

Mentoring Novice Teachers to Advance Inclusive Mathematics Education

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Abstract

We facilitate a year-long teacher induction program in the United States involving early-career teachers in urban elementary schools as a means to advance their inclusive mathematics practices. The participants in this program joined in professional learning experiences and discussions focused on advancing inclusive mathematics education with peers and university faculty and agreed to classroom observations. We report on the features of, challenges, and highlights that emerged during this year-long induction program by juxtaposing our experiences with two early-career, alternatively certified teachers within the larger context of teacher shortage. These snapshots alongside the issues discussed during this induction program provide a vivid account of the learning spaces and community created by, and for, early-career teachers. There is a need for the culture in schools to include more active mentoring for early-career teachers to develop their pedagogy, in general, and more specifically, to advance inclusive mathematics education.

Keywords: *mentoring, alternative certification, early-career teachers, mathematics instruction, induction, urban schools*

Introduction

Beginning and novice teachers make up a substantial portion of the teaching force in urban schools but struggle with teaching mathematics effectively (Fennema & Franke, 1992; Wood, Jilk, & Paine, 2012; Yanisko, 2016). Moreover, record numbers of early-career teachers are either emergency certified or licensed through alternative teacher education programs making the beginning and novice teacher population in more dire need for effective mentoring in mathematics. Teachers certified through alternative programs and those receiving limited teacher preparation are associated with higher rates of attrition. In the U.S., attrition is a problem particularly acute for teachers of mathematics in culturally and linguistically diverse schools (Sutcher, Darling-Hammond, & Carver-Thomas, 2016). Indeed, induction programs that include effective mentorship (Bullough, 2005) are crucial to curb attrition rates. Induction programs support early-career teachers' development in mathematics teaching, even for those earning certificates through traditional teacher education programs. With increasing numbers of students with disabilities participating in general education classrooms (United States Department of Education, 2016b), induction programs must also attend to developing knowledge, dispositions, and skills not adequately addressed in teacher education programs for advancing inclusive practices (Danforth, 2014).

We share experiences from facilitating a year-long teacher induction program in the United States focused on professional learning and mentoring to support inclusive mathematics practices with early-career, urban elementary teachers. Moreover, we highlight some of the "urban complexities, challenges, and excellence" (Matthews, 2009, p. 1) that participants and we encountered during the induction program through vignettes of two novice teachers' mathematics classroom practices. While we do not intend to make relational claims between the induction program and the illustrations we share, based on these experiences along with the body of literature we argue for the need to implement effective mentoring programs for early-career teachers especially in relation to advancing inclusive mathematics education. Mentoring and coaching are similar in that both are thought of as activities that support teachers to advance their professional learning (Rhodes & Beneicke, 2002). We chose the concept of mentoring since our work reflects more of a transition focus related to novice teacher learning (Clutterbuck, 1991). Moreover, the agency awarding our critical support and retention grant encouraged the use of a mentoring model to gather data in order to distinguish the impact of mentoring on novice

teachers

To contextualize our work, we begin by briefly discussing the teacher workforces across the globe and the context of this work related to current practices in mathematics education involving students with disabilities. We then define inclusive mathematics education (IME) and introduce three guiding principles to support IME. Through this framework, we present features of the induction program and vignettes of two novice teachers by describing observations of their pedagogy and participation during this program. To close, we share our reflections of our work with novice teachers to provide insights for mathematics teacher educators and practitioners, nationally and internationally.

Teacher Workforce and Alternative Paths to Teaching

Early career teachers make up a substantial proportion of the teaching force in U.S. urban schools but struggle with teaching mathematics effectively (Fennema & Franke, 1992; Wood, Jilk, & Paine, 2012; Yanisko, 2016). The need for continuing professional learning for teachers is evident across the globe especially in relation to the teaching of mathematics which has led to serious concerns in some European countries “about the level of expertise required for generalist teachers of mathematics in primary classrooms” (EACEA P9 Eurydice, 2011, p. 117). The European Commission (2011) found that in European countries, teachers of mathematics report, “dealing with diversity was the least addressed competence in both the generalist and specialist teacher education programmes...” (EACEA P9 Eurydice, 2011, p. 136). This is supported by Waitoller and King Thorius (2016) who write “Inclusive education is a continuous struggle...” (p. 368).

