

Democracy's College Podcast

College Readiness in Math and Curricular Alignment

Announcer Sal Nudo: Welcome to the Democracy's College podcast series. This podcast focuses on educational equity, justice, and excellence for all students in P-20 educational pathways. This podcast is a product of the Office of Community College Research and Leadership or OCCRL at the University of Illinois at Urbana-Champaign. Learn more about OCCRL at occrll.illinois.edu. In this episode, Dr. Eboni Zamani-Gallaher talks with Dr. Ann Edwards about college readiness in math and about curricular alignment. They also discuss issues related to placement and developmental mathematics courses, guided pathways, math pathways, and student participation in STEM. Dr. Edwards is a Senior Research Associate and the Director of Learning and Teaching at WestEd.

Dr. Zamani-Gallaher: Thank you for joining us today on Democracy's College. Today joining us is Dr. Ann Edwards. Ann is a Senior Research Associate at WestEd. She also is the Director of Learning and Teaching for the Carnegie Math Pathways. Ann, thanks for being with us today.

Dr. Ann Edwards: Thank you so much Eboni for giving me this opportunity to speak with you on such really important and urgent questions. Eboni, I also just want to say I admire your work, and the work of your organization so much, and so it's really an honor to be able to dialogue with you.

Dr. Zamani-Gallaher: Thank you so much, we really appreciate that you're going to spend some time with us and give us some insights and share your expertise and also have really enjoy the work that is coming out of the Carnegie Math Pathways in WestEd. Many times we have thought, and have taught, you and I, as of late about how so many of us are being affected by recent events, we have a global health crisis, we also have an environmental crisis, economic crisis, a racial crisis, a leadership crisis. We've talked at length about what is happening at present, but for our listeners today, can you share with us how COVID-19 is affecting mathematics instruction in community colleges, relative to the challenges facing instructors and students during this time, I'm particularly wondering for communities of color and students from low income families?

Dr. Ann Edwards: Sure. First, I'm going to start by asserting that the myriad challenges that we're facing, in particular with respect to students from communities of color and low income families, that the challenges we're seeing are not new ones and they're not new anywhere in the educational landscape, K-12, post-secondary. We haven't long known about deep inequities and access to high quality mathematics learning opportunities about prejudices that are rooted in race, culture, language, and socioeconomic status that are actually built into the fabric of our educational systems and that served to marginalized these learners.

We also know about the impact of these inequitable inputs on their outcomes, impacts that reach well beyond schooling to career and life and their communities. So, this is not new news, these things have been around for a long time. What the pandemic has done, it's shined a bright light on these inequities and injustices, it's really forced us hopefully to pay attention and to take action. So, having said that, then what are some of the specific things that we've seen with respect to mathematics learning and mathematics instruction in this context for community colleges and the students in them?

So, I'm just going to enumerate some of the challenges that we see, and then I know later on, we're going to have an opportunity to talk about some of the ways that we can move forward, but I'm going to take this opportunity to enumerate. So, one big issue of course is one of access, and that speaks to technology, but it also speaks to access to relationship and connection. It also speaks to access to physical spaces and environments that are conducive to learning and participation, access to meaningful student supports like tutoring and advising, access to meaningful and relevant curriculum.

So, I just want to put a pin in this one, oftentimes when we in life, but also, especially in education, find ourselves in really difficult challenging circumstances, we revert to things that are more comfortable, might be more traditional, might be easier for us to pick up and engage students with. So, doing the hard work of innovation and meaningful and relevant, in this case, curriculum is what I am talking about, we find it sometimes harder for people to do under really challenging circumstances. So we lose things like real world projects, engagement with the community mathematically in meaningful quantitative problem solving. These are all issues that undermine the project of mathematics learning in meaningful ways that have hit these communities of color and low-income families, particularly hard.

I would also add that, time, just time for students to be able to meaningfully engage over and above issues of access is really important to consider. Like many of us, these students are now facing myriad challenges in their homes and in their lives and in their communities, and finding the time to be able to, with intention and focus, spend with their mathematics learning is being challenged. So, I would say that's something that is really an important consideration. Then lastly, I would say specific to mathematics, due to the huge pivot to remote learning, instructors are losing access into students' ways of mathematical thinking and reasoning that they would have in a face to face classroom.

You can imagine in a face to face classroom, and in particular one that utilizes active learning pedagogies that teachers can see and can probe and can access what student's thinking is, and in particular for students who enter into the classroom with math anxiety, or with other really problematic histories with mathematics learning that direct access into student's reasoning and being able to talk to students' about their mathematics is critically important. That's very difficult to do in remote learning situations.

Then lastly, I would say that there are inherent challenges in mathematics assessment given the conditions we find ourselves in. Challenges that adhere to communities of color and to students from low income families in particular, assessments under the best of circumstances are often measuring the wrong things or are often biased in ways that don't appropriately honor and demonstrate student's actual proficiencies. In this case now with remote learning, that is doubly so, we have real questions about the adequacies of the assessments to measure what we want to measure, we have real questions about how then we can actually use the results of these assessments.

