Mathematics Education, Ethics, and the Limitations of Ethno-Mathematics

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"I don't know what to tell you.
Your daughter doesn't understand
math. Numbers trouble her, leave
her stuck on ground zero."

Y fueron los mayas
quienes imaginaron el cero,
un signo para nada, para todo,
en sus gran calculaciones.

Is zero the velvet swoop into dream,
the loop into plumes of our breath?

"I suggest you encourage languages.
Already she knows a little Spanish,
and *you* can teach her more of that.
She lives for story time."

In the beginning there was nothing.
Then the green of quetzal wings.

Las historias siguen cambiando,
sus verdades vigorizadas
con cada narración
como $X \times X = X^2$

- Brenda Cárdenas[1]

In her compelling article, Grace Chen opens with a question many students ask: "Why are we learning this?"[2] Her purpose in the article is less about responding to this question by employing (or criticizing) utilitarian or cognitive aspects of mathematics, but rather by exploring an immanent ethical

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justification that is based on the nature of mathematics itself. Chen scrutinizes current predispositions and practices of math education and calls for the promotion of ethno-mathematics. The poem that opens this paper echoes, to some extent, Chen's claim about how current practices of math education prioritize the Western view of mathematics, "leaving its formatting power and its ability to mark those who think differently as being inferior."[3] Chen calls for advancing an alternative approach of school mathematics that will be placed into context and learned "alongside other mathematic-es and in the context of its history of being privileged and thus its power *to* privilege."[4] While I find this argument philosophically interesting and can agree with the call for contextualizing mathematics education, I believe that its supporting premises merit further consideration. My aim in this response is twofold: first, I will discuss the ethical premises in Chen's article. Second, I will consider the limitations of ethno-mathematics and contend that ethno-mathematics, in and of itself, may not provide a sufficient ethical justification for math education.

Chen's article provides some intriguing examples of how current practices decontextualize learning experience and leave students with a set of discrete facts, looking for the right answer. Her examples of how different cultures understand the concept of *measuring* clearly render the distortion of current education practices, which focus on training rather than educating. One way to challenge current practices and promote an ethical pedagogy is to follow Freire's idea of problem-posing education, rather than problem-solving. For Freire, as for critical mathematic education (CME), the focus of learning should be transformed from banking education into a dialogical learning process, based on continuous exploration, critique, and contextualization of the subject.[5] This paper will not be able to capture Freire's epistemology and his influence on CME,[6] but one can just recall his adult literacy programs and how he insisted on connecting knowledge to one's history and culture. It is on this point that I disagree with Chen's critique on CME. Chen claims:

> It [CME] leaves unquestioned the substance and the primacy of school math, and also the "formatting power of mathematics," or the power of those who know mathematics to

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> organize the reality of and make decisions on behalf of—possibly in coercive ways—those who do not.[7]

While this claim is well articulated, it merits a caveat: first, for Freire, power relationships are part of human relationships (in this case, mathematics are designated as a form of hegemonic knowledge), that should be acknowledged, confronted, and resisted. As in the example of the adult literacy programs, the recognition of power-relations empowered the marginalized. Second, the idea of *conscientization* is central to Freirean pedagogy and involves students developing a critical, dialogical agency, which embraces, on the one hand, progressed knowledge but, on the other hand, cherished historical and local knowledge, all of which is vital for growth. In this respect, Freire (and CME) rejects using any kind of knowledge in coercive ways. I wholeheartedly agree with Chen that "acting ethically requires negotiating the values of human situation while honoring the experiences and dignity of other people,"[8] but I cannot see how this claim challenges CME. To some extent, this claim seems to provide a reductive view of CME. Chen contrasts CME with ethno-mathematics, as an alternative approach to learn and teach mathematics. As I pointed out in the beginning of the article, I agree with Chen's call for contextualizing math education, and as I claimed earlier, Freirean pedagogy and CME embrace this approach. Yet, I contend that ethno-mathematics requires further consideration. I argue that ethno-mathematics does not provide a sufficient answer to Chen's question. While it may provide a general framework of how teachers can integrate various forms of mathematics-es, it fails to provide an answer for how to consider "mathematics as an intrinsically ethical endeavor."[9] In the remaining passages of this response, I will elaborate on three major limitations of ethno-mathematics.

