

EXPLICIT AND EXPANSIVE: THE IMPORTANCE OF (RE)DEFINING STUDENT SUCCESS IN MATHEMATICS

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The work of mathematics education often seeks to increase student success, but rarely explicitly defines this concept. When it is, it commonly corresponds with quantitative measures that enable the positioning of students as economic resources within a school or university's institutional structure, providing an incomplete portrait of student success and reinforcing deficit perspectives on student achievement. Fostering critical analysis of how we conceptualize student success within mathematics requires aligning how we define such success with the perspectives of mathematics students. I advocate for centering student voice in the (re)defining of student success, and issue a call to the mathematics education community to (1) make definitions of student success explicit in mathematics education research and policy, and (2) acknowledge and value the expansive nature of students' definitions of their own mathematical success.

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As mathematics educators and mathematics education researchers, we are given a substantive amount of power in determining what is, and thus what isn't, student success within mathematics. Increasing student success is often put forth as a goal and a justification for our work, but rarely is "student success" explicitly defined. When it is, it often corresponds with quantitative measures such as Grade Point Average (GPA), rates at which students receive D's or F's or withdraw from a course (DFW rates), and persistence rates- measures that enable the positioning of students as economic resources within a school or university's institutional structure (Apple, 2006). While these kinds of measures therefore may be useful in arguing for funding and easing student-to-student comparisons, these notions of "student success" do little to serve the student themselves outside of their connection to and status within the university. Further, these definitions are constructed from a top-down perspective (Martin, 2003); those who have already been traditionally successful within the mathematical academic system have the opportunity to maintain their power by defining what is considered successful within that system. This results in entrenched viewpoints regarding what student success can look like in mathematics and fosters an inequitable system in which the values of the system don't align with the values of all of its participants.

As Weatherton and Schlusser (2020) note, the power present in these definitions may be "unknowingly upheld by researchers, faculty, and other institutional-level stakeholders who consider these dominant ideas of success to be 'common sense' or standard" (p. 10). It takes conscious effort by individuals who are considered traditionally successful within a system to critically examine that system. In order to fundamentally shift how we view student success within mathematics, there exists a need to listen to and place value upon the definitions constructed by key stakeholders in student success: the students themselves. We cannot claim, in any context, to be actively involving students in conversations about their own success when we do not allow them a seat at the table to speak on what they believe success embodies. Evidence points to the idea that students define success in multifaceted and complex ways that go beyond

traditional quantitative definitions (see O’Shea & Delahunty, 2018; Quiles-Wasserman, 2019; Weatheron & Schlusser, 2020; Yazedijan et al., 2008), and thus if we continue to define student success in traditional quantitative ways, we neglect elements that are crucial to how students themselves are perceiving their own academic experiences.

Attending to student voice in discussions of student success in mathematical contexts provides a valuable perspective to qualify or counter the dominant ideology of those who are considered successful by traditional definitions. Student voice is already utilized in higher education for means of gathering valuable feedback for program evaluation and reorientation (Campbell et al., 2007; Brooman, Darwent, & Pimor, 2015). However, it has been critiqued for providing a one-dimensional view of students in which those students express views without compelling those within power to take action in response to those views (Seale, 2009). To combat this viewpoint of a one-dimensional student, not only does student voice need to be attended to when considering the concept of student success, student voice must also be given weight when determining how student success is conceptualized within the field.

Particular weight must be attributed to the voices of students for whom mathematics education has not been historically oriented to serve. Traditional quantitative definitions of mathematical success do not serve all students equitably, and often serve to reinforce deficit perspectives on who is successful in mathematical spaces (Baldrige, 2014; Jaremus, 2020). Gutiérrez (2017) potently notes that “we cannot claim as our goal to decolonize mathematics for students who are Black, Latinx, and Aboriginal while also seeking to measure their ‘achievement’ with the very tools that colonized them in the first place” (p. 12). These ‘tools’ are widespread at all levels of our educational system, and are particularly manifested in national standardized testing as a gatekeeper for funding and student opportunity (Baldrige, 2014; Gasoi, 2009). Such standards were not designed for the achievement of marginalized students, and thus do not necessarily highlight the ways in which they *are* achieving, instead focusing on and easing the process of deficit-oriented gap-gazing (Gutiérrez, 2008).

One way in which such gap-gazing is present in contemporary societal discourse is as “learning loss,” a concept highlighting the quantitative effects of the ongoing COVID-19 pandemic in the context of standardized testing and learning. In this context, when we limit student success to quantitative measures, we ignore the myriad of ways in which our students may have experienced success over the past year and a half of mathematical instruction. For many, that included “persevering through challenges”- the theme of this conference! If we consider “persevering through challenges” an important component of student success, then it is crucial that our definitions of student success acknowledge that facet. However, calls to regain “learning loss” experienced during this time have been oriented towards ensuring that quantitative test scores are matched with those of what prior years would call “successful.” This does not recognize the inherent mathematical success of persevering - intellectually and emotionally - through mathematics learning during a pandemic, regardless of quantitative outcome.