Then there are instructors, in particular administrators, that have real concerns about what the assessments could be telling us when there are concerns about security or "cheating" that they see in mathematics in particular. So, I would say overall, it's a really challenging landscape, and there are a lot of ways in which those challenges are produced specifically in light of the pandemic, but I would say that it's more of what we already should have been paying attention to for a long time.

Dr. Zamani-Gallaher: Yeah, there's a lot in terms of the challenges as you noted, and the changes, there have been rapid changes alongside these challenges and uncertainty during this pandemic, but especially during the pandemic, some of these cultural and societal shifts, the conventional ways in which we've measured student success, as you've already alluded to, I think, and some of your remarks is that this creates unique challenges for students of color. So, I guess with that I'm curious, what are the necessary resources, accommodations, and or modifications to do the assessment piece, to measure students progress and their outcomes in mathematics education?

Dr. Ann Edwards: Yeah, that's a really good question, it's really important question. I think in general, we've placed too much emphasis ... pre-pandemic, we placed too much emphasis on the ability of certain high stakes assessments, standardized tests, to be able to tell us meaningful things about students learning and students progress. In our conversations about placement in the last several years, we've come to recognize the limitations of those high stakes standardized tests and seeing that a broader form of multiple measures can be very, very useful and can give us more authentic windows into students learning.

In the pandemic, I think, that becomes even more of an issue, for example, math anxiety, which is something that is a real challenge for many, many, many students, in particular students from populations in which they experienced stereotype threat when it comes to mathematics. Those kinds of testing situations produce great deal of anxiety, and so that raises the question of, "What kind of an actual accurate measure of their learning could those tests actually be?" I think with the pandemic that it's just worse. That's even a more critical situation. Then I also wonder, under these circumstances what we think we're actually measuring? So, are we measuring actual mathematical proficiency or are we actually measuring something more like students access to learning opportunities?

I think that the pandemic, again, shines a bright light on this notion of access that students' lack of access is now very visible and concrete in certain circumstances, and so I think this question of what these tests are actually measuring becomes more salient for a lot of people. So then what do we do about it? I think we still need to understand where students are at. We still need to have a window into students' understandings and still have a way to be able to report back to students and report back to the instructors and to help institutions understand how good a job or not that they're doing to help students learn.

We need a way to get a window into and document. I would say that there is a lot that we know about things like formative assessments, performance assessments, assessments that have to do with projects or project-based learning, and also innovative assessments that get more of the ways in which students reason about the world using the tools of mathematics rather than asking them to regurgitate the things that they are expected to memorize. That brings with it a different way for students to engage the content, and that then should reveal a richer more authentic view into their learning.

What I've just spoken about refers broadly to assessments of students' mathematical learning. I think the question about outcomes that, for example, course completion, grades and that kind of thing, speaks also to grading policies. So, I have recently read a lot about how part of the project of making mathematics more equitable and in some sense, making it a more human activity in its schooling context needs to allow for mathematics as a continuous process of learning and that grading policies need to allow for students continuous learning and revision and progress, not just dropping in and having these summative assessments that are supposedly a snapshot of what students have learned and can do.

So, I think grading policies that are not less rigorous, no, they're in, I think, many ways allowing for retaking and revision is more reflective of the ways in which humans actually learn. I think that will also give us a more authentic view into what students have learned and therefore giving better information back to teachers and to institutions about how well their courses and their programs are going.

Dr. Zamani-Gallaher: Some of the work that we've done here at OCCRL, in particular I'm thinking about work that has stemmed from the transitioning learners to calculus and community colleges consistent with some of what you were just sharing responses that we received from mathematics chairs, doing a census survey of community college mathematics chairs, as well as with some of the survey work with the faculty, we found that there's some twin redesign efforts really needed, and so when we think about what are the mathematical strategies, as well as the relational strategies and how they can mutually reinforce one another and in particular within many community college mathematics programs, data not being used as effectively as it ought to be, right? So that

there's opportunities, as you mentioned, to really be definitive and distinguish between what we mean in the way of assessment of student learning outcomes.

How we examine student outcomes data, as well as this aggregated at a minimum with respect to opportunity gaps by race and ethnicity, as well as for those that are STEM interested or focused and students that aren't in STEM Pathways, who again, may disproportionately place in the dev math, but I'm also curious with respect to what we see occurring at present, how students, as you mentioned, us really kind of parsing out the assessment pieces, formative, summative, and thinking through that in very different ways from other measures in terms of student learning and what's representative of that. I think we're at an unprecedented time, right? We've heard that term used a lot. So then the speed and the scale with which we have to pivot and have to think about as you already mentioned some barriers that were here prior to the pandemic.

So, how do institutions and faculty, staff, and when think about our students, they were more connected than ever before, but because of the pandemic, right? So via online, and due to the pandemic, we've seen that a different way in which folks have had to engage. So, in terms of opportunities to cultivate what is this wire connected community that has emerged, this new network, if you will, how do we strengthen a networked community of equity minded community college practitioners, because the whole piece around, how do you do culturally responsive pedagogical mathematics in the online format is also something that is really curious to me.

