematics and crises: Mathematics can (a) picture a crisis, (b) constitute a crisis, or (c) format a crisis. Are there parallels for mathematics *education*? Even as numerous mathematics educators would agree that significant cultural, historical, and political knowledge is needed to make sense of complex global issues (e.g., population movements of refugees and migrants (Xenofontos, 2015; Planas & Gorgorió, 2004), climate change (Barwell, 2013; Appelbaum & Stathopoulou, 2020), species extinction (Radakovic, et. al, 2018), local community problems (Gutstein, 2006; Hunter & Sawatzki, 2019)), typical school curricula worldwide is primarily formal, decontextualized (academic) mathematics, a manifestation of Western thought, Cartesian logic and ‘rationality’ rooted in a logic of domination and human-centric thinking, sometimes termed a logic of domination (Warren 1990). In this conception, purpose lies in generalizability, wide applicability to decontextualized concepts/methods, and in structures that manipulate variables across specific cases. This bird’s-eye view of human experience and deeply-rooted cultural patterns undergirded by Western assumptions of domination over nature are increasingly recognized as creating interrelated challenges of climate change, extreme weather, food production, and species extinction, demanding new directions of relation centred in social justice and alter-global social movements (Warren 1990, Appelbaum, 2018). Persistent dichotomies (e.g., people of Western culture(s) and Others) project one of the pair as the epitome of progress (despite its ignorance of other knowledge traditions and practices): mathematics education is seen in this was as a tool of power, oblivious of its failings (Gerofsky, 2010). Educational experiences curate forms of knowledge and exclusion, function as processes of normalization and epistemicide (Santos, 2007; Paraskeva, 2020), and structure the identification of differences across teacher, student, family and community cultures.

The catastrophic COVID-19 emergency demonstrated these processes of normalization and epistemicide more clearly than pre-COVID mathematics simply because it placed ongoing learning and teaching practices in a new context. Initial discussions -- politicians, media, medical experts, educators -- often amplified feelings of confusion and disempowerment. Some well-intending mathematics educators seized on the “teachable moment.” Remote education simplifies some aspects of instruction, complicates others. Some mathematicians and mathematics teachers used the virus to make mathematical concepts and skills accessible (Sullivan et al., 2020). An unprecedented number of blogs, websites, news articles, Tik-Tok videos, Instagram feeds, etc., used visual representations and analogies to explain exponential growth, the nature of meaningful evidence, model mathematical inquiry, or demonstrate the importance of mathematics in the study of a global pandemic. That is, we lived through parallel experiences: for school mathematics, the questions mostly became a matter of how teaching will be continued through distance learning, not a moment of curricular reconsideration; for public pedagogy, this was an explosive moment of graphs, metaphors, and a contestation of knowledge, demonstrating the superiority of social media over school in making mathematics relevant. Although public pedagogues successfully provided resources, and although there are many ways in which they created examples of how mathematics

can help the public to understand their situation, feel informed and to witness themselves as in control of knowledge, we ask whether this was nothing more than a shifting of focus from school to popular culture of a more insipid and disempowering form of education, constructing a dystopian version of knowledge and knowing. We claim most of our many resources on using mathematics to solve real-world problems are caught in the trap of social and cultural reproduction, despite their claims to a certain overarching ‘natural goodness’ (Swanson, 2017). COVID-19 is an example: the majority of school and public pedagogy mathematical lessons focused on mathematical models of the behaviour of the epidemic, and not on a broader framework for interpreting the models of the world, or our experience of it (regarding modelling and problem solving, see English & Watson 2018; Kaiser & Brand 2015; Houston et al. 2010; Lingefjärd & Meiter 2010). Such public pedagogy (Appelbaum, 1995) mirrored standard textbook approaches –simplified, artificial models, glossing over details, confounding variables -- even as it dressed up key concepts and relationships in engaging video and animation. The more general observation is that the focus on the pandemic distracted from the enormous crises around the world that existed pre-pandemic, and continue to this day, inadequately addressed. This latter point indicates one more way in which mathematics education and its impact on problem generation and solving can have far-reaching consequences for what becomes the focus of attention, reproducing and amplifying global legacies of power, as well as related assumptions about what is a universally agreed-upon “urgent need.”