In our particular educational context, record numbers of early-career teachers are emergency certified (Oklahoma State School Boards Association [OSSBA], 2017), meaning they were not required to have any official teaching credential or teacher education learning before being hired and placed in classrooms. Another path to teaching is to obtain a license through alternative teacher education programs based outside of institutions of higher education (U.S. Department of Education, 2016a). Like emergency certificates, alternative certification also features a process of attaining a teaching license after hire. The difference is that alternative certification requires some level of teacher education learning before hiring and this can vary anywhere from a few weeks to several semesters of teacher education coursework. Both of these

forms of registration emerged as a response to a severe teacher shortage in the state in which we work and reside and throughout the United States (OSSBA, 2017). However, teacher shortage is not just a problem in the United States as other countries are also grappling with this issue (Donitsa-Schmidt & Zuzovsky, 2016; Dupriez, Delvaux, & Lothaire, 2015; Weldon, 2015).

The Need for Induction Programs

Teachers certified through alternative programs and those receiving limited teacher preparation have higher rates of attrition, a problem particularly acute for generalist teachers of mathematics in high-poverty and high-minority schools (EACEA P9 Eurydice, 2011; Sutchter, Darling-Hammond, & Carver-Thomas, 2016). Indeed, induction programs that include effective mentorship are crucial to curb attrition rates and to support early-career teachers' development in mathematics teaching, even for those earning certificates through traditional teacher education programs (Bullough, 2005). Effective mentoring programs, often created in European countries as collaborative communities, can also strengthen early-career teachers' foundational educational knowledge that is an integral part of teacher education programs and strongly influences teaching effectiveness (Education, Audiovisual and Culture Executive Agency P9 Eurydice [EACEA P9 Eurydice], 2011; Flores & Day, 2006).

With increasing numbers of students with disabilities participating in general education classrooms (United States Department of Education, 2016b), induction and mentoring programs must also attend to developing early career teachers' pedagogy to support students with disabilities. Yet, effective inclusive practices are not adequately addressed in teacher education programs in the U.S. (Danforth, 2014; Waitoller & King Thorius, 2016) and beyond (Artiles, Kozleski, & Waitoller, 2011; Forlin & Chambers, 2011; Subban & Mahlo, 2017). Such practices are notably vague for generalist teachers in European countries when related to mathematics teaching (EACEA P9 Eurydice, 2011). This is problematic given the historical marginalization of students with disabilities in mathematics education.

Marginalizing Practices in Mathematics Education

Although the field of mathematics education espouses access and equity for all, research and practices involving students with disabilities fall short of this expectation (Tan & Kastberg, 2017; Kleinert et al., 2015; Kroesbergen & Van Luit, 2003). The National Council of Teachers

of Mathematics (NCTM), the various mathematics curriculum used in European countries, and the Common Core State Standards for Mathematical Practice (CCSSMP) used in the United States promote equitable access to high-quality mathematics instruction (EACEA P9 Eurydice, 2011; NCTM, 2014; National Governors Association Center for Best Practices & Council of Chief State School Officers [NGAC], 2010). Yanisko (2016) stated: "...we must first think about how the mathematics being taught in schools to students of non-dominant backgrounds mirrors (or not) what the NCTM and the CCSSMP consider high-quality mathematics instruction" (p. 154). As a concept, inclusive education can serve as a unifying construct to guide these considerations.

The call for inclusive education is partly in response to inequities in the field of mathematics education regarding access and outcomes for historically marginalized groups such as Indigenous populations, Blacks, and Hispanics (e.g., Gutiérrez, 2018; Martin, Gholson, & Leonard, 2010). However, students with disabilities are not mentioned in NCTM's Principles to Action (2014): "Our vision of equity and access includes both ensuring that all students attain mathematics proficiency and increasing the numbers of students from all racial, ethnic, gender, and socioeconomic groups who attain the highest levels of mathematics achievement" (p. 60). Many conversations, including national and international curriculum standards, often exclude students with disabilities (EACEA P9 Eurydice, 2011; NGAC, 2010)

Such neglect in national and state sanctioned organizations also seems to extend to research and practice. Tan and Kastberg (2017) reported that between 2006 and 2016, the Journal for Research in Mathematics Education, a leading research journal in the field, had published four empirical studies that focused on students with disabilities. In schools, many students with a disability spend a majority of their school day in segregated special education learning environments (United States Department of Education, 2016b) due to pull-out practices (e.g., removing certain students during a regular classroom to receive individualized services in another location). Inclusion of students with a disability alongside students without disabilities in a regular classroom are based on the goals created by the Individual Educational Plan (IEP) team (consisting of educators, families, support personnel, and school administrators) for each student with disabilities. The low educational quality related to segregated practices for students with disabilities are of great concern (Ferri & Connor, 2005; Valle & Connor, 2011) if the intentions is for all individuals to coexist interdependently in, and out, of schools. Consequently,

mathematics instruction in classrooms is far from where the richness of inclusive practices can help all students thrive.

