

# Critical Math Drop Episode 5 Water Quality Project

Transcribed with Otter.ai. Please excuse typos.

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Intro Music

**Kari** 00:01

Hi, everybody, and welcome to episode five of the critical math drop podcast. With your favorite math teachers, Kari kokka, and

**Michelle** 00:12

Michelle Cody.

**Kari** 00:14

I'm Michelle.

**Michelle** 00:16

Hey, Kari, how are you?

**Kari** 00:18

Good morning. I like seeing your classroom.

**Michelle** 00:22

Yeah, early in the morning. It's yeah, a little bit messy. But that's okay. learning happening.

**Kari** 00:30

It is Wednesday morning, October 18 2023. And Michelle suggested that for today we share with folks when we're recording because we did want to speak a little bit about what is going on in the world. Michelle, and I spoke before we started recording. And to be honest, we're not really sure what to say. But we do know that we can't remain silent and say anything. And we do have a resource that we'd like to share with folks from Rethinking Schools, regarding Palestine and Israel.

**Michelle** 01:17

Yeah, we hope that, um, folks will educate themselves. This is one of the things we talk about all the time with our students is that numbers and tell stories. And it tells the story that you want people to know. So we really hope that folks are taking the time to really educate themselves read and get

different perspectives, so that they're making informed decisions. Because people's lives are valuable. Period point blank. Yeah, yeah.

**Kari** 01:54

Yeah. And the both of us to, you know, like we're working on educating ourselves. And also just really thinking about critical media literacy, in terms of what we're consuming.

**Michelle** 02:08

Yeah. So yes, please check out that link. Um, and hopefully that will engage you to think and read more. from different sources.

**Kari** 02:20

Yeah, yeah.

**Michelle** 02:23

Yes. So we're going to transition. today. Yeah.

**Kari** 02:30

Yes, yes. Today, we are going to share a project that I designed based on investigating water quality. And it's a project that I did when I was teaching in a summer program in Pennsylvania. And it was really inspired by a task, by Dr. Julia Aguirre and some of her colleagues designed around the water crisis in Flint, Michigan. And so we will also share with Phil a thing. Yes. And I, you know, I actually went to Flint, Michigan, I was invited by Dr. Beth Herbel-Eisenmann to give a workshop with some teachers that she was working with in Flint, Michigan. So I stayed in Flint, Michigan. And I remember actually, I was just trying to get food. And I think that I had never, I had never really experienced food apartheid. And every place that I tried to go to a grocery store, I would look on Yelp. And I would get there and the grocery store would be shut down. And so I got dinner from McDonald's. Because that was the healthiest place that I could get food. And then on. On the last day, you know, I kind of became friends with some of the teachers. So two of the teachers, Tiffany and Carla invited me to dinner. And so we went to go eat at Applebee's. And they told me about what they were experiencing with the water quality and the fact that they were using bottled water to take showers. And they didn't have access to fresh healthy water.

**Michelle** 04:30

In United States. Yes, that's actually great. Because before you get into your lesson, I just want to like, throw some facts down to kind of help frame how serious this thing is. So first of all the facts that I'm getting comes from the World Health Organization. So here's some key facts in 2021. Just two years ago, over 2 billion people believed in water stress countries, which is expected to be exasperated in some regions as a result of climate change and population growth. In 2022, globally, at least 1.7 billion people using a drinking water source has contaminated with feces, micro, micro bro. So like very, very small amounts, but still, poop is poop. You don't want it in any of your water. And this is also this really interesting fact. Because not only we're talking about like access to like water, like, within your house, like when you go to your sink carry you like turn on your faucet, and water comes out. And you can drink that water. And you can bathe in that water and cook with our water. But the the travel time is seconds, right? Because it's within your within your within your house within your place. So 1.5 People