To take an anti-deficit approach to student success during this time is to shift the focus from quantitative deficits to the ways in which students *have* experienced success in mathematics. My own research and conversations with undergraduate First-Generation, Pell-grant eligible, and/or racially minoritized women students have revealed that students are thinking about success in intricate ways that both build on and extend beyond traditional quantitative definitions. When asked how they would define success within mathematics, these women provided nuanced

perspectives, and I highlight several quotes from four of their interviews, attributed to their pseudonyms, in *Table 1*.

Ada	Taylor	Kenzie	Isabel
<p>“I think [success in mathematics] is about learning something and getting something out of it...even if it’s not necessarily the content, I need to get something out of the experience, whether that was learning critical thinking or just something positive.”</p>	<p>“I think grades are important, of course, but I think more important than that is actually understanding what you’re learning... I think success in a college setting is being able to understand what you’re learning, especially with math, because it can be really hard.”</p>	<p>“I think [success means] being a level ahead, feeling proud after all that work, you know? Every summer I took a math course, so finally being where I wanted to be... that’s what I was reaching for.”</p>	<p>“For math in general, I would define success as you actually being able to practically apply your math skills... there’s being able to do well in school and then there’s being able to actually use what you’ve learned in school.”</p>

Table 1: Quotes from four undergraduate women students speaking on their views of what it means to be successful in mathematics.

The direct quotes from these women students are but a fraction of richer conversations in which they expanded on their definitions of success in mathematics, as well as moments in which they themselves had felt successful within mathematics. By presenting their quotes here, I intend to engage the reader reflectively: in what ways are these quotes aligned and/or unaligned with the ways in which student success is traditionally defined in mathematics education? Student perceptions of their own success in mathematics exist beyond the constraints of quantitative systems that were designed to measure their success. Without acknowledging the expansive nature by which individual students define their own success in mathematics, we risk overlooking dimensions of mathematical success that are immensely impactful and influential to how students discuss and experience their own mathematical journey.

Scholars in other disciplines have put forth research regarding how definitions of student success might be expanded on (i.e. Atwood & Childress, 2018, in School Social and Emotional Learning; Beilin, 2016, in Library Science; Ulrich & Strong, 2019, in Engineering; Weatherton & Schlusser, 2020, in Biology Education). Because mathematics often is often perceived as an indicator of student intelligence (Adiredja, 2019; Gutiérrez, 2018; Roth et al., 2015) and holds a privileged place within capitalistic systems (Andrade-Melina, 2017; Valero, 2018; Woodrow, 2003), ensuring that student success within mathematics is critically examined can have broader implications for ways in which student success is conceptualized within STEM. **With this in mind, I challenge the mathematics education community to move toward centering students in the discussion of “student success” through two actionable items: (1) make definitions of student success explicit in mathematics education research and policy and (2) acknowledge and value the expansive nature of students’ definitions of their own mathematical success.**

Make Definitions of Student Success Explicit in Mathematics Education Research and Policy

Using the term “student success” without definition creates an assumption of the term as having universal meaning, which establishes success as a “privileged ideal, partially reliant on the possession of certain cultural or academic capitals” (O’Shea & Delahunty, 2018, p. 1069). Assuming universality of perceptions of success restricts who has an entry point into the conversation about student success. In addition, making explicit definitions of student success “before beginning their projects will allow researchers to clearly ground their work and accurately describe what they intend to study” (Weatherton & Schlusser, 2020, p. 6), fostering clarity for all involved in the project- researchers, participants, and eventual readers. Regardless of how student success is defined, making its definition explicit counters the idea of student success within mathematics as a privileged ideal known only to a select few, and allows for more diverse entry points into the conversation surrounding work that focuses on increasing a specifically-defined component of student success.

Acknowledge and Value the Expansive Nature of Students’ Definitions of Their Own Mathematical Success

Students, as key stakeholders in their own success, are and ought to be treated as the authority concerning how they experience success in mathematics. Reconceptualizing what we consider student success in mathematics necessitates seeking out and intentionally placing weight on the perspectives of students with identities that are traditionally marginalized in mathematical spaces. Doing so can counter the ways in which traditional quantitative definitions of student success have reinforced deficit perspectives and systemically minimized the achievements of individuals who hold these identities. Acknowledging the varied way in which student success can be defined also enables better alignment among student-level, faculty-level, and university-level priorities, and reduces the cognitive dissonance felt by students whose definitions of their own success contradict that which they see messaged by their institutions and instructors (Ulrich & Strong, 2019).

In Conclusion

As a concept that underlies so much of what the mathematics education community works toward as a field, the notion of student success deserves our attention and intentionality in assuring that we are framing it in a way that is reflective of how our students see their own success within mathematics. Moving beyond deficit-oriented quantitative measures of student success necessitates exploring and valuing student voice regarding what it means to be successful in mathematics, and that we apply those definitions in our work to critically shift how student success is conceptualized and measured in this field. I implore the mathematics education community to both make definitions of student success explicit in our work and acknowledge that traditional quantitative definitions of success are only a fragment of the expansive ways in which students frame their own success. Students are a key stakeholder in their own mathematical success; their perspectives deserve to be heard, and we are privileged with the opportunity to listen and foster change.

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