Specific to mathematics, students with disabilities engage with a vastly different curriculum that emphasizes rote learning and basic knowledge and skills (Browder, Spooner, Ahlgrim-Delzell, Harris, & Wakemanxya, 2008) when compared to the intended general education mathematics curriculum that emphasizes, for example, developing conceptual understanding, communication, and problem solving (NCTM, 2014; Common Core Mathematics Standards (NGAC, 2010)). Students with disabilities have thrived when afforded the opportunities to engage with the intended curriculum (Göransson, Hellblom-Thibblin, & Axdorph, 2016; Hostins & Jordão, 2015; Peltenburg, van den Heuvel-Panhuizen, & Robitzsch, 2010). IEP team members can craft mathematics goals that approach the intended curriculum (Tan, 2017a) in order students with disabilities to be an integral member of their general education mathematics classroom. Importantly, teachers must be adequately supported to engage students with disabilities in inclusive mathematics education and constructivist-oriented mathematics, (Xin, Liu, Jones, Tzur & Si, 2016). Yet, traditional paradigms that inform mathematics teacher education involving students with disabilities does not align with intended forms of mathematics engagements (Lambert & Tan, 2017; Tan & Lambert, in press). Such paradigms point to discrimination based on a perception of mathematics ability, and more broadly to the problematic nature of school curriculum that omits the “perspectives, histories, and contributions of non-White, non-male, non-dis/abled, or non-cisgender people” (Midwest and Plains Equity Assistance Center [MAPEAC], 2017, p. 1). Consequently, teachers may not be adequately prepared to design opportunities for students with disabilities to meaningfully engage in mathematics in inclusive settings. By addressing issues of equity and access in professional learning such as induction programs, teachers can be better positioned and empowered to more effectively prepared to advance inclusive mathematics education (Tan & Thorius, 2018).

Framing Inclusive Mathematics Education

Inclusion has many varied definitions, but for our work we embrace a definition of inclusion which extends beyond students with disabilities learning mathematics alongside peers in a general education classroom. We build on Waitoller and Artiles' (2013) definition of inclusive practices to frame inclusive mathematics education (IME) as a way for researchers and

educators to acclimate to two related dimensions: access and personhood.

The dimension of access concerns the quality opportunities for students with disabilities to grapple with mathematics (e.g., engaging in tasks that are meaningful, cognitively demanding, and offers opportunities to be creative). Access also relates to teachers possessing strong mathematics content and pedagogical knowledge.

The personhood dimension relates to recognition of (a) students as mathematics doers and thinkers, (b) social forces (Slee, 2010) that perpetuate ableism and (c) centering the voices of students with disabilities and their families. Students as mathematics doers and thinkers means that educators recognize and value all students as having powerful mathematics minds (Boaler, 2015), potential for tremendous growth, and insights. Lastly, personhood means centering the voices of students with disabilities, their families, and advocates to advance claims of mathematics education exclusion and their preferred solutions to inequities in and out of schools. Such issues do not operate in a vacuum of the classroom, rather they are influenced at the systemic level and by social forces (Artiles, 2003).

Recognition of social forces means that researchers and educators consider the ways in which ableism impacts various facets of mathematics education such as lesson planning, curricula design, placement decisions, social exclusion, oppression, and the co-construction of mathematics learning disability (Heyd-Metzuyanim, 2013). Moving beyond recognition requires countering these social forces (Tan & Thorius, 2018) through reconstructing disabilities in mathematics education (Tan, Lambert, Padilla, & Wieman, in press). A first step in this process requires a deep understanding of social, cultural, historical, and relational aspects of disability (American Educational Research Association [AERA], 2017; Waitoller & King Thorius, 2016) and ways in which educational systems often perpetuate disabling views of students in mathematics classrooms (Tan & Thorius, 2018).

Three Principles of IME

The induction program we report on is situated within the conceptualization of IME's three specific principles: (1) reframing and relocating disability, (2) presume and assign mathematical competence, and (3) mathematics for and of all. In applying the first IME principle, we ask participants to consider the concept of disability as a difference or uniqueness rather than a merely a deficit located within individuals (Oliver, 1996). This framing of

disabilities meant having early-career teachers attune the personhood and access dimensions of IME in considering the social construction of disability and examining disability within the context of inaccessible and inequitable mathematics curricula. Thus, deficits shift from students to the barriers that prevent access.

With the second IME principle, we aim to convey the notion that all students, regardless of disability, have powerful mathematical minds (Boaler, 2015) consistent with the personhood dimension of IME. Participants are to consider presuming mathematical competency as they diligently look for evidence of competence within students (Donnellan, 1984). Such actions may support educators as they enact IME #1, reframing and relocating disabilities.