The first and general issue with ethno-mathematics is that, while it celebrates an attack on European culture, it fails to provide a substantial theoretical framework. I identify with the critique of Žižek[10] and Pais that, in this sense, "the other is accepted, even celebrated, as long as it is the Other of our gaze."[11] Though I can echo the concern about hegemonic forms of knowledge (and in particular the current assault on education taking place under the neoliberal apparatus), ethno-mathematics contains eminent contradictions. Chen, as oth-

er advocates of ethno-mathematics, provides examples of how counting and measuring may differ from one culture to another (i.e., in cooking, in building, and in other forms of everyday activities). Therefore, they argue, resisting hegemonic knowledge requires the inclusion of local knowledge alongside "formal knowledge." The problem is that what one might refer to as "local knowledge," "indigenous knowledge," or "community knowledge" is based on practices and rituals that are not grounded in scholarly knowledge nor on schooling. Perhaps their great power is held by the way they have been preserved in their communities through generations. Therefore, the idea of integrating those practices in Western schooling will miss the authentic nature of those approaches (or if you like, the *lifeworld*) and lead to an evisceration of their cultural importance, which will end up "by being neither 'real math' nor 'real life.'"[12]

Second, beyond the problem of decontextualizing ethnic knowledge, inserting ethnic forms of knowledge into a system that is inherently structured by practices that contradict the principles of ethno-mathematics leads to superficial routinization of those forms of knowledge. But, perhaps the greater danger is that, rather than resisting the status-quo, this kind of transformation will lead to the commodification and fixation of those different mathematics-es. Clearly put, my claim is not against the idea of contextualizing math education and connecting students through their historical cultures (as in Freirean pedagogy), but rather against the naïve approach of ethno-mathematics, which, with the best of intentions, paints marginalized groups as exotic.[13]

The third and final issue of concern relates to the logical flaw of ethno-mathematics. If the hegemony of Western knowledge and school mathematics is so destructive and oppressive, why should schools teach and students learn ethno-mathematics alongside "Western mathematics"? If using local knowledge is intended to encourage students to attain Western forms of knowledge, then there is an immanent contradiction in this approach. One may rightly respond that ethno-mathematics should not be used as a bridge between local practices and school mathematics. Yet, even if we agree that education should resist its instrumental role, one cannot deny that ignoring school mathematics may perpetuate the status quo and increase social inequalities.[14]

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CONCLUSION

In this short response, I attempted to problematize some of the premises in Chen's article. I argued that, while I embrace her vehement call for contextualizing math education and resisting current, oppressive, pedagogical practices, I suggested reconsidering some of the premises of Chen's argument and particularly discussed the limitations of ethno-mathematics. While I argued that ethno-mathematics does not provide a sufficient explanation why mathematics, in and of itself, can be considered an ethical enterprise, I contended that Chen's argument for integrating local and communal mathematics knowledge alongside school mathematics could be supported more effectively by critical pedagogy and CME than by ethno-mathematics. I return again to the poem "Calculations" that opens this response and think about that girl who is troubled by numbers—I consider how the poem binds together knowledge, culture, and freedom—I think about the power of posing problems—as a starting point of letting the green of quetzal wing its way.

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1 Brenda Cárdenas, "Calculations," *Boomerang* (Tempe, AZ: Bilingual Press, 2009), 9.
2 Grace Chen, "An Ethics of Teaching and Learning Mathematics," in *Philosophy and Education Society 2018*, ed. Megan Laverty (Urbana, IL: Philosophy of Education Society, 2019).
3 Ibid.
4 Ibid.
5 Paulo Freire, *Pedagogy of the Oppressed* (Lanham: Rowman & Littlefield Publishers), 85.
6 In this article, I will primarily refer to Freire's ideas that greatly influenced the delineation of CME.
7 Chen, "An Ethics of Teaching and Learning Mathematics."
8 Ibid.
9 Ibid.
10 Slavoj Žižek, "Tolerance as an Ideological Category," *Critical Inquiry* 34, no. 4 (Summer 2008), 662.
11 Alexandre Pais, "Criticisms and Contradictions of Ethnomathematics," *Educational Studies in Mathematics* 76, no. 2 (December 22, 2010), 211.
12 Ibid., 221.
13 Ibid., 222.
14 Ibid., 220-222.