live with a basic service, which means that there's an improved water source located within a round trip a 15 minute, excuse me, a round trip to 30 minutes. So that means 30 minutes to in front like total for them get some improved water. to 292 million people live with a limited service, or improved water source requiring more than 30 minutes to collect water. 297 million people are taking water from unprotected wells and springs. And lastly, 1.1 point 50 or 115 million people, Lord, it's early in the morning all collected untreated surface water from lakes, ponds, rivers and streams. It is such a it's like we don't think about this. Right. Right. Right. You're living in like privileged areas. You don't think about this. And it's crazy, because this is happening globally. But like you said, it's also happening in, like, communities here in the United States. And so it's just, it's heartbreaking. It's, it's really heartbreaking. So I know, I remember this being a big deal for Jay Z like 20 years ago, huh. It's all campaign about access to water. And he has like, he had like, he was working with the World Health Organization. And he got this whole video. And he was going to Africa specifically. And he was just traveling with children. He did, he did the route with him to get the water to bring back to the village. And as he's walking, he's like, you know, I mean, he's all he's all fitted out, whatever. And he's like, Yo, this is like a slip, this is a walk this the movement. And I gotta say that was like 20 years ago. You know. And so climate change has made an impact. And I it's not something that we really, you know, I mean, even the Flint, like Flint was a big thing for like, a minute and a half. And I want to say it was a doctor. It was like a doctor who actually like blew Flint up. Because they saw and I want to look this up, they saw their kids getting sick. And then it was like, what is happening, what is happening? And then it became, I think, anyways, now that we have some framing, I want to listen and get into this lesson. For exciting.

**Kari 09:00**

Thank you. I just want to edit one thing when you said the 30 the trip of 30 minutes to get the water. It was 1.5 billion people what I say? I think you've just accidentally left out the billion. Oh, does a 1.5 Yeah. So I just wanted folks to know, like how big of a number that actually is. Because you know, like you said, just because this isn't something that may not affect those of us who are privileged to have fresh water. Running water doesn't mean it's something that we shouldn't care about. You know, and it does relate to what's going on right now in Gaza, with people not having access to fresh water. So, you know, we hope that you and your students will see this as a relevant, serious important issue. And I'll share what I did with the kids in the summer school. And so this was a summer program. And the students were middle school students. And my background is, as a high school teacher, this is why I have so much respect for Michelle teaching middle school, the only times that I've taught middle school have been, I taught middle school summer school for the STEP program, the Stanford teacher education program. And I also taught in this program in Pennsylvania. And so what I did was, basically, I wanted kids to be able to investigate and analyze the water in their own homes. And so the basic premise of it was that I, you know, I bought all of these little containers where kids could take water from home and then bring it to school for us to, to test and I had these water quality monitors that I had bought that really using the electric current of the water, it will approximate how many parts per million of particles are in the water. So there's some science that I don't know all of the science part of it. But that's not necessarily like the best measure for the water quality, because, you know, there's certain minerals that we put into water intentionally, because certain minerals are good for us. And also, you can actually put acetone in the water and it won't, the water quality monitor won't show that then your your water is actually toxic. Because it's just measuring the like the parts

**Michelle 12:03**

you're saying that there can be like, different types of toxicity located in your drinking water, that testing certain testing apparatuses don't actually pick up on

**Kari 12:19**

correct and also the water, you know, those water quality monitors that you put in as this like digital readout of how many parts per million, it also doesn't tell you about the lead content of the water. You know, and so the other thing that I did was I bought these strips where you put the water on it and it turns different colors to try to tell you the lead content. And I also ordered from the city's water treatment plant a kit where you could fill it with water, send it in, and they will analyze it for you and tell you your water quality and whether or not there's lead in the water. So I also ordered one of those.

**Michelle 13:07**

So according to the CDC, the most common source of lead in drinking water are from lead pipes, faucets and plumbing fixtures. So if you are living in an older establishment, right, not a newer house or not in house as updated plumbing, then you probably have a higher increase of lead being leaking into your, into your water.