Dr. Ann Edwards:

Yeah, that's a great question. I think something that we should all feel at least a little bit excited about, the pandemic really has forced us and forced many of us to seek community. Like we can't take it for granted anymore. The technology age in which we live gives us ways to do that. And as you said so, this online wire connected community, but then the real question is how can we leverage these tools in this moment to create sustain, nourish and equity minded community of practitioners, and in doing so what's the how? What does it mean to be equity minded and engage an equitable teaching practices in remote instruction and fully online instruction? What does that look like and how can we support people to be able to do that specifically in mathematics?

So, I'm going to respond in two different ways. One has to do with the community of learners or the community of practitioners, and then another area I'll touch on has to do with that question of the what, and maybe we'll start there. The question of the what. Mathematics is unfortunately, a discipline that has been instantiation in schooling, rip broadly in education, been a real dehumanizing force. It has served as a gatekeeper to so many students, so many students of color, so many students of poverty, women historically, and it has been used as a bludgeon in the name of meritocracy, a kind of idea of an intellectual meritocracy, that is all terribly wrong and terribly damaging.

Part of the project I think of ... what I think of as an equitable mathematics education is to kind of ... I mean, this is what Rochelle Gutierrez talks about, right, as rehumanizing, rehumanizing mathematics, so that it becomes very visibly and explicitly an activity of humans that speaks to the humanity in us, and is a way in which we as human beings in a social world, make sense of the world around us and can understand, and engage and participate in the world around us. So, what does that mean for what we do in classrooms to be able to support the development of that kind of way of thinking about what mathematics is and way of engaging in mathematics?

A big part of Rochelle and others who do this kind of work focus on, beginning from the lived experience of those who have been not just underserved, but historically disadvantaged and damaged by mathematics, by mathematics education, and seeking to turn mathematics learning into a relational activity. So understanding your students, understanding what your students needs and interests are as learners, as doers of mathematics. So what does that mean? It means getting to know what your students' experiences in mathematics have been and understanding from the point of view of your students.

There has been a lot of work in thinking about and conceptualizing mathematics as a racialized experience, that race has structured mathematical learning opportunities and has impacted and shaped the ways in which we as a society conceptualize who is competent and who is not in mathematics. These are the kinds of things that need to be tackled, that need to be understood and tackled in the context of mathematics instruction that I think is truly equitable. Culturally responsive pedagogies are a big part of that, cultural responsive curriculum that really speaks to the interests and the needs really of students as they engage in their world in a quantitative way, those are all really important aspects of it as well.

How do we support teachers to be able to do that? We need to support and promote their window into who their students are. "Is that harder to do in remote learning?" "Absolutely." "Can it still be done?" "Yes." It takes the creation of opportunities on the part of instructors to engage relationally with their students, and that could be through Zoom, that could be through the ways that we ask students to share with us what their experiences are, invitations for students to share their perspectives on their mathematics learning experience and what they're feeling about the mathematics they're engaging in right now. This all needs be understood as part and parcel of a pedagogy, and even if you're doing this remotely, you still need to carve out the time and space to be able to do those kinds of things.

I think on the curriculum side, like I mentioned before, a lot of people revert and it becomes more difficult, but I still think part of the project then needs to be, to have a professional community that is really committed to this idea of asking students, finding out about their lives and then turning that knowledge into

mathematics curriculum that is meaningful and relevant to students. So, I think that there are ways, very concrete ways that we can support teachers, even in a remote context to meaningfully relate to their students and present mathematics, engage students in mathematics that is relevant and meaningful to them.

Now turning to a network community, I love the idea of leveraging the momentum behind these incredible, some of these groups that have emerged in the last six months in the wake of the big pivot to online learning, they really have become spaces for people to problem solve together, to share resources, to share ideas, to learn from one another. And in particular, I think some of these groups have really taken a strong focus toward what does it mean to take on what equitable mathematics teaching and learning could look like, especially when we are facing this layering of crises that you articulated. So, I think there are really good examples. I was going to tell you about a couple of these examples, like 3CSN in California started a new community, they called Wayfinding Online.

They've even incorporated students in their community, and I really think that that kind of community that has multiple strands and modes of participation leaders, voices, that demonstrates the possibility of online community focused on problems of practice lived experience and importantly collective agency, which I think 3CSN has really done really well.

Dr. Zamani-Gallaher: I can appreciate so much of what you said, I think in particular, just the acknowledgement that mathematics does not empower everyone equally. It has not. So that when we think about the production of mathematics education, while on the surface, there's this assumed neutrality, right? But it's not neutral, it's not impartial. It has never been equally accessible. So, kind of embedded, kind of part and parcel to that have always been these kinds of cultural blind spots alongside the perceptions of neutrality, and much of what we've seen in some of our own work here too, kind of jives with what you're saying.

