

Democracy's College

Episode 21: Equity-Minded Approaches to Mathematics Education

- Dr. Fox: 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. Vilma Mesa, Associate Professor of Education at the University of Michigan, talks with Dr. Tatiana Melguizo, Associate Professor at the University of Southern California, about equity-minded approaches to mathematics education.
- Dr. Vilma Mesa: I'd like to start asking Dr. Melguizo to describe your work to our listeners.
- Dr. Melguizo: First of all, thank you so much for inviting me to participate. This is a really important effort. I am honored that I have been considered to share my own views and my own research. I wanted to start by saying that the work that I have conducted over the past almost 10 years has been a strong collaboration between researchers and practitioners. I start by saying that because I want to say that it's very important for researchers to really get insight from practitioners and work together in identifying research questions that are really meaningful to them, because this is the only way that we can really influence the life of the students of color and unrepresented students that we really want to bring back.
- Over the past 10 years, I have had the privilege to engage in a strong collaboration between the Los Andes Community College and the Rossier School of Education. And, along ... and leaders like Ryan Cornner, Maury Pearl and George Prather, we have engaged in trying to identify questions, as I said before, related to the relevance of math, that were important for them. I developed this research in partnership with my graduate students, and I would like to really highlight the importance of collaborating with them in developing this work. This work is the result of a very strong team effort, and I want, again, to just say that Federick Ngo, Holly Kosiewicz, Kristen Fong, Eddy Chi, Liz Park, and David Velasquez, among others, have been instrumental.
- Over the past 10 years, I've had really a lot of interest in understanding assessment, placement, policies and practices in community colleges in California, and all the work that I'm going to be referencing is situated in this context. That is important because I know we have listeners nationwide and maybe international listeners, so it's important that we think that this is within the California context. That is a very unique context that implies that we have one of the largest community college districts probably in the world, and one of the most diverse.

So, when we engaged in this collaboration, we really wanted to understand something that we thought was very simple. How are community colleges assessing and placing students in developmental math within one district, one single district. And we found substantial variation. This is basically the result that there is a lot of autonomy in California, which is great, because community colleges and faculty and leaders have the opportunity to experiment a lot. The drawback is that sometimes there is much more variation than we would like, and what we found was that there was so much variation that it was not explained only by the differences in the characteristics of the students. So this meant that, in some cases, community colleges were using this assessment and placement as enrollment management tools. This is not great because what we want is to create a very strong development math program, and then we want to place students in the courses where they are more likely to succeed.

So this was probably driven by the fact that the community colleges were using commercially- developed tests, and the advantages of these commercially- developed tests, like the Accuplacer and the Compass place around the campus, were that they were connected to this enrollment management system, and they were helping the administrators to place students in very long sequences of math, developmental math courses. We found that some colleges have up to six different developmental math courses. This is really problematic because we have a student, just graduating from a high school, who spent a lot of time trying to finally pass the math requirement for high school graduation, and this student could have been misplaced and put back in a lower level course in a community college. This is a big disservice to the student, in the sense that the student played by the rules, they did what they were supposed to do, and then the fact that we don't have a strong link between the high schools and the community college means that this student fell into the crack because of problems with the assessment and placement, and we have deep inequities in the system, that could have been solved by having a much more aligned system.

I want to also highlight four other important findings, and then we can talk about the research in more detail if it's necessary, but through this collaboration we also learned something that I think is important currently, because there are still a lot of policies nationwide, where we're all trying to think, how can we really strengthen this assessment and placement policy and placement, and the diagnostic tests? So we really need to move away from this commercially- developed test, which I think most of the states are doing, but we cannot just get rid of tests, because we need to have some instrument to assess the students, in order to put them where they are more likely to succeed.

But we don't need only one instrument. If you think about psychometricians, they are all going to tell you that you cannot place students based on one single measure. So what we learned is that we need to have these diagnostic tests, not only telling us whether the student has to go to development class or not, but what are the specific knowledge and skills that then the math faculty can work with the student, hopefully in a system of co-requisites, so we don't have to put

these students through four, five and, as I said before, six courses before they take college-level math.

And the other important thing is that people in California are talking about multiple measures. Multiple measures means, let's see what are the information that we're getting from the high school transcripts, and use it to place the student. There are also other psychosocial factors, motivation, and academic self-efficacy that also provide important information to help students that might be just below being placed in a developmental class, but that have many other characteristics in their favor that will help them succeed.

We also learned that there are systematic ways of setting cut-offs, and this is very important because, as I said before, we cannot ... I wouldn't advocate necessarily for a single diagnostic exam would be helpful, but again, in a very systematic process, where the faculty and the counselors and the matriculation officials all get together and try to understand what are these cut-offs where the students are going to be placed, leave them in the right course.

And finally, I would strongly advocate, and I think this is something that we're seeing, to moving away from these long sequences, to a system of co-requisites, where we have students being placed in college-level math courses directly, but they have the additional supports that they need instead of having the student, in some cases, spending two to four years they have the math prerequisite to get an associate degree and certificate. In many cases, these students won't transfer to a four-year college with the college-level prerequisites that they need.

