

Forging Mathematics and Special Education Partnerships to Strengthen Instruction and Interdisciplinary Research

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Forging the Partnership

Bridging theory to practice for preservice teachers (PTs) can be challenging. Teacher educators can assist PTs in making connections before field-based experiences with case-based instruction. This pedagogical approach presents real-life scenarios for PTs to critique and apply theoretical ideas (Gorski & Pothini, 2018). While case-based instruction can help PTs reflect on their own teaching and learning (Gorlewski & Gorlewski, 2012), the cases must be strategic in eliciting relevant conversations for targeted goals. In this paper, we share about our efforts to forge a partnership with a special education (SPED) content specialist liaison to design cases that would strengthen our mathematics methods instruction and interdisciplinary research.

In Summer 2021, we (Gonzalez and Moldavan) met as two mathematics teacher educators (MTEs) to plan for our fall semester courses at our respective institutions (East Carolina University and Fordham University). We wished to extend our previous work using case studies to explore teacher bias in mathematics classrooms (Moldavan et al., in press) but tailor such work to the specific needs of our preservice teachers (PTs). Moldavan planned to teach an elementary (K-6) mathematics methods course, while Gonzalez planned to teach a Pre-kindergarten - 2nd grade (PreK-2) mathematics methods course for SPED majors. Previous SPED PTs felt like this course was not related to their SPED students, so she wanted to make explicit SPED connections referencing research on teacher bias about students' ability and labels that influence instructional decisions in the mathematics classroom (Turetsky et al., 2021). Thus, we partnered with George-Puskar, a teacher educator of Early Childhood (EC) and SPED at Fordham University. Her expertise made for an ideal SPED liaison that would be an asset to our work.

In our first meeting, we decided on our shared goal of case-based instruction (Gorski & Pothini, 2018). We knew that the early identification of disabilities and developmental delays is essential for long-term student academic success, especially in mathematics (Gersten et al., 2005). Thus, we decided for the case-based instruction to address elementary mathematics content and pedagogy, early SPED identification, and the developmentally appropriate knowledge and skills of young children. Furthermore, we wanted our cases to consider bias related to race in an effort to challenge systemic inequities, particularly in reference to the over-identification of Black boys in SPED (Cruz & Rodl, 2018).

Our Cases

We wrote two cases and developed discussion prompts to elicit targeted conversations about elementary mathematics content and pedagogy, SPED identification and evaluation procedures, and teacher bias (e.g., race, ability) in student referrals for SPED evaluations. A brief overview of each case is described to provide a context for our interdisciplinary contributions.

Case 1: A Counting Lesson Ending in Defeat

Tay, a 5-year-old Black boy, is engaged in a Counting Collections task. Tay drops the dinosaurs he is counting, and while picking them up he misses the teacher's instructions. The teacher often gets frustrated with Tay and is quickly upset when Tay begins to loudly ask his peers what he is supposed to do. The teacher decides to remove Tay from the learning task to keep him from disrupting his peers and misses the mathematics understanding he demonstrates when counting the dinosaurs off the floor. The case ends with the teacher suggesting that Tay needs to be evaluated for a learning disability. The discussion prompts that follow ask PTs to reflect on Tay's demonstrated mathematical thinking and behavior, the teacher's actions, and the impact of implicit biases on instruction. The case provides PTs with opportunities to explore behavior and the over-identification of Black boys in SPED, particularly for subjective disabilities like Attention Deficit Hyperactivity Disorder (ADHD; Cruz & Rodl, 2018).

Case 2: Dyscalculia

Sarah, a 7-year-old White girl, is well-liked by her teachers and friends. In preschool, her teachers first noticed Sarah's difficulty learning beginning mathematics skills (e.g., number recognition, one-to-one correspondence). Sarah's friendliness and teacher-pleasing behaviors prevents her teachers from acknowledging poor academic performance and reporting her disruptive behaviors. It is not until 2nd grade that Sarah's teacher began to document observed learning problems, including difficulties with representing quantities, simple arithmetic problems, and staying on task. The case ends with Sarah's teacher suggesting she needs to be evaluated for a learning disability. The discussion prompts, similar to the previously described case, inquire about Sarah demonstrating mathematical understanding of specific concepts (e.g., place value, comparing numbers) as well as the evidence collected to support an evaluation for SPED services with an emphasis in looking at teacher bias. The case challenges PTs to see how teacher bias impacted the academic support Sarah received and what appropriate evidence would be needed to support Sarah's referral.

Case Implementation

Through the development of our cases, we had many conversations about the need to make strategic and deliberate connections between mathematics and SPED. Gonzalez and Moldavan realized that they did not spend enough time focusing on bias addressing ability and tiered interventions in mathematics classrooms. George-Puskar

realized that she did not contextualize her cases with mathematics content and often favored literacy contexts. Because of this, we decided to implement case-based instruction with these two cases in our three respective courses (see Table 1). We hoped to identify how each group of PTs engaged with the two cases and what additional support was needed to extend learning across areas in mathematics and SPED. Throughout the courses, we collected PTs' artifacts (e.g., surveys, group notes, individual reflections) and took memos on our own experiences facilitating case-based instruction. The PTs' varied responses to discussion prompts highlighted the need to have deliberate discussions about the intersecting role of mathematics and SPED, including how racial bias impacts perceptions of classroom behavior.

Table 1
Instructor Context

Instructor	Context	Preservice Teachers
Gonzalez	PreK-2 Mathematics Methods	SPED Majors
Moldavan	Elementary Mathematics Methods	Elementary & SPED Majors
George-Puskar	SPED Foundations	EC & Elementary & SPED Majors

Lessons Learned

This interdisciplinary partnership brought expertise across content areas to learn from one another. First, we realized that there is a need for strong and open communication among disciplines, especially those that share the goal of preparing teachers who are knowledgeable about areas of mathematics and SPED. George-Puskar helped us to understand the typical process for SPED evaluations, and we provided her with an understanding of the mathematics content and how students typically demonstrate their understanding. This collaboration helped us to write cases that explored both areas, strengthening the content learned in SPED and mathematics methods courses and exploring the complexities of mathematics teaching and learning. We recognize that additional conversations among the disciplines need to ensue so mathematics and SPED teachers gain a common understanding of what is needed to provide high-quality mathematics instruction to students with diverse abilities. In addition to implementing the case-based instruction, we found value in examining the intersection between the disciplines to inform our professional practice in other areas of teaching such as lesson planning and addressing PTs' questions. Finally, we learned that our PTs appreciated that we positioned ourselves as continuing learners who sought expertise from others. This experience demonstrated how interdisciplinary partnerships between mathematics and SPED teachers are essential for all individuals across their professional trajectories.

Implications for Mathematics Teacher Educators

PTs will take many education courses to learn of high-quality instructional strategies to support diverse students; however, the siloed nature of these courses often makes it difficult for PTs to make connections and put theory into practice (Darling-Hammond, 2020). Although not all MTEs have expertise in fields such as SPED, it is our responsibility to prepare our PTs to provide appropriate tiered interventions in their mathematics instruction and help them to question biases that might impact their decision making. We must reach out to our colleagues in SPED to learn about their best practices with respect to instruction and research. Forging such interdisciplinary partnerships can help make connections across courses explicit for our PTs, while also extending opportunities for MTEs to provide SPED teacher educators with mathematics examples to use in SPED courses. Together, we can ensure teachers have the skills needed to critique their biases and advocate for appropriate student referrals for SPED evaluations.

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