I mean, much of what I'm excited about, at least with the possibilities of the network communities, is it as a third space? What are we doing with this space between in terms of not just mathematical practices, right, in terms of the math work itself? The level of the math, the challenge of a classroom. Again, not the traditional classroom, but this third space for how we engage through learners, how it is organized in terms of the curriculum, what is deemed relevant or may not have as much relevance when we shift gears in terms of the medium by which is the primary one, but even more so than that, as you talked about collective agency, what's exciting is the relational strategies that are emerging in terms of the empowerment of learners, a greater expectancy revisit critical pedagogy, that's culturally relevant teaching as well as culturally relevant materials.

Then I think there is a different level of accountability as well that is also burgeoning with this time that we're in, not just in terms of innovation for the

exchange of teaching and learning, but hearkening back to our earlier part of the conversation around assessment and placement and performance monitoring, if you will, and the degree to which there is welcomeness or not, right? So, all of this I think is a part of the equity discussions and equity related efforts and mathematics has typically been, as you mentioned with Rochelle Gutierrez's work, that there's this absence of the consideration of social and structural realities when we think about the modification of classroom environments and school culture and mathematics curriculum.

I think particularly given the racial unrest and pervasive crisis that has been perennial as it relates to race, and as we think about moving in discussions around equity and math beyond one that's just access and achievement to address issues of identity and power. I think what's happening right now is a really interesting time for the exploration and for a call to action, to look at issues of identity and power, and particularly what happens in terms of mathematics being experienced and framed as ... I guess historically constructed in terms of something for whites and the white elite, and that there's an equating of mathematics not referenced as whiteness in terms of who can do, has done and excels in math. You did actually touch a little bit on where I want to go next.

So, maybe there's more you might want to add, but you provided us with some good food for thought, some rich examples in terms of some promising practices that are happening right now that can help to provide us with ways to augment and be responsive to the current challenges and find opportunities, even in the midst of what is happening right now with the development of these new platforms. So, when you think about professional development activities that may parallel or be aligned with some of the unique needs of students that are racially minoritized, other underserved students in math pathways and in STEM, what are your thoughts about what might be helpful to fostering racially equitable student outcomes and student outcomes in general for those from marginalized underserved communities during, and at some point, hopefully right after this current pandemic?

Dr. Ann Edwards:

Right. What I want to focus on is relationships with students. I think that might be my mantra for the day. As you mentioned, mathematics is so often seen as something that is not relational, that is absent from or excused from, in some sense, the larger social cultural context, and it's just not, it's not in its development and construction, it's not in the ways in which it is presented and engaged and participated in, in educational contexts. It is deeply embedded in the fabric of our everyday lives and all the identities that we bring to that, right, and the ways in which our structures are built.

I think, like I said before, a big way into that to disrupt that is knowing your students, really taking a deeply empathetic stance with respect to your students. I think there are a number of ways in which professional development can support mathematics instructors capacity to be able to do this, because while a lot of mathematics instructors really do care deeply for their students,

they aren't always mathematics instruction, and in particular in post-secondary spaces is not one that is typically known for a deeply relational set of practices. So, in professional development, really helping instructors see the importance of, and giving them concrete tools, whether that's activities or whether that's videos, for example, of conversations with students to see a modeled ways in which we can promote and support instructors to be able to get to know their students better in meaningful ways.

That's, I think, a core aspect of professional development. I think part of that includes tools and strategies for making connections for noticing students. So, noticing what they're thinking mathematically, but also how they're engaging and how they're participating in the mathematics. Then with that noticing them being able to demonstrate care, I think that last thing about demonstrating care is really important and can be a challenge in remote learning, but it's something that ought to be an explicit focus of professional development, making virtual spaces for mathematics learning safe for students.

Mathematics often feels unsafe to students, and especially for students who have been determined to be in developmental mathematics. It has not historically been a safe space for them, and so knowing specific ways, engaging with specific strategies that help students see themselves as welcomed, see themselves as invited to participate, and where they begin to see that taking intellectual risks is not only not going to get them into trouble, so to speak, but that is a valued part of being a learner in this environment, that is something else that needs to really be a focus. I would say those three things really have to do with students and connecting with students and relationality.

I would say in addition, there's a really important aspect of professional learning that has to do with the instructor's own perspectives, the instructor's own biases and their perspectives on how their students are experiencing the implicit biases that they as instructors bring into that space. So, a lot of self reflection, self interrogation about what you as an instructor bring into mathematics, who you think is good at mathematics and who isn't typically, who you think is motivated and not motivated to do mathematics and why. What you believe about the capacity and future trajectories of your students and why you believe them. These are all things that need to be examined explicitly, I think as part of professional learning too, in order for the relationality and responsiveness in the classroom that we want to promote in order for that really to take root.

Dr. Zamani-Gallaher: I couldn't agree more. One of the things I think that's also very much a necessity is with that professional development, and in particular with community colleges, right, in the case of mathematics education, there has been not just community colleges, but post-secondary in general, I guess, arguably P-20, there's a glossing over of deeply embedded structures that produce inequities. I think some of that is also due in part because of the definitions and lack of level setting related to, when we say equity what does that mean, and then how does that connect to the different types of math reforms, educational reform efforts

that even in lieu of being so-called equity minded, that some of these efforts have fall prey to an unwittingly sometimes perpetuating that some groups are left out when we can ill afford to have a throwaway group.