Dr. Vilma Mesa:

Wow, that is very, very interesting. Thank you. It would be great if you could share with us those perspectives on what it means to have equity in mathematics education at community colleges, and maybe highlight some of the inequities with which we are grappling right now.

Dr. Melguizo:

The research has been very good at unearthing these inequities, and there are a really wide range of inequity. So, if I think again about my own research, what I see is that one, we are not really valuing the knowledge that the students have acquired in high school. And why are we not really valuing it? Because there might be some mistrust between the faculties in the high school and the community colleges, so we create bridges for these faculty to work together and collaborate. The trust that they develop will translate in trust of the knowledge that the students are bringing from the high school. I couldn't reinforce more the message of the need of collaboration between high school, community college and four-year college faculty, because we really need to make the process as smooth as possible to the students. But if each time the student is moving to a different sector, if the students have to start from scratch, their faculty are not valuing what they did before. It's just going to create and deepen these inequities because, as we know, our students of color and our low-income students are the ones who are starting their academic careers at the community

colleges, and they are the ones who are not benefiting from a seamless transition.

It's important to also acknowledge that students feel insecure about math and that there has to be some sort of additional psychological support to the students. I'm not saying that we have to train the math faculty to provide this psychological support, but what I'm saying is that we have to think holistically, in maybe pairing students with mentors, or providing some counseling for students to feel comfortable and trust what they know. Related to that, our research has documented that when you give students the opportunity to self-place, the fears of the math faculty is that they are going to over-place. The reality is that the females and the students of color tend to under-place.

Dr. Vilma Mesa:

Thank you so much. Your research has been attending closely to placement practices in California community colleges. How do you see your research contributing to our understanding of the transition for students, and what are recommendations that we should be attending to, regarding lessons learned and things that you could suggest us to do about placement?

Dr. Melguizo:

Yeah, there has been a lot of research nationwide that really helped us understand what we are not doing right, but I think we are reaching a point where we have been learning from experimentation, not only in California, but Florida, Texas and other states. We have a better sense of how can we support the students in terms of progressing through the developmental math sequence. So I would say that, if I were to give specific recommendations, it's kind-of in line with what California is doing right now, which is moving towards what we call multiple measures. Multiple measures, authentic multiple measures, implies that we're really valuing what the students bring from high school, so we are placing students based on the information from the high school transcripts, not only the GPA, but the specific grades in the different math courses that they took.

We are also interested in valuing some known cognitive or psychosocial characteristics of the student, so it would be very interesting if we can also complement these multiple measures by including questions about motivation, including questions about academic self-efficacy and other psychological dimensions that are very important in the process. I think that we should not place students based on a single measure, but we have to use a comprehensive, holistic way of measuring students. If you think about the special education literature, students are never evaluated at one single point in time, on one single measure. They are evaluated over time, over multiple measures. I know this is costly, but I would ... that's what in an ideal system I would advocate for.

This is like the entrance label, but what happens when the students actually enroll in those courses. Now we're talking about instruction. How can we benefit from assessment and placement in the instruction program? As I said, we can use the diagnostic information to really provide the math faculty information, or what are the specific gaps in the knowledge of the students that

they are going to be teaching? That's a way that we're using diagnostic tests to support instruction.

But we also need to encourage faculty to take more risks and use creative ways of teaching math. There are research-based practices like cognitive-guided instruction. We know also that contextualized learning has been effective in some cases, and we know that this system of co-requisites, where we place directly the students in the college-level math, instead of putting them through these long sequences, but we provide them with opportunities to support them along the way. That is a much better and equitable way of supporting the students to get the math knowledge and skills that they need in order to get their specific certificate, associate degree or transfer to fulfill their bachelor's degree.

Dr. Vilma Mesa:

That is excellent. You also mentioned earlier some findings regarding students deciding which courses to take, and the fear that faculty may have that they over-place. Could you say a little bit more about that, that you were mentioning?

Dr. Melguizo:

Yes. Yeah. I keep using the word trust, because one thing that we learned from our qualitative interviews was there was mistrust between the faculty and the student. So faculty's preconception were that the students were going to over-place, that they were all going to choose to go directly to calculus, or the highest level math course that they needed for their own specific credential. The reality was that one of the colleges of the district had an issue with one of their commercially developed tests, and they had to give the students the option to self-place. What we saw was that the students were not self-placing at the higher level courses. They were kind-of self-placing where the students thought they would be better to succeed, and we saw no difference in the outcomes of the students because, if the students would have over-placed, you would have seen a higher probability of students not passing the course.

The other thing that was very interesting piece, that one college used diagnostic tests, and these diagnostic tests let the students choose whether they want to take the test for the college level math or below college level math. When we looked at the characteristics of the student, we saw that specifically women and students of color were less likely to place in the course that they had passed in high school, so this means that they were under-placing. So it's very interesting because, again, it goes against the preconceptions of faculty and our own misconceptions, that you have the students over-placing. Indeed, we saw the opposite. We saw that students feel insecure about their learning, insecure about math. They fear math and they feel that they might be better off repeating courses that they already passed.