Embracing Dystopia

Critical mathematics education embraces coloniality as both the problem and the method of social change; mathematics education can embrace coloniality and dystopia as its problem and method. Rather than searching for solutions to the legacy of colonialism, critical mathematics education recognizes the dystopia of coloniality as here to stay, and appropriates both western mathematics and the coloniality of school mathematics as its own tool, not for “dismantling the master’s house,” but for accomplishing local and indigenous goals of dignity and reconciliation (Appelbaum & Stathopoulou, 2020). This contrasts with the pursuit of utopian dreams. Those working to implement curricular reform imagine a post-dystopic vision; they try to overcome dystopia, and are doomed to failure no matter what gestural leaps they attempt. As Stein, et al. (2020) argue, “decolonization is increasingly treated as a site and subject of consumption and accumulation, not only of material benefits, but also of knowledges, relationships, experiences, and even critique itself” (p.44). This is why we urge avoidance of “decolonial critiques,” as is fashionable academic currency, arguing instead against solutions and alternatives to colonization within existing paradigms, regimes of property, and comfort zones. We understand “colonial patterns of relationship and colonial habits of being are reproduced at the very moment they supposedly become unsettled ... when efforts made under the umbrella of decolonization are re-routed back into the same desires and entitlements that produce colonization in the first place,” so that “the transformative possibilities and ethical responsibilities of decolonization are eclipsed, and decolonization itself becomes weaponized as an alibi to continue colonial business as usual.” Fantasizing a possibility of decolonization is a fallacy, as is curricular reform. It is better to appropriate methods and resources of dystopia for alternative, local goals. It has sometimes been coined ‘creolization’ (Appelbaum, 1995, 2008).

This approach critiques reform efforts in general as typically enacting a utopian-fueled fantasy of leaping out of the current dystopia (see Popkewitz 2018, Lim & Apple 2016). A caricature of reform efforts would describe policy-makers as saying, “Oh, this didn’t work. Let’s try something else, which would be so great!” Instead of imagining utopias, designing them and promoting new curricula, teachers, and students to act as utopian characters, we urge the following: start with acknowledging that the current curricula, teachers, students, and policy-makers are currently actors in a dystopia. Instead of trying to escape that dystopia, we could appropriate tools of the dystopia for local and indigenous struggles. The dystopia is both the problem and the method. Even as we pursue local and indigenous appropriation of tools and practices of coloniality for locally-identified purposes, we recognize the problematic term “indigenous” as preserving and maintaining distinctions of colonialism. One might say that we are perpetuating the dystopia. A ‘composite’ definition of both terms, utopia and dystopia, understands how most utopias are linked by their commitment to a form of enhanced sociability, or a more communal form of living, sometimes associated with ideals of friendship, while their dystopian counterparts are substantively connected by the predominance of fear, and the destruction of ‘society’, as a polar opposite of friendship. Perhaps we can reframe indigenous in this sense of an ‘enhanced sociability,’ where enhanced sociability has been maintained for some period, “utopia” has been lived to some extent (Claeys 2013); and where the opposite occurs, “dystopia” is the relevant descriptor. Fundamentally, utopia and dystopia are mutually determining.

Mathematics Education in the time of war in Ukraine, in the time of COVID, in the time of mass migration from severe weather and famine ... are here to stay, as is mathematics education in the time economic inequality, the breakdown of democracies ... Mathematics and mathematics education are at the heart of each crisis, serving at once as forms of knowledge with which we describe and come to know each aspect of the global crises together, and in erasing alternative forms of knowing and coming to know about our world and its future. Inherited from critical mathematics education is the key concept, “abyssal gap of coloniality” (Santos 2007) -- that separation literally and epistemologically between metropolitan and colonial societies. Even today, people who live in or whose origins are in former colonial countries -- and women, refugees, etc. -- are framed as inferior by structures of coloniality. This distinction also concerns people’s knowledge, a distinction that ignores the intrinsic value of various bodies of knowledge in favor of dominant social, political and economic structures. This knowledge is excluded and essentially erased, because the people who produce this knowledge are excluded as creators and finders of knowledge. Epistemological clashes between different kinds of knowledge, in particular, between scientific and non-scientific forms of truth, are only recognized once one takes a critical stance. One kind of knowledge—counting as true—is on the one side, while the ‘other side’ is relegated to mere “beliefs, opinions, intuitive or subjective understandings” that at best are issues for scientific inquiry. In this way “abyssal thinking” consists of distinctions and dichotomies that construct a divided world (Santos 2007, p. 45). It is supposed that people stay in a static situation – the dystopia does not change placement relative to the abyssal line. Yet people are also different, even if they share elements that define them on one side or the other (López, 2019; Benson, 2019). “Kinds of people are cemented through research and administrative apparatus, but also through uprising and