So, one of the challenges has often been, as we work with folks on our end, thinking through when they talk about equity, what do they mean by that? How do they grapple with an equitable conditions, particularly those that underrepresented racially minoritized students are facing both in and out of school and especially within the math community in terms of the opportunities in these contexts for the students. So, in the short and the long term, wondering what do you see playing out in terms of community colleges and mathematics education are there, particular things you think we ought to have or greater support of institutions and their instructors and meeting diverse student learner needs?

Dr. Ann Edwards:

Yeah, I guess in the short term, I'm going to really focus my responses to the online pivot and what that means and what students and the instructors need. And just to say like what I'm hearing from the field right now is that, a lot of places are going to go fully online in mathematics, in particular. Mathematics is seen as something that's "relatively easy" to put online, and so even then institutions in which they're looking to have some students on campus or some hybrid models, mathematics is often the one that is fully online. So, what does that mean? It means in contrast, I think to the rapid pivot that was required in the spring, institutions and instructors for the fall have had a little bit more time to really consider what their design might be and what their implementation model might be for these courses.

What I think is needed in those conversations is student voice and student experience. I know that there's a lot written about the student challenges to technology, the students challenges to find time to be able to log on and do their homework and so on and so forth. But I am mindful that institutional considerations, the kinds of structures and processes that are necessary to put in place to allow for implementation are fully online, math course is taking precedence over the lived experience of students and trying to optimize even under those institutional conditions, that experience for students and that as we know, falls disproportionately on the shoulders of students of color and poverty.

So, I think in the short term, what I hope in the short term is that there is a lot of learning that has been leveraged for what we're going to see in the fall in ways that better reach students, not just in terms of time and technology, but also really importantly in terms of relational connection and meaningful engagement in meaningful mathematics. In the longer term, what I think right now we might see is an increased reliance over time on online and hybrid models in mathematics. I think institutions with the very significant pressures to budgets and the uncertainty to enrollments are going to be turning increasingly to online and hybrid models in those disciplines that they think can be done reasonably well "online" and that is like I said, almost always mathematics.

I hope that that means that there will be increased understanding of and responsiveness to student needs that there is a push for innovation to address those needs in terms of not just the technology and the platform, which is where we typically think of innovation, but also implementation models, not just fully online with unfacilitated homework or office hours, but something that really engages students in meaningful ways. I hope that this occasions and opportunity to think about how technology could be leveraged to better reach students. There are some really interesting ways in which we can think about how technology can enable just-in-time interventions, both in terms of content and in terms of where students are emotionally and socially.

I think that we should think also about what all of this means for faculty development, too often in these times of budget pressures, faculty development is something that is cut pretty dramatically, and I think we can ill afford to do that at this time when the instructional model is changing so rapidly and it is an opportunity to do something really important and innovative. Lastly, what I see coming that I hope I am being too melodramatic, perhaps not, I see a kind of the rising of disaster capitalism in the Ed Tech sector. So, there's a very pejorative way to put it when there are institutions and people out there that need solutions, and there are providers out there who have solutions.

But I am very, very wary of pitching and promotion of course ware or other kinds of educational technology that somehow is going to magically save us all, and that's just not true. I want colleges to be very thoughtful about how they use their dollars at this time and really think about their investment and their human resources, as well as our technologies so that the innovation and the change that comes from this really is for the benefit of all and is sustainable.

Dr. Zamani-Gallaher: Yeah, there has been, I'm not sure that it's gotten to the point of a flooding, right, of the market, but there definitely is some opportunistic endeavors out there as institutions are really trying to reconcile what comes next and be able to pivot rather quickly, others that are again, they have their ducks in a row and this is not new to them, right? They've been true to this, not new to this, and so they have some good results that they can produce and that these are places that we should look to, to have more collaborations and partnerships, but you're right. There are also [phishing 00:37:06] attempts, if you will, to have institutions jump at, and again if it seems too good to be true, all right?

Dr. Ann Edwards: Exactly.

Dr. Zamani-Gallaher: But one of the things that everyone has again been dealing with year in and year out, and of course, very concerned about is, nationally the figures they range from as little as a half to upwards of four out of five depending on where you are, but the large number of students that are requiring remedial coursework nationally, and I know in my own home State of Illinois, we have two out of every five of our community college, full time freshmen that are immediate high school graduates that are entering the community college sector here as freshmen requiring remedial math courses. There've been different educational

reform attempts in the past [inaudible 00:38:01] being one way that some states are dealing with how to curb dev math.

The transitional math is something that is also quickening pay staining steam and then here in the State of Illinois, by law, our high school districts have been charged to implement transitional math pathways per our secondary and Workforce Readiness Act, and of course with the PWR, as an initiative is really intended to improve high school students, college readiness. So, here in Illinois, this transitional math pathways has three pathways, right? So these transitional courses are to be applicable to mapping to students end goals. So, if a student's career goals have been explored and developed, then they can pursue one of three pathways, one being STEM, one being technical, and then another pathway being quantitative literacy and statistics.