Dr. Vilma Mesa:

And that regenerates some costs for them as well, right?

Dr. Melguizo:

Exactly. It's interesting, because you say, well, maybe the student is going to get an A, and that A will reassure them and make them feel better, but if you think

about it, that is a big cost ... And now I'm talking as an economist, that is a big cost to the student, it's a big cost to the colleges, it's a big cost to a taxpayer. So why, instead of placing the student in college-level math, providing the psychological support that I was mentioning at the beginning, probably through the counseling services and work, and really helping faculty also be attentive to the fears of the student, and acknowledge that they might have the knowledge, but they might just too scared. So it's a process of building trust and really making sure that we are using these resources effectively.

Dr. Vilma Mesa:

So what'd be your call to action, the call to action that you'd like to issue for those listening today, and who want to take an equity-minded approach to mathematics education? And, I guess, in particular, regarding placement, which is your area of expertise.

Dr. Melguizo:

Yeah. What I would say is that I would go back to this issue of trust and this issue of a true system. Right now we see high school, community colleges and four-year colleges operating independently, and this is what is creating these gaps in the smooth transition of the student. So what I would say is that we need to start encouraging programs like dual enrollment. Dual enrollment, by definition, you have math faculty in the high school and the community colleges, working together, developing these college-level math courses that hopefully the student will pass and complete by high school. Then again, if there's trust, the community colleges will simply accept those courses, so we get rid of all this complex and obscure and cumbersome process that is not really helping us reach this equity goal.

But that is tricky, because we know that, who are the students who are going to be enrolling in these dual enrollment courses? There probably are going to be over-represented, middle-class and upper middle-class students, so we have to work with the high school districts to make this meaningful, to scale up these programs to make sure that our students of color and the students that really need them, these supports, are the students who are going to be enrolling in these dual enrollment courses.

So given that, obviously, there's no way that we're going to have every single student take the high school college math at the high school, then we need to think about the transition as they go to a community college. So if we think about how can we strengthen the process? Well, we are going to strengthen it by using the high school transcript information. Right now, in California, we documented that, in some cases, students who had the proficiency levels documented by state-level tests, they were being placed, again, in developmental math. This is a flaw of the system that can be, very easily, be addressed and again, it will be economically a good measure because, why do we have to pay a testing company to test our students when we have relevant information from the high school transcript?

So I would, again, advise for using these meaningful high school transcripts and, again, avoiding making placement decisions based on a single point of

information. We also need to think holistically of the individual and use motivation and academic self-efficacy and other important, non-committee measures, and now we have some decent tests nationwide that have been developed to measure these characteristics of the students, that are also related to progression and success in developmental math.

We need also to think about instruction because, as much as I care about assessment and placement, and placing the students in the courses where they are going to be most likely to succeed, if we don't have the math faculty with the pedagogical strategies to really engage the students, meet them at their place, help them overcome their fears, create these contextualized learning experiences, support the students through a system of co-requisites, use this cognitive-guided instruction and, in some cases, even use technology, because we know that technology should not be replacing the instructors, but you can use software like ALEKS and other software that have been effective, just to complement and supplement what the students are learning through their instructors.

And I would finalize by saying that, if we use some diagnostic tests, these diagnostic tests contain information about the specific knowledge gaps that the students have, and then the teachers can adapt to the students instead of expecting the students to adapt to the teacher, and they can focus on delivering the knowledge that the student, related to the student's gap. That's what I would say. And I would just finalize by saying that we need to pair either with the counseling department, but especially for women and students of color, they really need some effective component. They need validation, and that will go a really long way, so we can support a math faculty to make them at least aware of the need to be more in tune with the effective demands of the student, or we can provide those supports through counseling services or other supplemental services.

Dr. Vilma Mesa:

Wow, that was very interesting, Dr. Melguizo. Thank you so much. I am going to close, reminding our listeners, Dr. Melguizo is an Associate Professor at the, in the University of Southern California, Rossier School of Education. She was with us sharing her research on placement and her insights on the issues of transition for learners at community colleges. Thank you very much, and thank for being with us today.

Dr. Melguizo:

Thank you so much, Vilma. Thank you to the team. I think you guys are doing really impressive work, and I'm honored, as I said at the beginning, to be part of this conversation.

Dr. Fox:

For more information about equity-minded approaches to mathematics education, we recommend that you visit Dr. Tatiana Melguizo's [faculty profile](#) for a list of publications. And visit the [Transitioning Learners to Calculus in Community Colleges \(TLC3\)](#) project website. Tune in next month when Chaddrick Gallaway from OCCRL talks with James Felton, III, Chief Diversity Officer at SUNY-Cortland, and Michelle Smith, Associate Provost and Special

Assistant to the President for Diversity and Inclusion, at William Rainey Harper College, about chief diversity officers in higher education. Background music for this podcast is provided by Dublab. Thank you for listening, for your contributions to educational equity, justice and excellence for all students.