revolt” (p. 164). People are constructed in these kinds of ways for governmentality’s purposes, but at the same time, since people are not just the object of static nominalism (Hacking, 2006), and not merely “passive receivers of imperial administration and control,” they react in resistant ways.

Mathematics education expresses coloniality and other characteristics of power relationships through languages of accountability and global economic competition. Mathematics education is both experience and cause of this dystopia. We can explore ways to open imagination, giving learners spaces for creativity and knowledge of self, and in using problems posed by the students themselves; such a utopian imaginary of mathematics education can challenge the perspective of globalization, exploring for example alter-globalization (Appelbaum, 2018)—where there is space for solidarity, participation, self-determination, dignity, and reconciliation. However, there is no magic in pursuing utopia, as in contemporary rhetoric and its dreams of “Mathematics for All”, “Life skills”, “Citizenship”, “Problem Solving,” and “Mindsets.” Language such as deregulation, climate, and inequality, relegated to those ways in which people “solve problems,” establishes the abyssal gap between politics and life (Latour 2018). a language of culture, survival, justice, existence, land, and land reform might describe what is at stake with necessary clarity. Such language is central to critical ethnomathematics. What would mathematics education look like if culture, survival, justice, existence, land and land reform replaced numeracy, life skills, problem solving and mindsets in our rhetoric, framing of research and practice, policy documents, to dwell in dystopia rather than fantasies of various utopias?

Latour (2020) proposed a within-dystopia response to the pandemic: “Let us take advantage of the forced suspension of most activities to take stock of those we would like to see discontinued and those, on the contrary, that we would like to see developed.” We advocate an analogous approach for mathematics education through the following questions, paraphrased from Latour.

What are the mathematics education activities, in and out of school and remote school learning, now suspended, that you would like to see not resumed?

Describe why you think those activities are harmful/ superfluous/ dangerous/inconsistent, and how their disappearance/suspension/substitution would make the activities you favour easier/ more consistent. (Make a separate paragraph for each of the activities listed in the first question).

What measures do you recommend to ensure that the workers/employees/agents/entrepreneurs who will no longer be able to continue in the activities you are removing find support for their transition toward other activities?

Which of the now-suspended activities would you like to develop/resume or even create from scratch?

Describe why your newly developed or resumed activities seem positive to you, and how they make it easier/ more harmonious/ consistent with other activities that you favour, helping to combat those that you consider unfavourable. (Make a separate paragraph for each of the activities you list).

What measures do you recommend to help workers/ employees/ agents/ entrepreneurs acquire the capacities/ means/ income/ instruments to take over/ develop/ create these favoured activities?

In those places in the world where COVID-19 was experienced as the most urgent crisis, there were three main mathematics-related trends: (a) The greater need than we might have previously realized for the wider public to comprehend and interpret the mathematics behind models, graphs, etc., related to the pandemic, and in general as preparation for any crisis. (b) Perpetuating the same curriculum that did not prepare people for understanding the crisis in the first place even as schools focused during the pandemic on how to make (mathematics) teaching more accessible. (c) Inconsistencies between what the public needs and what schools are doing. To understand why these trends unfolded, we analysed school mathematics and mathematics education as dystopia. Critical ethnomathematics is a model of how to embrace dystopia rather than to try to overcome it or avoid it. Critical ethnomathematics education is an approach that addresses dystopic elements of contemporary mathematics education practice while centering attention on coloniality and the need to exploit traditional school mathematics in ways that serve local cultural, political, and environmental needs, in a broader, ethnomathematical commitment to local and indigenous mathematical practices.

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