**Kari 13:33**

Yeah, and actually, at that time, you know, I had bought a home and they were changing out the pipes. Because the house the house that I bought was built in 1901. So everything is old, and so they were changing out all the pipes to make sure that we weren't drinking lead. I also I recently bought they have these water filters. So it's different than the Brita it's called the Zero water filter. And that one is supposed to also do tried to filter out for lead in your water. Okay, so let me share a little bit more about the lesson. So I started out with kind of just like a KWL activity. What do you know, what are you? What do you wonder and what did you learn? And I asked students, you know, what do we know about water? What questions do we have? I brought in I wanted it to be interactive right away. And so I stopped myself from saying hands on because you know, it's kind of ableist to say hands on but I wanted it to be interactive right away. And I wanted to give kids samples of water for them. To test on the first day, and so I had them do multiple tests for them to find the mean, or the average. We had discussions around. You know, when you take the mean, and you do these multiple readings, will that help increase the, the accuracy of what you're measuring? And I bought different types of bottled water. So I bought Dasani, I bought Fiji, I bought SmartWater. And I bought this water called ice mountain. And it was just the different types of water that I found at the target. So I went to Target, I bought all these different types of bottled water. And interestingly, you can actually read the ingredients of the water, because some of them have minerals that are put into the water intentionally, right. So I think fluoride is another thing that is often put into our water, intentionally for our health. And so again, thinking about the parts per million is not necessarily the best indicator of how healthy the water is, because some of those parts per million is going to count the minerals. And so I also, not only were we finding the average, but on another day, one of the activities that we did was, we were I asked them, Which is the best deal. So I had the pictures of, you know, the price tag from the target shelf, of all the different types of water. And they could figure this out in so many different ways. This is actually an activity of thinking about the best deal that I learned when I was doing my student teaching at San Lorenzo High School. And so kids go look at this, so many different ways. So it's basically a ratio and

proportion activity. Kids could look at, okay, well, for this amount of money, how many bottles of water are you going to get, irrespective of how many fluid ounces of water is in that bottle? Because that's, you know, if kids want to say, Okay, well, I'm gonna get six bottles with this much money and make that argument, they could look at the total number of fluid ounces that they're gonna get. There, there's just many ways that you can go about that activity. And so I had them think about, you know, what's the best deal. And certainly, I think, because of marketing, there was this conception that kids thought like, oh, Fiji water, that one's the best one. So it's worth it to spend the extra money to get the Fiji water, because, you know, they felt that somehow that water was actually going to be better. And that water, because it has more minerals in it actually does have a higher count of parts per million when you do the water testing. And so, we start out with just testing the bottled water. And then as the project continues, I have students bring in their own samples, we test those, we also tested the water of where we were actually holding their sessions, which was at a community center. So we had them, test the different water. We also from the community center, filled up the jug that I had mentioned from the city, we sent that in for the city's analysis. And it came back that that water actually did not have lead in it and that it was pretty healthy. So that was a relief to hear that and you know that we weren't drinking water that was toxic to us. And then I had them also do these different presentations. And so every different group decided on what they wanted to present on. And so in this particular program, they each had a mentor that they were working with. And so their mentor helped them to create a presentation. And their culminating project was a presentation to their own community and also shared about like, what were the actions that they recommended and what were the actions that they wanted to take. So I think one of the things that I think often becomes missing due to time constraints and logistics is this opportunity for for both for kids to be able to present to an authentic audience, and for us to think really intentionally about this action piece.

**Michelle 20:12**

What? Sorry, sorry, say, you don't know, I think that that's one of the, like framing principles around project based learning, right? Like this whole idea that students aren't learning in a vacuum, and that they're able to, to take their learning and apply it to something and, and just honestly, like, I do a project, I do at least one project every year where the kiddos present their thinking to an authentic audience. And it does a lot of things, right. It allows them to take what they learn and apply it to something meaningful, and it's for them to take a stand and listen to what we've been talking about since the beginning, like math, numbers, all these things matter. And they allow folks to tell stories. And that's 100% we're doing and that's so exciting that the kids and the action, I'm assuming you allow them to decide like what action they wanted to take. And so then also allows them to, like, take that sense of like ownership around.

