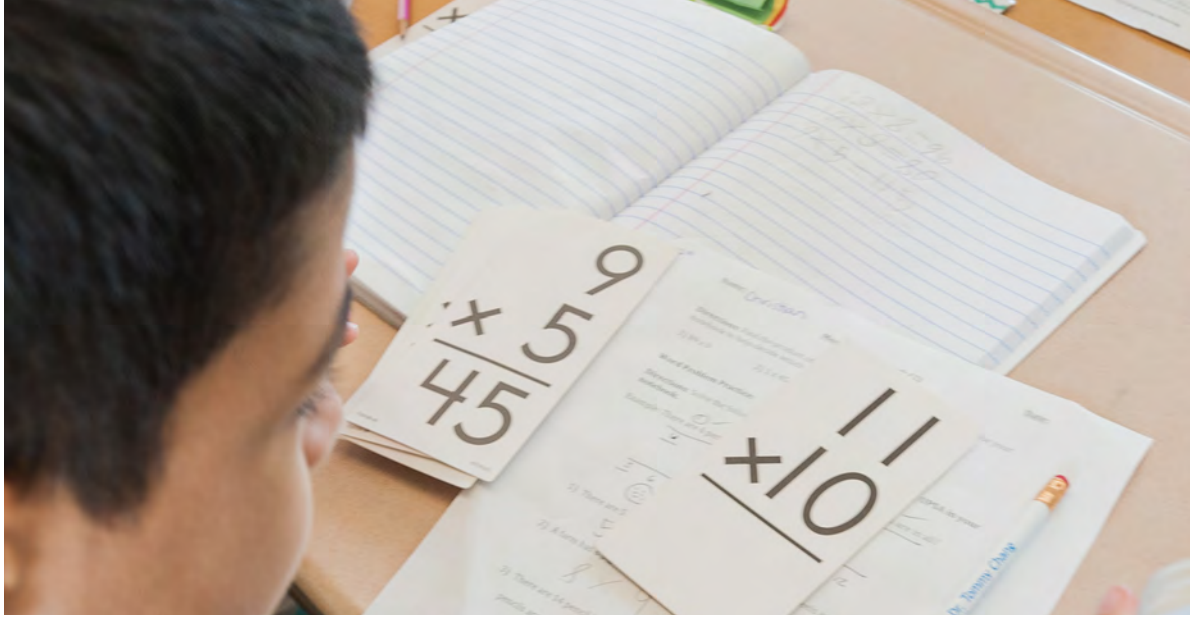
Mapping Out Mathematics Interventions

Report by: Anjali Deshpande, Ph.D.

Spring 2024

edvestors



Educators have been concerned about finding the best ways forward in providing effective interventions to students in mathematics. On March 13, 2024 Ashley Jacobson, Mathematics Program Director for Boston Public Schools and Dr. Anjali Deshpande, Director of Mathematics for EdVestors, brought together 16 people across various sectors in education to map the landscape of interventions in the Boston Public Schools. Participants included teachers, school-based intervention specialists, instructional coaches, consultants, researchers, and math tutoring program leaders. This report unpacks four key themes that emerged from the session and hope to continue the work of coordinating support to meet the needs of students in the Boston Public Schools.

Four themes emerged from the dialogue and written feedback from participants: (1) curriculum considerations need further exploration, (2) the constraints of time and related effects on teacher practice, (3) in many instances school structures and supports currently do not allow for effective intervention work, and (4) defining intervention in mathematics and differentiating intervention from other student supports is needed. Recommendations are offered based on these findings with the hopes of guiding a path forward in designing effective mathematics interventions.

First, there are some important contextual factors affecting the current state of providing mathematics interventions to keep in mind:

1. We are coming out of a pandemic. BPS had never been "shut down" and moved online before. National trends show that students have largely fallen behind in math (Barshay, 2024).
2. BPS Mathematics is currently shifting towards adopting uniform curriculum for the purpose of coordinating support across 116 schools. National trends are moving towards vetted problem-based curriculum over traditional textbooks or teacher-created curriculum.

Curriculum Considerations

Participants noted interventions in mathematics should either come from the curriculum itself or should be closely aligned to the curriculum. The guidance from curriculum developers is generally that support should be provided in a just-in-time fashion during regular class instruction and not during separate intervention blocks. Writers of Illustrative Mathematics (IM) state "extensive remediation on below grade-level content is not productive" and "IM is designed to provide access and challenge to all students within the entire, inclusive classroom." Furthermore, "teachers [should] take advantage of built-in features of the curriculum to respond to student thinking during grade-level instruction." (IM Team, 2021) Evidence from the session shows that in many ways, the rationale for choosing the curriculums at the district and school level, and the specific design philosophy of the curriculums with respect to interventions, is not clear to everyone working with students in mathematics.

