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A DUOETHNOGRAPHY OF REHUMANIZING MATHEMATICS FROM GUÅHAN AND THE
US VIRGIN ISLANDS

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Uma duoetnografia de matemática reumanizadora de Guãhan e das Ilhas Virgens Americanas

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*Una duoetnografia de la rehumanización de las matemáticas de Guãhan y las Islas Vírgenes
de EE. UU.*

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ABSTRACT

In this paper, the authors take part in a duoethnographic dialogical and reflective conversation about their experiences in mathematics teaching and learning in two unincorporated United States (US) territories (Guãhan and the US Virgin Islands) and discuss how such differed from experiences since moving to the US mainland. The two authors are in a professional mentor-mentee relationship and currently work at a large research university in the central US. Informed by recent experiences since living in the US mainland, the authors used the edited book, “Rehumanizing Mathematics for Black, Indigenous, and Latinx Students” by Goffney et al. (2018) to ground their reflections and discussion. The Rehumanizing Mathematics conceptual framework was used as a sociopolitical lens to guide their dialogic exchange. As duoethnography was used as the methodological approach to analyze the discussion and reflections, the authors were the focal sites of research. Findings from this duoethnography revealed three themes: (1) a recollection of race, culture, language in mathematics; (2) math classrooms as familial community; and (3) culturally responsive mathematics. The paper concludes with implications of these findings for researcher and practitioner communities.

Keywords: rehumanizing mathematics. US territories. math education. duoethnography.

RESUMO

Neste artigo, os autores participam de um diálogo duoetnográfico e reflexivo sobre suas experiências no ensino e aprendizagem de matemática em dois territórios não incorporados

dos Estados Unidos (Guãhan e Ilhas Virgens Americanas) e discutem como tais experiências diferiram das experiências desde a mudança para o continente dos Estados Unidos. Os dois autores têm uma relação profissional de mentor-mentorado e atualmente trabalham em uma grande universidade de pesquisa no centro dos Estados Unidos. Baseados em experiências recentes desde que se mudaram para o continente dos Estados Unidos, os autores utilizaram o livro editado "Rehumanizing Mathematics for Black, Indigenous, and Latinx Students" de Goffney et al. (2018) para embasar suas reflexões e discussão. O arcabouço conceitual da Rehumanizing Mathematics foi usado como uma lente sociopolítica para guiar seu intercâmbio dialógico. Como a duoetnografia foi usada como abordagem metodológica para analisar a discussão e as reflexões, os autores foram os focos da pesquisa. Os resultados desta duoetnografia revelaram três temas: (1) uma recordação de raça, cultura e linguagem na matemática; (2) salas de aula de matemática como comunidade familiar; e (3) matemática culturalmente responsiva. O artigo conclui com as implicações dessas descobertas para as comunidades de pesquisadores e praticantes.

Palavras-chave: rehumanização da matemática, territórios dos EUA, educação matemática, duoetnografia.

RESUMEN

En este artículo, los autores participan en una conversación dialógica y reflexiva duoetnográfica sobre sus experiencias en la enseñanza y el aprendizaje de las matemáticas en dos territorios no incorporados de los Estados Unidos (EU) (Guãhan y las Islas Vírgenes de los EU). Los dos autores tienen una relación profesional de mentor-mentee y actualmente trabajan en una gran universidad de investigación en el centro de los EU. Informados por experiencias recientes desde que vivieron en los EU. continentales, los autores utilizaron el libro editado, "Rehumanizing Mathematics for Black, Indigenous, and Latinx Students" de Goffney et al. (2018) para fundamentar sus reflexiones y discusiones. El marco conceptual de Rehumanizing Mathematics se utilizó como un lente sociopolítico para guiar su intercambio dialógico. Como la duoetnografía fue utilizada como abordaje metodológico para analizar la discusión y las reflexiones, los autores fueron los lugares focales de la investigación. Los hallazgos de esta duoetnografía revelaron tres temas: (1) un recuerdo de raza, cultura, lenguaje en matemáticas; (2) aulas de matemáticas como comunidad familiar; y (3) matemáticas culturalmente sensibles. El documento concluye con las implicaciones de estos hallazgos para las comunidades de investigadores y profesionales.