So, I'm wondering if you might share your thoughts regarding transitional math and whether you find that it can effectively reduce remediation of entering college students. One of the concerns is potentially it could actually further stratify and segment opportunities kind of creating an advertently another version of student tracking.

Dr. Ann Edwards:

Yeah, so this is a really big question and one that I think a lot of states and a lot of systems are taking up right now. We ourselves in the Carnegie Math Pathways have worked with a couple of systems on math transition courses from high school to college and has faced the exact same set of questions. Let me start by saying that the notion that a traditional algebra-based high school course sequence that leads to calculus is some kind of ideal and common pathway to which all students have access, like that's just a fallacy. Like you mentioned, research shows that some very significant proportion of students are not prepared for college level of mathematics, and that also research shows that few students actually navigate that pathway as it actually has been designed.

So this idea that there is some path that everybody has access to and it's the right thing, and it's going to lead them to the greatest set of opportunities in college, the reality is that that's just not true for most students. I might say that what we have now is a thing called a STEM Pathway in high school and kind of like a failed STEM Pathway for all the other students, right? Where the vast majority of students are in this second pathway, and it is a kind of alternate route, so to speak, but it's an alternate route full of obstacles and barriers, and that really serves to derail students from their goals.

So, I think really rethinking high school mathematics is something that is long overdue and considering like we have done in the community college space of the mathematics that can really tap into and support young adults interests and goals is an important way to think about that. "Could we improve the algebra-based high school courses?" "Absolutely." And The mathematics education community has been at that for decades, decades, if not a century. I think the efforts to innovate and improve curriculum and instruction in these courses, and

we've learned a ton, and to be perfectly honest, we haven't made that much progress. "Is it still important to do?" "Yes."

In addition, I think we need to think about different pathways, and the Illinois PWR is one instantiation of a model, but there are lots of different models to provide these alternate high school pathways for students. In fact, Phil Daro and Harold Asturias have written about this idea of what they call Branch Pathways as part of the just equations initiative. In that proposal, they focus on a number of different possible high school pathways like in statistics or data science or quantitative reasoning or applied mathematics. Those alternatives to the traditional pathway can provide students with just as rigorous, but better aligned mathematical experiences that help them be better prepared for their college and career goals.

However, it's not enough just to create these additional options and then it's going to be fine, because what you end up with, I think, is exactly what you warned against in your question, you end up with sorting and tracking, because what we haven't done, if we just create the courses is change the culture, and that's what is most important here, right? So, we have to ensure equitable access to these pathways. I think the key here is choice as opposed to placement, students need to be supported through advisement that's equity minded and focused on understanding them and their aspirations rather than placement that utilizes or draws upon perceptions of their ability or perceptions of their preparedness.

So, when we shift the focus of the culture to who are these students and what do they really want and what do they really aspire to and equip students with choice, that is supported and guided by knowledgeable advisors and others, then I think that mitigates the possibility of sorting and tracking as the primary mechanism. So, I think the transition course as a single course, leading from high school to college, as opposed to a multi-course pathway in the high school, I think that's a step, but it has to be really situated within the larger set of cultural shifts and other sets of resources and supports that are necessary in order for that to serve the goal that it had in mind.

Dr. Zamani-Gallaher: Yeah, and I think sometimes in terms of the unintended outcomes is wanting to also unpack within those pathways, who's in the pathway.

Dr. Ann Edwards: Yeah, absolutely.

Dr. Zamani-Gallaher: So, the extent to which, what has been deemed the STEM Pathway, which has been referred to around these parts and the default way as the college track pathway, right? Who's more robustly there, and is there a disproportionate representation in tracks that are thought to not have the same mobility for students in terms of college and career preparedness?

Dr. Ann Edwards:

Yeah, I think part of the conversation here also needs to be around college admissions. So in, I think, the Illinois case, right, these transition courses are developed in partnership with the colleges so that successful completion of the transition course ensures placement into the college level course in that college, which is how we've done our transition courses. But in the broader context of the conversation about these courses, I think part of the goal really needs to shift colleges admissions so that the calculus-based pathway is not seen and understood as the college pathway.

Dr. Zamani-Gallaher:

I was thinking about, not unrelated to where we are in our conversation, but one of the things that I have been thinking about and preparation of us having some time to have a discussion today, was back in the fall last semester, again, the pre-COVID days, I run across where Twitter was all lit up, and it was actually about what was happening in Seattle. The question of, "Is math racist." There was a new course that was prompting conversations and debate around identity and math and the role of race in Seattle math classrooms. Right?

So as [inaudible 00:45:48] what's happening here with this eruption on Twitter, I thought it was really interesting as well because there was an assertion that, while we have U.S. history classes in those classes, typically they are histories of oppression and institutionalized racism, community organizing a resistance that are worked into lesson plans. There was the argument that within math lessons that they are too theoretical and that we need to ask questions like, "What's going on with power and oppression and how they show up in math education and students' experiences in math? And how's math manipulated in such a way sometimes as to allow perpetuation of oppression and the pervasiveness of power and the extension of inequalities?" Right?