**Kari 21:24**

Yeah, yeah. And actually, another project that I did with students also in Pennsylvania is we kind of flipped the order and had them first learn about what are actions that leaders in the community are taking, because I didn't want and this was a task around racial and reproductive justice, investigating the disparity, especially for black women and birthing people, the maternal and birthing mortality rates, and I wanted,

**Michelle 21:59**

which is ridiculous. Yes, it's, I read somewhere that an educated black woman is more likely to die in childbirth, then a woman who you know, versus a white woman who's never graduated from high school, and that education has anything to do with it. But it's just like, you would assume that someone with more education would have more economic resources, which would in turn mean that they would have more access to higher quality health care. But it don't even matter. Because we still out here dying. Yeah, it's not worth in childbirth. I know, that we've been doing for, like, ever. We're still dying. I mean, there's stories around Serena Williams, you having to like advocate for herself, because she had a blood clot after having given birth to Olympia and trying to explain to her doctors that something wasn't right. And this is a woman who is very in touch with her her body, because her body is literally her tool. And the doctors didn't want to believe her. And had she advocated for herself, she could have died. And that's crazy. And I know we're not talking about this right now. And we'll go back to water quality, but it's just

**Kari 23:14**

it's relevant. It's relevant. Yeah. And, and so, you know, because I didn't want kids to as we were doing the activities, to feel disempowered. I wanted them to think about that action piece first, and at the end. So okay, so yes, that was a relevant. I don't know what you want to call that like detour and then coming back to the water quality project. But I just remember how proud the students felt that they were able to present to all the adults. So what we did, my colleague, Cassandra Brentley, helped to organize this community event. So we invited folks from the community, we had some food for everybody. And then we had different stations. And so we had presentations going and then, you know, the the audience was able to ask feedback. I mean, ask questions and give the students feedback. And then they would rotate to their next presentation. So they all developed PowerPoints. They all practice their presentations, so they were working also on their presentation skills. And so it was just it was a great way to really honor what students were thinking what they were feeling, what were the actions that they wanted to take in their own communities around water quality. And this was relevant to Pennsylvania because a lot of homes are much older homes. that may have led, you know, in their water pipes. And as we were saying earlier, I think it really does help to build solidarity with other communities that don't have access to healthy water sources. So students can help to advocate for others. I also showed them part of the movie Flint. It's a 2017 movie with quaint Queen Latifah to kind of help students to really know and remember what was going on. In Flint. I know this was, you know, a movie. But I also showed them some documentary footage. I showed them also some videos that the, the city water organization, was putting out to the community about changing the pipes in the city. And so the very last handout that students have, it was called, I just called it our water Water Project packet. It lists a whole bunch of different links. And so some of the questions that were potentials that I gave them to investigate are, where does our rainwater go? Are Pittsburgh pipes treated for corrosion control? Why is there lead in the water? Are there total dissolved solids that are good for us? What type of harmful bacteria might be in the water? And how is the water treated for this? What happens to all of the plastic bottles we discard? So that's another complexity of doing this work. So for instance, when we think about Flint, Michigan, people had to use bottled water. But then that also meant that all of these bottles or plastic is going into the environment. And then we also have

**Michelle 27:25**

courses around like, like, the reserves around like purchasing bottled water, bottled water, right. And they what is it a band aid over a bullet hole? Right, yeah. And then also like, the implications around like, it's still plastic. And so bottled water that's not properly stored, the plastic can then leak into the water. Like you're not supposed to, like reuse water bottles, you're not supposed to keep them in, in places where it gets really, really hot. So all of these, all these other like crazy health factors that are, you know, a part of it.