Many educators reach for external, sometimes procedural practice-based interventions. Educators are using what they can purchase and/or create to meet the immediate needs of students with skill gaps in mathematics. A concern arose around whether the chosen interventions support conceptual problem-solving approaches or whether they support procedural and rote learning. One participant shared, "I worry about interventions that are highly procedural because I think this moves students away from their own thinking about what makes sense." Support partners including consultants and coaching providers shared a challenge around finding guidance on interventions that are philosophically and pedagogically aligned to the BPS chosen math curricula that are largely problem-based. Relatedly, some wonder about where the parallel in mathematics exists for the current push for phonics in English Language Arts. Is there a similar approach to "fundamentals" worth exploring in mathematics?

Finally, the topic of mastering content as a goal in mathematics was discussed. Participants wondered, when is mathematics content revisited in future units of study or grades? Others also questioned setting mastery as the goal, wondering, "The notion of mastery—is it really forever? Usually people need a refresh at some point." Others talked about knowing (and not knowing) when to move on from a given topic, and a need to engage in learning about vertical alignment, or the way that mathematical content builds over time (e.g. the way that division is revisited in some applications of fractions).

Time and Teacher Practice

Participants repeatedly mentioned stress and tension, particularly as it related to the necessary time needed to support students in learning grade level mathematics. In fact, “time” was written 24 times in the course of 2 hours with 14 participants. Educators are feeling the pressure to find time to meet the vastly differing needs of their students. Furthermore, this work is tough to do in an environment characterized by the stress of tests. One participant stated, ”pacing, and desperation for test scores create negativity and pressure.”

The pressure of time and the stress of testing, participants noted, can often lead to over-scaffolding the content of lessons. Teachers feel pressure to keep moving at pace, which could be at odds with students’ needs if many students are not ready for the content of the lesson. Over-scaffolding can look like breaking a lesson into too many discrete parts, removing the complexity or nuance of the problem structure that could have led to deeper conceptual understanding. Over-scaffolding is essentially a response to feeling the pressure of time. The logic goes that if a teacher breaks a lesson up into enough “bite sized” pieces, then it is more likely that the students will complete the lesson, which oftentimes is at odds with the goal of having students grapple with grade-level problems.

Because of the pressure of time and the urgency to adopt high quality math curriculum in BPS, teachers are learning the curriculum as they are teaching it. At the same time, they are trying to teach in ways that are aligned to the design principles of problem-based learning, which can be a difficult task if teachers themselves have not experienced this type of instruction. While teachers are concurrently learning content and pedagogical strategies, they are also working diligently to support students who have learning gaps in mathematics.

School Structures and Supports

In the Multi-Tiered Systems of Support (MTSS) model adopted by BPS, Tier 1 instruction refers to whole class instructional support available to all students. When students need more targeted support, tier 2 includes small group work and additional practice time and tier 3 includes more intensive support that may happen one-on-one or in smaller groups. According to the Equitable Literacy Memo (2021), tier 1 instruction should effectively serve 80% of the students, while additional support in tiers 2 and 3 may be necessary for the remaining 20% of students.

Participants were surprised by this stated expectation and wondered how their own practice measured up. Several educators noted that far more than 20% of the time is needed for tier 2 and tier 3 support because "far more students need intervention than are receiving it." Even once interventions are structured for students, motivation is a challenge. Students "often begrudgingly take part in the support provided." Participants discussed how difficult it can be to find ways to motivate students to take advantage of opportunities for additional learning.

Another obstacle to structuring interventions is scheduling. One participant noted the same students who might be scheduled for first period intervention are also those students who are chronically late or absent. The group explored whether, in this particular case, the absenteeism potentially affected student math outcomes which led to intervention assignment, or whether obstacles to learning and/or student disengagement negatively affected a student's desire to be at school. It is a highly nuanced and complicated issue worth much more discussion and exploration.

Defining Intervention

All participants agreed with the definition of intervention as "focused, often more intense, instruction provided to students who are falling behind in core instruction, usually provided one-on-one or in small groups" (Fuchs et. al, 2021, Institute of Education Sciences). However, participants reported that other terms and activities are sometimes conflated with intervention. The MTSS framework and several other resources cited in this report caution against confusing mandated services based on a student's individualized education plan (IEP) or mandated services for multilingual learners (MLLs) with interventions in mathematics. However, participants wondered, how should this be happening? What is the guidance for working with students with special needs who also need targeted math support?

Scaffolding, for instance, may be conflated with interventions. Based on definitions from the Universal Design for Learning framework (CAST, 2018), scaffolding is providing just enough support so that students can access the next component of the lesson in order to persist in learning. Examples of scaffolds are checklists, rubrics, submitting drafts on the way to a final product, and using routines to support learning complex ideas and topics. Participants wondered, are these types of scaffolding structures and strategies also considered interventions? What counts as intervention? Further guidance is needed to distinguish the two.