Palabras clave: rehumanización de las matemáticas. territorios de los Estados Unidos. educación matemática. duoetnografía.

Introduction

In the edited book, *Rehumanizing Mathematics for Black, Indigenous, and Latinx Students* (*Rehumanizing Mathematics*, henceforth; Goffney et al., 2018) published by the National Council of Teachers of Mathematics, Gutierrez (2018) promotes a sociopolitical conceptual framework of *rehumanizing mathematics* (RM) that positions students from historically and systemically marginalized groups as creators, and not just doers, of mathematics. RM means countering predominant narratives by interrogating who belongs to and succeeds in mathematics. It brings to light the prevalence of hegemony and challenges supremacy and power to re-position those whose experiences have been dehumanized by systems and groups that claim to be the authorities of mathematics. The use of the term *rehumanizing*, as opposed to merely *humanizing*, is intentional as a means of restoring identities in mathematics that have been erased due to dehumanizing practices. Gutierrez's (2018) RM framework consists of eight dimensions: (1) participation/positioning, (2) cultures/histories, (3) windows/mirrors, (4) living practice,

(5) creation, (6) broadening mathematics, (7) body/emotions, and (8) ownership (See Table 1 for brief descriptions of the RM dimensions).

Dimension	Brief Descriptor
Participation/positioning	Refers to the hierarchies at play in a classroom and shifting authority from the teacher or text to the student.
Cultures/histories	Takes into consideration students' cultural backgrounds or their funds of knowledge.
Windows/mirrors	Students being able to see themselves in mathematics as well as have a glimpse into the lives of others.
Living practice	Recognizing different practices in mathematics.
Creation	The autonomy that students are given to invent new algorithms or ways of knowing.
Broadening mathematics	Refers to going beyond mathematics that is taught in school curriculum.
Body/emotions	Allowing students the opportunity to conjure up feelings of joy or use of their body.
Ownership	Viewing mathematics as doing something for oneself.

Table 1: Brief descriptions of the right dimensions of the *Rehumanizing Mathematics* framework (Gutierrez, 2018).

For many people, mathematics is seen as the most neutral of disciplines and should not have any space for conversations surrounding race and politics (Gutierrez, 2013). The predominant mathematics discourse, at least in the United States (US), points to the widening achievement gap among racial groups, but fails to consider that such a case is heavily due to inequities in access and opportunity and who is situated in power more than anything else. As much as we try to avoid them in the discourse of mathematics achievement, issues of race and politics in math education are inevitable. To continue disrupting this discourse of the achievement gap, in this paper we consider RM a sociopolitical and conceptual lens as our epistemological, ontological, and axiological view of mathematics education and discuss our historically lived experiences of mathematics teaching and learning. While there has been a paradigm shift in refocusing math education in more sociocultural and political matters (Felton-Koestler, 2017; Gutierrez, 2013), we believe that the sharing of our stories and experiences provide an additional interesting and unique take on the matter since we are originally from and grew up in US territories—Guåhan (the Indigenous term for Guam) and the US Virgin Islands (USVI), respectively—and are now currently living in the contiguous US. For clarity, our nationalities are US American as individuals born in a US territory are bona fide US citizens, but many consider the US territories to be modern day colonies (Bastian, 2001; Bevacqua & Cruz, 2020; Malavet, 2004) to which we also ascribe. Furthermore, we are intentional in avoiding the sole term, ‘American,’ to acknowledge and recognize the population of people from the larger, global Americas.