**Kari 28:11**

Yeah. And then, and then also, I had asked them about, if they wanted to investigate how does fracking influence water quality, because in Pennsylvania, fracking was a big issue in that area. And so this is something that anyone can do in their own community. And then thinking about what type of actions can be taken in their own community? Or it could be how do we want to support another community and uplift another community? And you know, the inequities that another community is facing, like, what can we do to support another community, because I think that, you know, and Taica Hsu always talks about this as well is really thinking about solidarity. And that solidarity is such a big part of doing community engaged social justice work. And, you know, like, Michelle, how, right before we started recording, I was telling you about how I've joined this organization called Tsuru for Solidarity, which is a Japanese American activist organization. And one of the campaigns that I recently joined, is around working towards rough reparations for black Americans. And so, you know, what, within the Japanese American community can we do to support that movement for reparations for black Americans and so, and that's not even, you know, like, when we think about solidarity, it's not even like, you know, there's this quote that I think I really like, and it's this saying that people say, I don't remember the exact thing, but it's something like, Okay, well, they're they're going after this group. And pretty soon people are coming after your own group. And I don't think that that's really what solidarity is about, like solidarity is about supporting another community because it is the right thing to do. Not because I want to support this community so that later on someone supports my community. No, I want to support this other community, because simply because that is the right thing to do. And I'm using this lens, you know, my critical lens to look at the world and think about what do I think, is just, and what do I think needs to be done to help to, you know, tackle and justices and work toward equity and justice? And so what are the actions? What is my responsibility? In that work?

**Michelle 31:05**

Yeah, I think this is like, how it just becomes this ongoing battle of just like self reflection, and where do you stand? And what's your value and what's important, and teaching people to think outside of themselves? And I hear you, I think that I think that the, the initial poll, in the Solidarity movement is to be like, if you don't help. If you don't help, then when it's time for you, no one's gonna help you. And that's maybe the carrot that pulls some people in. And then hopefully, as they're doing this work, they'll be like, Oh, no, I just need to do this work, because this is what's going to help me and the world push to become better versions of ourselves. And so I think that that is that's an important thing to recognize and realize. This is a good lesson. I'm I, I know that when we drop our lessons, or are you also going to have like, links to the kits that you got, so folks can look at that. Is that going to be part of the

**Kari 32:24**

Yeah, the I'm pretty sure in the very last in the project page, it has the link to the cities. They have a whole the Pittsburgh water and sewer Association has a whole link to what does it mean to have lead in your water? Or what is the

**Michelle** 32:46

I mean, like the I'm sorry, I wasn't clear. I mean, like the you talked about the different kits that you used? And oh, yes, sir. Yeah. Water samples. Can we make a resource page for free? Yeah,

**Kari** 33:00

yes. Yes, I can do that. Yeah, there there were actually there. So yeah, there was another one that I got on Amazon. That was like anybody can collect water and send it in to get tested. As well as the test strips, you know, I mean, and honestly, I think it would be great for to collaborate to the scientist, because there was also a lot of the science that I didn't necessarily understand the chemistry behind it. And then the other part was like the city offered the water testing for free. But there is there is a resource that I can add where like anybody can send in their water sample to get tested. Yeah, definitely.

**Michelle** 33:43

I also like because I'm really big on teachers not spending their own money. If this is like a project that you want to do. And again, we know that not all of our listeners are traditional educators, but we are all teachers in some sort of way. And now that to that public service announcement, I if you want to think about doing this activity in the future, you can always do a DonorsChoose and create a DonorsChoose project around these kids. Me samplings so that you can really, like get into this. I know it's so funny because, um, I do a rates unit. And I was actually going to, I was thinking about doing a project around my right unit. And my co worker who used to be my coach, he does the same unit and he did it around health disparities. And I was wondering maybe I can also think about like, water quality for this right unit for the babies and how do we bring this in? Because the kiddos in sixth grade do do They do some things around climate change and just like, accessibility. So how can we marry this together so that folks are able to, you know, make that connection? That'd be cool.