So, I think that again with the current climate that we're in right now, that there's also been urgency at present as well as momentum around anti-racism in society and in our schools and colleges as microcosms of society. Wondering how you feel about, and if you could just share some thoughts regarding what this means, this larger context and as it impacts the public schools and K-12, and post-secondary, what does it mean for mathematics education and for our efforts toward math reform when we think about community college context more specifically?

Dr. Ann Edwards:

Yeah. Really important and really powerful topic. We've touched on this before, I think that I begin with a premise here that mathematics learning and participation are racialized forms of experience, and I lean heavily on some of the folks that we've already talked about before, right? Like Danny Martin and Rochelle Gutierrez and the work of folks like Gregory Larnell and Ebony McGee and Imani Goffney and others who have really opened our eyes, I think, in the community, the mathematics education community to how race is salient and how mathematics learning opportunities and experiences are structured and how mathematics is talked about in racialized ways in regards to competence and access.

I think that work has really challenged me, and I think challenged us as a community to look critically exactly at what you're talking about, the systems through which learners experience mathematics and learners experience the inequities that manifest in our current ways, in which mathematics learning and teaching are realized, and the ways in which these structures deny and damage students. I think the work gives us those lenses to be critical, but then the work also gives us some tools and ideas for what to attend to and how to take action. This is, again, I think Rochelle Gutierrez has a really powerful idea here of rehumanizing mathematics.

So then to answer your question, I begin from these scholars and their ideas in this body of work, and I think what does that mean for math reform and community colleges. I think to help me out in terms of thinking that question through, I tend to cut up the educational ecosystem in several interrelated areas. So on the one hand, student experiences and student identity as one focus, instructional practice and the learning environment as one, the curriculum and the content, in my particular case we're talking about mathematics of course. Then of course, the larger structural and institutional context, which in itself, of course, is a very complex multilayered thing.

So, in each one of these sort of foci I think we take the lens of understanding how race has played into the structuring of these different arenas in ways that have dehumanized students, that have oppressed and denied students of color, have created obstacles that then are turned into deficits on the part of students. So, I think that that's part of the work is really unpacking and interrogating critically all of these areas with that lens. Then from that place using all of the tools available to us, and one of those tools is data, and I think all kinds of data, we can harness a lot more data than we currently do, to really change and monitor and keep accountable our institutions to be able to make progress against these things.

Like in one example, if we take student experience and student identity, what I think we need to do is frame our efforts like even the questions that drive our efforts in this arena from the perspective of race. So for example, how do Black students experience mathematics writ large? And everything from mathematics in relation to their admissions, to placement, to how they experience the advising process, to what they experience in classroom instruction, to when they go home and they work individually on their homework, to grading policies, to student supports, every single one of these spaces in relation to student experiences and student identity is shaped by race.

We need to better understand how race figures into the obstacles they encounter their access to resources, and also super importantly, their successes and their resilience, and how then our Black students mathematics identities as ways in which those experiences are instantiated in them and sustain and shape their future engagements, how are their identities shaped by those experiences? Then what can we do as designers and implementers of all of those myriad different experiences in and out of the classroom? What can we

do to learn from and respond to those experiences in ways that support the development of positive relationships with mathematics, with mathematics learning spaces and ultimately to promote their learning and success?

I think it's a super important and super complicated set of questions, the critical importance of institutional culture in all of this, that maybe we're just talking about "math class," but the ways in which a math class and how a student experiences that math class, it reaches out and is touched by basically all the aspects of institutional culture and that institutional cultures really need to shift to have a real focus on the experiences of students of color and be, I want to say, humble about what we already know and what we need to learn.

Then getting back to this notion of how we learn in data. I think in the particular example of the student experience and student identity, that we need to really center the student voice, and we can do that a number of ways, but I think it requires both qualitative and quantitative data. We have a tendency to look at outcomes, that's important to track it's important to monitor, but it doesn't really speak to, I think, the qualities of experience as much as qualitative data can. So, being really, I think, intentional about the ways in which we're learning about and hearing student voice is important, and that will allow us, I think, to dive deeply into the systems that structure mathematics education and be able to respond.

Then the last thing I'll say about this is, even just in this one example of students like, "Can any one educator accomplish this alone?" "Absolutely not, nor should she." This is an effort that really is about systemic change and collective action. This, I think, is the promise and challenge of efforts like the guided pathways. Guided pathways implementations really challenge us to ask whether we can make the shifts in culture and practice and strategies to meaningfully engage and improve how students of color experience our spaces. And frankly, the guided pathways reforms are so ambitious that they require those big systemic shifts, and the only way to do this really is collectively and with really a humble approach to understanding who we're serving and in a deep way, learning about their experiences.

I just want to say at this point, Eboni, that I think your work and some of the conversations and really incisive work that you've done with the guided pathways has been really instructive and really guides us to be able to realize those ambitions. So I just wanted to let you know that that's been really, really helpful to me.