In terms of education research, not much has been studied about the teaching and learning of mathematics in these specific contexts. Indeed, there is a visible invisibility regarding data and experiences about math education in a more global scale when the territories are problematically clumped under one umbrella category—the US (Castillo, 2022). However, scant in the literature and

something that we need to consider is whether or not these data are reflective of mathematical learning experiences that are ongoing and happening in the US territories, specifically. Thus, using RM as a conceptual lens, we sought to begin this line of inquiry and add to this gap in the literature by beginning with sharing stories from our selves. The overarching research question that drove our inquiry and this initial study was, *what were our experiences of math education growing up in a US territory and how are they informed by a RM lens?*

Methodology: Duoethnography as Dialogic Reflection

Given the nature of bilateral story sharing of our historically lived experiences, we employed duoethnography as methodology (Sawyer & Norris, 2012) to reflect upon our dialogic conversation regarding our experiences with math education in our respective US territories. As authors of this underexplored area of research and investigation, we also found duoethnography to be a suitable approach because it has “the potential of being accessible to a wider population than does conventional scholarship” (p. 78). By making this study more accessible to a wide population, we seek to further expand conversations surrounding issues of race and politics in mathematics and mathematics education.

Authors as Sites of Duoethnographic Research

In duoethnography, the authors are the sites of research, and their dialogic conversation serves as data for analysis (Sawyer & Norris, 2012). As such, we wish to briefly describe our geographical origins and acknowledge our professional mentor-mentee relationship as participants and sites of research for this study. The first author, Richard, was born and raised in Guåhan and identifies as cisgender Filipino American. Richard was a former secondary math teacher in Guåhan, has also taught secondary mathematics in the US, and is currently an assistant professor of mathematics education at a large research university in the southwest region of the US. The second author, Ashly, was born and raised in USVI and identifies as Virgin Islander. Ashly studied mathematics in her undergraduate education experience in USVI, then moved to the US to begin her graduate studies in pure mathematics. She has since transferred to the math education graduate program where Richard works and is currently assigned. Since finding out that we both are originally from and grew up in US territories, we have been interested in knowing about each other’s respective early experiences in teaching and learning mathematics. Furthermore, we were also interested in how our experiences compared to and/or contrasted those presented in the discussions surrounding RM.

For 10 weeks from August to October 2022, we met once a week for 30 minutes to discuss and reflect upon the chapter readings in the *Rehumanizing Mathematics* text (Goffney et al., 2018). To assist with creating a review of literature, Ashly also created a running annotated bibliography of the chapters, providing brief summaries of the entries as well as her reflective thoughts. The annotated bibliography was a shared document between the both of us, so Richard was also able to add in his reflections of the readings to the live document. We used these reflections in the annotated bibliography as talking points to help guide our dialogic reflections. At the end of 10 weeks, we had one final 30-minute discussion giving our overall reflections of the edited book as well as shared lived experiences relative to the content of the text. Given that this was a final overall reflection of the text and our experiences, we recorded and transcribed the session—using Otter.ai (2022) online transcription software—as additional data for this study. We met two more times thereafter to review our recordings and refine transcription software errors for closer analysis, examination, and discussion of data points (i.e. conversation passages) which evoked further analysis. We analyzed passages of our dialogic conversation using RM as a conceptual lens and looked for points in our dialogue that highlighted any of the dimensions described in Table 1 in the Introduction section above. We then compared our analysis with prior weeks’ discussions and reflections of the chapters from the *Rehumanizing Mathematics* text which in turn resulted in emergent themes.

Findings with Discussion

We uncovered three overarching themes based on our dialogic conversation and reflections about the intersections of our historical lived experiences and the contents of the *Rehumanizing Mathematics* text: (1) Recalling race, culture, language in a math classroom; (2) math classrooms as familial community; and (3) culturally responsive mathematics. While there is no set template on how duoethnographic research is presented (Breault, 2016; Sawyer & Norris, 2012), we chose to follow the structure of duoethnographies that showcased similar dialogic conversations (e.g., Banegas & del Pozo Beamud, 2022; Banegas & Gerlach, 2021; Rose & Montakantiwong, 2018). That is, we juxtaposed our transcribed dialogic reflection under its emergent theme, then follow that dialogue with discussions in the paragraphs thereafter.