**Kari** 35:16

Yeah, yeah. Yeah. Well, thank you for listening, Michelle, and our audience. Hopefully some other folks. Listen to this episode of this water quality project more than me just talking about it with Michelle, whom I love. And so,

**Michelle** 35:40

my loves for you to my friends. That's why we do this.

**Kari** 35:44

I do. I know, Michelle, I texted you this, but I think I didn't get a chance to say it to you. But you know, at the end of our episode for I just love at the end, maybe this is like our thing we do at the end of every episode, but I was just listening to it, you know, at the end, and it's like how much we just love on each other and uplift each other and support each other as women of color. Yeah, I just like had warm fuzzies as I was listening to it again.

**Michelle** 36:17

Yeah, it's, it is important that we don't bring each other down, but we lift each other up. And I think that especially the way the world is situated, we're always, there's always this desire that there can only be one in the room, there can only be one best. And it's never like that for folks who are male identifying, or folks that are male presenting. And so it's it's a lot of room in this room. It's a lot of room. It's a room for everybody. And everybody can get everything. And we need to be okay with that.

**Kari** 37:02

We need to be Yeah, we're happy about it. Right? Yeah. Yeah,

**Michelle** 37:07

we're happy about it. Everybody can get everything, all their desires met? Yeah, it's

**Kari** 37:13

not it's not a zero sum game at all? Well, so we would like to thank everybody for listening, joining us. We hope that this might be something that's useful to you, you might be able to try it out. We would love to have you join us or send us a voice memo. You could send us a voice memo at [criticalmathdrop@gmail.com](mailto:criticalmathdrop@gmail.com).

**Michelle** 37:43

Send us a voice memo, like Yes, send us an email, send us a tweet. And I think that if we get some stuff, we can start to like, share that out. Like, it was so cool. For folks. And I mean, like, it can be a myriad of things. Like, I'm gonna go back to Mythbusters because I feel like I always have on the show Mythbusters part of the thing was that they would, people would check sending like, I this is this myth, I want you to check out this myth, right. And so they will do the thing to either, like, see if this myth was plausible, or debunked it or anything, but it was, a lot of this stuff was like, listener generated. So here's the big ask, cuz it's a big one. The first thing is like, give us feedback that you would like to share, like that you would like us to share out right? On either some of the lessons that you either did, or the talks that we had, or, you know, if there's like, topics, or things that you want us to think about our research. And when I say research, I mean carrier research, because that's how I will listen and talk and get my opinion because that is my gym. And, or, you know, just voice memos that you want us to like, listen, or play or whatever, I think it'd be really cool because, you know, we're talking into this ether that is the internet. And outside of like, the homies that Texas who say good job, we don't know. Right? We don't know. We don't know if this is making an impact. We don't know if this is making you think, making you smile, making you angry. We don't know. We don't know what you're going through. We want to know, we want to know.

**Kari** 39:48

And also Michelle, you are a researcher as well. You're the one who was giving us all the stats today.

39:54

I was I was okay. You're a researcher.

**Kari** 39:58

You are you are are okay, so you want to close this out?

**Michelle** 40:06

Oh my gosh I feel like this is this is like, you open and you should close but okay, now I got you. Um, so a all this is Dr. Kari Kokka and Michelle Cody with Episode Five. When we have a name for it,

**Kari** 40:28

What about Water Quality Project? We can think of something more snazzy. Your face!

**Michelle** 40:37

Yes. Episode Five Water Quality Project. We're gonna we're gonna workshop that name. Don't worry about some episode drops. It'll be something a little bit more snazzy. And thank you for listening. Thank you for continuing listening to us. Thank you for continuing to rock with this. We are doing so well. And I'm very appreciative like we have over 50 followers. So 50 of y'all are saying yes. To us on some sort of social media platform. I've gotten folks who were like, Yeah, I hate your episode as soon as it pops up because they sent me reminder. So thank you, we appreciate it. Because we enjoy doing this and we hope that you enjoy having this. So until the next time. This is your favorite math teachers and we out.