Dr. Zamani-Gallaher: Oh, well, I appreciate that. We're again hoping to do work that is value added and all of us, I think understand that there has to be some rethinking of this existing structure. While guided pathways has a lot of promise, it too has had to evolve and has been iterative in terms of having to revisit how we have approached, whether it's mathematics in the education, a STEM Pathway or guided pathways, we can't do it in a way that has the blind spots, we have to do

it in a way that these pathways as well as the classes that are embedded within these programs of study are being framed and done.

So, not just through an anti-racist lens, but also with the understanding that at the frontal lobe, as you mentioned, but the intentionality of integrating what is not color evasive or race neutral, but to have a center to be centric, but not an afterthought or additive because it's in that way that we can then create courses that have the culturally relevant materials. We can create exchanges of teaching and learning that prioritize the experiences of communities of color. We can then hold ourselves accountable with the onus on us and not the student, as you said, do the self work, but not just do the individual on the personal work, but to do the work from a campus and institutional level so that we can actually chip away at that which is systemic in the sense of it being very much structural impediments to some of these initiatives that we know do bear some promise.

But still without that intentionality can still create harm because in many cases, and you mentioned this earlier, that so much of mathematics education and formal education is very much tied to institutionalized racism and histories and trajectories of racism that have not created experiences that are equitable, and it's through these experiences where some students have been demonized in that process. So, it's immense benefits, I think academically, socially, that we have these conversations and think more about, as you mentioned, collective agency before, as we think about student voice, so that when we see that students can then see themselves in the curriculum.

That diversity is something that is just not surface level, but that not only when they come into a room that they belong in that room, but that they have the type of instructional leaders and academic leaders and staff who also are just as committed to understanding them fully and also challenging structural racism within the embedded cultures of their own institutions. Because again, it's taken root, not just within mathematics, but within mindsets. So, that's really some of the hard work at play, and that's why here, identity is core, whether it's math or science, we just see it as mattering. With that, I want to just ask you one more thing as we wrap up, what call to action would you charge community college educators with in advancing racially equitable student experiences and outcomes within as well as beyond math pathways?

Dr. Ann Edwards:

So, I have one big idea that encompasses two big ideas. I think what I want people to do is to work to create systemic change that dismantles the traditional architectures of math opportunity that frankly to date have provided very little opportunity for many. Now, this project of dismantling the traditional architectures, I think, necessitates two really important actions. One is like we've been talking about for a while, right? Focus on and start from the experiences of those for whom mathematics has been a dehumanizing experience, individual students and historically for populations of students, because the only way really to rehumanize mathematics is to understand their lived experiences.

A big part of that work is really beginning from the fact, I'm not going to say it's an assertion, I'm going to say it's a fact, that students don't have deficits, they bring assets to mathematics learning. It is our job as educators to create and sustain systems or practices that honor and leverage or build on those assets to support their students continue learning and success. I think that's really important. That's a strong belief and it's an action agenda. Starting from that premise, changes everything from curriculum to pedagogy, to advisement, to structures, through which students navigate. It really is a core part of the cultural shift in institutions that we're talking about.

Then lastly, I would say in order to do that work, we all as educators need to understand our own baggage. We have to understand what we bring to this project of dismantling the traditional architectures of math opportunity, what we bring in terms of beliefs and our experiences, our own goals and our ambitions, our perspectives that can be obstacles to serving students and making real systemic change. But then also some can be resources in making the kind of change that we need to make.

So, I think in a real sense, we must know who we are and how we stand. What is our positionality relative to the project of advancing racial equity in education in order to do this work. So, there's work on us and work on our institutions. There is then the focus on students and leveraging all of that to make real disruptive systemic change.

Dr. Zamani-Gallaher: Well, to that I say amen, sister, you have definitely gotten a pulpit and you got me in the pew. All right. So Dr. Edwards, I just wanted to thank you again so much for your time and for providing wonderful and rich insights relative to the work that you are doing at WestEd, in particular, the work that you're calling us to do, again to get beyond just that which is theoretical and to really shift and change practice with an actionable agenda, and I think so much of what we need right now and that we're called to do is to have this completion agenda, to actually align and be evenly yoked, if you will, with our equity agenda. Those two need to be married, and you've given us some really great food for thought and pearls of wisdom. Again, joining us today is Dr. Ann Edwards, Senior Research Associate at WestEd, and Director of Learning and Teaching with the Carnegie Math Pathways. Thanks again.

Dr. Ann Edwards: That was a pleasure and a joy to speak with you.

Dr. Zamani-Gallaher: You too. I tell you, if we were on a video call, I'd be a bobble-head by now. Take good care.

Dr. Ann Edwards: You too. Thank you so much.

Dr. Zamani-Gallaher: Alrighty.

Announcer Sal Nudo: Tune in next month when OCCRL affiliate member, Heather McCambly talks with Dr. Lorenzo Baber about educational philanthropy and community colleges in the time of COVID-19. Dr. Baber is an associate professor in the school of education at Loyola University.

Background music for this podcast was provided by Dublab. Thank you for listening and for your contributions to equity, justice, and excellence in education for all students.