Theme 1: Recalling culture, race, and language in a math classroom

Illuminating this first theme, our discussion centred on our early educational experiences with culture, race, and language as US citizens but in a completely different and separated cultural context from that of the continental US. We had a conversation about mirrored cultures with our math teachers, accents, and other forms of English. The dialogue went as follows:

Ashly: Some of the articles resonated with me because I'm also Black myself. So, like looking back, it made think about my elementary and secondary schooling to see if I see the connection, and I have seen it. Creating relationships between students and teachers is actually helpful in rehumanizing math. Because once you have a connection or understanding of the students, you're able to create math concepts or materials that can help us get in there and help them build self-efficacy and mathematical concepts or be confident in their mathematical skills. Do you understand where I'm coming from? Different people come from different places. They don't be the same, even though we're in America, all Americans are not the same,

Richard: Right, right.

Ashly: Growing up in the Virgin Islands, everyone's...not everyone's the same. But we grew up with the same culture. Majority of my teachers were Black, so I didn't experience that teaching with students are taught by predominantly white teachers and feeling that they are not confident in their own mathematics. Because my teachers were Black, they understand the culture because we shared it. So, one of the chapters said, "If you share...it's very helpful to help students of color if they share the same race and culture. So, because of that, I've never really experienced the way or how Black students here in America have been taught or how they've been talked down to, like put in a special education course, because they take time to learn. So, I've never experienced that myself.

Richard: It's interesting, because I know that is important, but I remember growing up when I was going to school in Guåhan, my mom...actually, this was very common with other Filipino parents who moved to Guåhan. I'll never forget, my mom saying, "No, I'm not going to put you with that teacher because she has a really strong Filipino accent," even though we're from the Philippines. But my mom wanted our English to be really well. So she didn't want us to be in a class where the teacher's English accent was not that great. So, it's very interesting because that's like colonial mentality, too. You know, that thinking of wanting to sound white, or like whiteness prevailing again, just being the norm, even for people of color.

Ashly: I'll tell you, shoot, the teachers I had, like, their English, how we speak, we speak English, but we don't speak proper English. So, because of that aspect in the classroom, they speak improper English as Americans call it because we cut names short, or like sentences short. So, I've never experienced of how to speak English proper in a classroom, except for English class. It's different. But, in the math class, you use your language, because math is more of a pattern and not English.

Richard: Right. There's more of that relationality because there's a common understanding of how your language is in your place, right? Yeah, so there's like jargon and specific idioms that they use that's not common here.

Ashly: And that's how you can incorporate culture within a classroom. I just thought about that. Even though we speak English, but how we speak it is different. But I understand it to point like, this is our culture. She's my teacher and she teaches math. Majority of my teachers were female, black female.

In this exchange, the dimensions of *positioning/participation* and *windows/mirrors* were highlighted. In terms of positioning/participation, we discussed how our natural accents, though in English, had brought upon some form of self-consciousness within math spaces in the US. By mentioning the phrase, "proper English," Ashly situates the dominance of US English as being the standard language and discusses the feeling of embarrassment when having to speak in white spaces. She confirms this idea by referencing in the annotated bibliography a time when she was corrected for mispronouncing the number "three" as "tree" in one of her past math courses. Because of situations like this one, both Ashly and Richard reflected on numerous instances when they had to "code-switch" so that they would be deemed intelligent in their math classrooms. In other words, we were positioned to be in situationally immutable circumstances that disallowed the presence of our full selves (Jackson, 1999). Likewise, Richard referenced a time when he first realized that having a US-sounding accent was the standard for success in school and connects it to his reflection of moving to the US for the first time when students in his math class first commented on his "interesting" accent.

Meanwhile, in terms of the concept of mirrors, we also noticed a theme of representation in our discussion, but in somewhat opposing stances. Ashly referenced a more positive mirror experience when she saw herself reflected in her teachers who share the same race. Ashly brought up how she was able to relate to the article that referenced how having a teacher of the same race was impactful for her learning. She was able to empathize with the participants because that was essentially her experience growing up in USVI. That is, while she acknowledges that her experiences differed from Black students in the US, it was easier for her to establish connections and relationships with her teachers with whom she shared the same race in USVI. Richard, on the other hand, pointed to a more sobering experience. He recollected on conversations he had with his parents in the past about trying to avoid being in classrooms with teachers who had strong Filipino accents. He recalled an instance where his mom transferred him from an elementary class with a Filipino teacher to a class with a white teacher. The reason, as he had shared from what his mom has shared, was for him to learn "better English." It is evident through this conversation that while mirrored race between student and teachers in math classes are seen as important for relationships and connections, there still persists a dominant language ideology as deemed necessary to succeed in mathematics (Subtirelu, 2015).