Also consistent with the personhood dimension, the third IME principle aims to have participants consider student voice along with concepts of Universal Design for Learning (UDL) (Center on Applied Special Technology [CAST], 2016) into their mathematics curricula (multiple means of representation, expression, and engagement). An essential element of this principle is to include these considerations before and while designing curriculum rather than as an afterthought. Importantly, mathematics for and of all (Tan & Kastberg, 2017) extends the notion of UDL concepts "to interrogate constructions of normalcy and whiteness, how they materialize in classroom curriculum and their relationship to oppressions students experience in schools and society" (Waitoller & King Thorius, 2016, p. 376). While the three principles framed the content planning of the induction program, we did not cover all three principles in depth and adjusted to spend most of the time on the first and third principles of inclusive mathematics education as dictated by our participants' identified areas needing professional growth.

The Induction Program

The induction program consisted of six facilitated meetings with a group of six early-career teachers, a social media presence to support learning, peer-to-peer mentorship, networking and communication, and teaching observations. We grounded our meeting processes within concepts of expansive learning (Engeström, 1987). In particular, we introduced conceptual and practical tools (e.g., inclusive mathematics lesson planning activity) to incite deep thinking and dissonance with the goal of advancing learning. Our meeting agendas included both specific tools we aimed to share and ample time for focused and open-ended discussions. Each meeting lasted approximately two hours with a focus on IME concepts.

Discussion-based Meetings

Discussions encompassed several topics that organically surfaced including the difficulty of using district mandated mathematics curriculum, need for additional resources, lack of mentoring available in the school environment, and guidance for incorporating IME into pedagogy. We clarified questions which arose such as, “What resources would provide some support for teachers?”, “How can we encourage teachers to continue to support each other and share information to mentor each other?” during meetings. The induction meetings answered these and more questions from the participants. After each meeting, we met to debrief and noted important areas to address for upcoming meetings although the meetings were generally productive given the richness of the conversations. We recorded each meeting and used the transcriptions to create minutes as well as data to guide faculty in scaffolding participants’ ability to advance inclusive mathematics instruction in their classrooms.

To provide a firm foundation of general inclusive practices and IME, we initiated participants in the induction program with a discussion of central concepts of inclusive classroom practices. During the first induction meeting, we invited a representative from the Center on Applied Special Technology (CAST) who shared inclusive practices concepts, rationale, and strategies with participants. The presenter’s review of UDL practices included the use of multiple modes for student engagement, representation, and expression, and creating a classroom climate where students feel valued (CAST, 2016; Pennsylvania Department of Education, 2015).

We assigned participants the first chapter of Charlton (1998) for reading to complete prior to the second meeting. Our purpose for assigning this reading was to provide participants with a perspective for understanding disability rights and oppression worldwide. In addition, we asked participants to think about the debate on full-inclusion of students with disabilities in education. We assigned each participant one “side” of the debate and asked them to come prepared by the second meeting to engage in this conversation.

During the next four meetings, we spent time unpacking the core concepts of inclusive education within the larger struggle around disability rights and oppression through the debate activity, debriefs, and discussions. The three IME principles guided our content for these meetings. For example, the inclusive mathematics lesson plan activity tool that we introduced had elements of reframing and relocating disability (IME #1). We guided them through this

activity and generally provided support as they made deeper meaning of UDL and inclusive mathematics education planning and processes.

Observations, Social Media, and Peer-to-Peer Mentoring

In between meetings, we conducted informal classroom observations to get a sense of participants' mathematics teaching practices. We informed participants that these observations were not meant to assess their level of inclusive mathematics practices, but rather for us to get a sense of their "typical" day-to-day work as mathematics teachers. We individually scheduled a mutual time for the observations with each participant. As such, scheduling alignment or conflicts allowed for us to visit some participants more than others. We generally observed each participant for the duration of their mathematics lesson for that day which averaged around 36 minutes for each observation. The observations took place from approximately the midway point of the induction program and lasted to near the end of it. Lastly, we spent time during the final meeting debriefing and discussing excellences and issues associated with the observations.

We created a social media presence to supplement the induction meetings. This was done through a closed Facebook group to provide opportunities for participants and us to collaborate and mentor each other. We also used the Facebook group to communicate on updates and logistics for upcoming meetings, share resources, and provide information on other professional learning opportunities that emerged. The online and in-person mentorship component of the induction program included peer-to-peer mentors in addition to the university faculty mentors.