Unfinished learning is another term worth noting here. Experts at McKinsey and Company provide the following definition based on extensive research on educational outcomes post-pandemic: "As we analyze the cost of the pandemic, we use the term 'unfinished learning' to capture the reality that students were not given the opportunity this year to complete all the learning they would have completed in a typical year" (Dorn et. al, 2021). In addition to interventions that may have been needed over the course of a typical academic year, educators must now contend with unfinished learning and the demands to provide learning experiences that were not possible for some students during the pandemic.

Recommendations

The following recommendations are based on direct feedback from participants. These recommendations can be seen as a starting point for a much-needed conversation on supporting students in mathematics.

Generate district-level guidance

Define the spaces where students get individualized attention. Give clear guidance on when teachers should seek assistance if there is some confusion or conflation of math intervention support and/or mandated services. Ashley Jacobson shared, “It has been challenging to craft guidance as it can be very different depending on the school structure, grade level and range of needs.” Despite the school-to-school variability, some consistent recommendations for all of BPS schools on math intervention would be helpful. One suggestion from the feedback on the convening was to reconvene the group of educators and experts to develop an initial framework for interventions to share with math educators in BPS.

Worth noting, the “study hall” approach came up in the feedback. A study hall space may be a space to work with the existing curriculum, assignments, and tasks from math class in small group settings. Teachers can preview content with students, which has been shown to motivate students during math class (Hawkins et al., 2010). Finally, educators can continue building strategies to strengthen students’ math identities, which has been shown to have a positive effect on math achievement (cite Boaler).

Provide professional development and coaching aligned to curriculum

Provide educators with professional support on deepening content knowledge and teaching problem-based curriculum. As one participant noted, “Remember, [the students] have already struggled with this content in the past. We often don’t ‘reteach’ in a way that helps them retain the learning.” Reteaching often resembles the initial teaching strategy, when what is needed is a different set of strategies designed to meet students where they are in the learning journey. Providers for this type of deep pedagogical and content-based professional development exist—Attuned Partners, MQI, and others. EdVestors also has an RFP open for creating Math Learning Communities, which may be a space where educators can determine what type of professional support they need.

Appendix A: Survey Feedback

- Overall, the convening was well received. 100% of respondents said they were satisfied with the information provided and the majority felt goals were met.
- A key takeaway is that many felt the collaboration in a hybrid setting was done well.
- Several participants hope to see another convening of this type in order to engage with building a framework or guidance for mathematics interventions in BPS.

Quotes

"Pacing was great and I was impressed at how you managed in person and virtual participants. It's really great to have representation from so many different organizations and people who are actually making decisions that will impact our students. I enjoyed hearing from so many different people."

"I really appreciated how the session was framed with a focus on MAPPING out math interventions. Oftentimes we want immediate answers on what math interventions "work" but there aren't any quick answers for the current landscape of math education in BPS. I loved working with other math educators and office staff in BPS. It made me feel like I wasn't as alone in my struggles."

Appendix B: References

Barshay, J. (March 15, 2024). "PROOF POINTS: How Covid narrowed the STEM pipeline." Hechinger Report: https://hechingerreport.org/proof-points-how-covid-narrowed-the-stem-pipeline/

CAST. (2018). Universal Design for Learning Guidelines version 2.2. Retrieved from http://udlguidelines.cast.org.

Hawkins, R. O., Musti-Rao, S., Hale, A. D., McGuire, S., & Hailley, J. (2010). Examining listening previewing as a classwide strategy to promote reading comprehension and vocabulary. *Psychology in the Schools*, 47(9), 903-916.

IM Team (2021). "What Does IM Think About Unfinished Learning and Supporting Students with a Variety of Entry Points? (Grades 6–12)." website.

About EdVestors

EdVestors mission is to advance equitable, meaningful education that prepares every Boston student to activate their power and shape their future. EdVestors combines strategic grantmaking, content expertise, and collaborative implementation to drive system-level impact in Boston schools. Since 2002, EdVestors has raised and invested over $42 million in school improvement efforts. We drive toward our mission by activating people and resources; learning and iterating in context; and influencing system change. We believe that continuously attending to all three of our drivers ensures our activities will create impact.

About the Author

Anjali Deshpande, Ph.D. is the Director of Mathematics at EdVestors. Prior to joining EdVestors, Anjali served as a professor of Mathematics Education at High Meadows Graduate School of Teaching and Learning located in Cambridge, MA in affiliation with the Massachusetts Institute of Technology. Anjali got her start in education as a public middle school teacher in the South Bronx for six years and went on to serve as a secondary mathematics coach for nine years. Anjali has also worked with high school students from a variety of backgrounds as a faculty member and program designer for three NYU college preparation programs, in Abu Dhabi and New York City. Her work is focused on supporting educators in the mathematics classroom and designing teaching strategies, programs, and policies that foster the development of positive mathematics identity for all learners. Anjali holds a bachelor's degree in Economics from New York University, a master's degree in Teaching from Pace University, and a Ph.D. in Teaching and Learning from New York University Steinhardt School of Education, Culture, and Human Development.