Theme 2: Math classrooms as familial community

Another theme that was uncovered in our dialogic reflection was a sense of familial community within the math classroom.

Ashly: I noticed that a lot of teachers are females recently now, or for like high school, and elementary. Because I feel like they are like motherly. So, because of that, we

expect for those kids who doesn't have that role model. I read it in this chapter one of the chapters today that they have this “other mother” mentality where they see or view their students as their own and they want to take care of them to succeed. So, because of that kinship or like community, they care. And they build a relationship with help students succeed. And I've noticed that possibly has happened to me in my classroom because I love all my math teachers.

Richard: Yeah, absolutely. So you grew a fondness or likeness towards the math subject or discipline because you had really great teachers who fostered that, that joy mathematics in you, would you say?

Ashly: So, to think about it, it's like a community base, because everyone is...I'm going to tell you the truth, the majority of my classmates were half of my cousins, or like extended family members or friends of friends. So that, like, everybody, it's a small island, so everybody know everybody. Sorry, I mean “everyone knows everyone.” So, because of that, they build a community of being like, parents coming in to check on the kids and that relationship builds structure and understanding for each kid so the teacher should be able to combine everybody's background into one. So, like, we were just basically that family in my classroom. So like, in high school, there was only 17 of us, and the teachers were awesome. Because of that, we built a relationship where basically we were a family of 17. So like, because of that community? I feel like it goes, it continues with you. It doesn't just stop there in the classroom.

Richard: Oh, that's so interesting. Yeah. I mean, Guãhan is still a small island, but it's not as small I guess, because I didn't really have like cousins for my class. And then we lived in different villages. So, we went to different schools.

In this passage, we see the dimensions of *living practice* and *body/emotions* being highlighted. We discuss how having a sense of community in the classroom is translated from relational experiences in community outside of school. Establishing this sense of community in the class where everyone (both students and teacher) has a part to play in the overall success of every individual present within said community. As such, students are more successful and feel a sense of belonging in a math classroom when there is a strong sense of community, where members are not just passive receivers of information, but active contributors as well (Helgevold, 2016). Ashly further reflected upon this notion of community when rereading these passages:

Building that sense of community within the classroom, will encourage students to continue in their future. For example, me. I don't think I would be where I am today without the community that was built in my classes. There will always be that one teacher that will keep the students going. As they say, it takes a village to raise a child. And that's how I felt within my class growing up.

Illuminating these feelings of community within the math classroom as living practice also sparked a sense of joy, which translated to a sense of belonging in the classroom (Good et al., 2012). Richard referenced that while he did not necessarily have blood-related family members in his classes, he still felt a sense of shared cultural value among his classroom community which made it feel like family. He affirms Ashly's notion of community when he shared his reflections in the annotated bibliography in that in the math classroom, “everyone helps everyone,” and added that such was a strategy he used in the math classes that he taught in the US.

Theme 3: Culturally responsive mathematics

One final theme that emerged from our dialogic reflection was the notion of culturally responsive teaching in mathematics. Speaking to the importance of students seeing their cultures and the culture of

others in the math curriculum, we recalled examples of instances when culture was integrated into math lessons.

Richard: I think I remember more of like how I was teaching when I was a teacher in Guåhan. But yeah, I don't think there were a lot of times that I incorporated any sort of cultural thing. I remember one thing. I asked for an example from my co-teacher, she was a mentor for me. And we were talking about order of operations, you know, PEMDAS, right. People just use it as a mnemonic device. But my co-teacher, one thing that she told me what was instead of, you know, math, division, addition and subtraction, you know, my dear Aunt Sally, right? Yeah, Please Excuse My Dear Aunt Sally. She wanted to make it like culturally relevant. And so she said, instead of Please Excuse My Dear Aunt Sally, it was Papa Ed, My Dog Ate Spam. Because she thought that was better context. But I really can't think of anything else. Anytime we still did math work, it was very much US American standard curriculum. "Oh, let's talk about the snow."

Ashly: But, where's the snow?

Richard: Right? Exactly. I think a lot of it was just very much textbook: "The ladder was leaning against the wall at a 45-degree angle, what is the length of the shadow that's forecasted?" You know, it was very much just in general like that.

Ashly: To think about it, I actually this summer wrote worksheets for remedial classes from an undergraduate level. So, one of the questions I created was basically to write linear equations, or like some equations. So, I was like, but I use a Caribbean name, but right now, I can't remember the name. I was like, Jamilla bought two Johnny cakes, and three patties for this amount of money. And Dennis bought five Johnny cakes and 45 patties with, which is like Johnny cakes and patties are like the cultural food that we eat, like fried cultural food. Then, you find like the x and y like how you find the systems on the equation or how much money they spend, or like how much patties they need to make that much money.

Richard: Yeah, I love that. I love that you incorporated not just the cultural items in the problem, but also names. That just reminded me of Guåhan. There was a specific date in the beginning of March. It was designated CHamoru History Month. So that's the month where I remember that we incorporated a lot of CHamoru culture into our lessons. So, we would use things like, "The CHamoru hut sits over the four latte stones." The way the huts are on Guåhan, it's like, there's a huge triangular hut and they would be on four of those things. So that's why we would take measurements of that, and we would use that instead of a house. And I remember we would use names also like that were very much common in CHamoru culture, like Joaquin.

From our dialogue here, *culture/histories* and again, *windows/mirrors*, were dimensions of RM that were evident. These discussion points were brought up when we reflected upon articles in the text that referenced the importance of culturally responsive teaching in mathematics classroom (Thomas & Berry, 2019). We both acknowledged that in our mathematics learning experiences, it was rare to see culture integrated into our math lessons. We also touched on the fact that we had a diverse population of students in the classrooms we were in and that we imagined that it would be difficult to consider everyone's cultural background when planning for a math lesson. However, we have come to understand the importance of having to highlight all students' cultures and backgrounds in the classroom to foster a sense of community and belonging in the classroom.

Speaking more to teaching experiences, we both referenced instances in which culture was a focal point in our math curriculum. Richard recalled an experience teaching order of operations to his middle school

students. He wanted to make the commonly known mnemonic device, PEMDAS (Parenthesis, Exponents, Multiplication, Division, Addition, Subtraction), more meaningful for his students. By integrating an aspect commonly known and consumed food item by people in Guåhan—Spam—students were able to retain the use of the strategy when solving problems involving the application of order of operations. This strategy tended to linking students' cultural capital in their mathematical learning (Feza-Piyose, 2012). Similarly, during a cultural month celebrated by his school, Richard integrated information on CHamoru hut building and the use of latte stones in his geometry unit to provide students of Guåhan a glimpse of CHamoru culture and history. In this same vein, Ashly chimed in and recalled a time when she helped to develop curriculum for USVI math curriculum. It was important for her to include common names from the USVI used in the math word problems, but in addition to, including cultural food (Johnny cakes) in the context. Not only did doing so provide a glimpse into USVI culture, but also provided a window for other students to see other cultures in a math context.

Conclusion

As seen in these excerpts from our reflective dialog, tending to students' diverse cultures, fostering an inclusive classroom environment, and integrating culturally responsive mathematics teaching is integral for a students' feeling of belonging and success in mathematics. Our experiences presented here were affirmed by the articles presented in the RM text, which suggests that such issues need to be confronted and addressed in mathematics classrooms. These issues of exclusionary mathematics by reinforcing Eurocentric ways in doing mathematics is not only problematic in the contiguous US, but is also in a way, an act of mathematical injustice and erasure for students in US territories where US American culture is not the dominant one. Though we lived in geographically unincorporated territories, our experiences through duoethnography have informed the need to do more research in the ways mathematics is taught and learned in the US territories. Perhaps doing so begins with making local students in the territories and the contiguous US feel less unincorporated. Rather, math education researchers and practitioners should consider avenues to help students feel like they are not just doers, but also creators and owners of their mathematics.

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