Peer-to-peer mentoring occurred organically as participants sought answers to questions about teaching or expressed frustrations with implementing the state's new mathematics curriculum. Also, the meetings allowed participants to share their successes and struggles with teaching inclusive mathematics education. Finally, critical issues arose from our observations and discussions with participants. In sum, the induction program included reflective time and space for participants to make sense of inclusive practices, share their successes and struggles with IME, engage in collaborative inquiry into current practices and contexts, and means for mentorship.

Next, we share vignettes to illustrate our encounters with two of the participants as our experiences with them best represent some of the critical issues in advancing IME with early-career teachers. The vignettes also provides a juxtaposition of our interpretations of their

classroom practices in urban elementary classrooms and their opportunity for mentorship.

Vignettes

The juxtaposition of early-career, alternatively certified, mathematics teachers' inclusive instructional practices in urban elementary classrooms and their opportunity for mentorship is the focus of these vignettes. We share the stories of Kasey and Amy because they best represented the struggles of the six early-career teachers in our group and represent the growing number of alternatively certified teachers in public schools. Kasey and Amy (pseudonyms) teach in the second largest public-school district, serving approximately 42,000 K-12 students, in an urban area of a Midwestern state in the United States.

Over the past few years, this Midwestern state faced substantial challenges in adequately funding public education. Because of annual cuts to educational funding, school districts were struggling to maintain a balanced budget, often cutting programs such as art and music education, and more recently for some school districts, initiating a four-day school week (Leachman, Albares, Masterson, & Wallace, 2016). Also, the state continues to face a significant teacher shortage. The beginning of each school year continuously marks a record number of emergency teaching certificates awarded to people without any certification, not even an alternative certification, before allowing them to teach in elementary classrooms. Public school teachers in this state rank near the bottom in the United States as measured by teacher salary (Frohlich, 2018). Similar to many urban schools across this state, the shortage of teachers is a particularly acute problem in Kasey and Amy's school district with high teacher turnover and reliance on emergency and alternatively certified teachers.

Our interpretations of the extent of Kasey and Amy's IME teaching practices are based on our observations of their classrooms and the conversations that took place during the induction program. From our brief encounters with Amy and Kasey, it was clear that they cared deeply about their students and their professional roles as teachers. Based on differences in their positionality and backgrounds (many of these complexities are beyond the scope of this paper), they brought vastly different strengths to advance inclusive mathematics education in their classrooms. For each participant, we first provide a brief description of their particular context, then we share instances of their practices, connect their work to the three IME principles, and lastly, ways in which we attempted to address challenges of implementing IME.

Kasey

Kasey teaches in an elementary school located a few miles from the center of the city, an area marked by high racial, linguistic, cultural, and socioeconomic diversity. Kasey was a first-year teacher at the time of the induction program, teaching second grade, and identifies herself as a Black woman. She grew up in the same city and attended the same school district in which she is currently teaching. Before entering the teaching profession, Kasey spent several years as a professional working in the insurance sector. Her passion for teaching led her to become certified to teach in a general education elementary classroom through an alternative certification teacher education program located in the same Midwestern state where she taught. Table 1 provides a summary of the number of students attending the elementary school where Kasey and Amy teach, the diversity of student populations, and the special services accessed.

Table 1

School Demographics

Categories	Kasey	Amy
Number of PreK-6 th Grade Students	523	293
African American	13%	56%
Native American Indian	11%	3%
White	31%	16%
Hispanic	32%	13%
Multiracial	13%	11%
Asian/Pacific Islander	0%	1%
Free & Reduced Lunch Program	57%	70%
English Language Learner ^a	23%	14%
Individual Education Plan (IEP) ^b	22%	17%

Note. ^aStudents whose first language is not English. ^bIn the U.S., to qualify for an IEP, students must be officially documented as having a disability.

**Students whose first language is not English*

Classroom practices.

During a spring morning, Kasey began mathematics instruction for 20 of her 22 students; two students had been pulled out for individual mathematics instruction in a special education classroom. Kasey called all students to sit on the carpet in front of the whiteboard as a large group then began verbally reminding her 20 students of prior learning. Kasey used a What Do You Know, What Do You Want to Know, and What Did You Learn (KWL) chart to organize previous mathematics knowledge for students visually on the whiteboard. To focus students' attention, Kasey shared the mathematics lesson objective for the day which was, *Practicing +/- ones, tens and 100's*. Kasey used formative assessments to confirm that all students were engaged in the lesson such as, "Do you agree with that?", "What do we do to check our answers?", and "How can I figure out the number"? Kasey used academic vocabulary such as "inverse operations" and provided each student with a small whiteboard and marker to practice problems as she worked problems on the board.

Kasey used multiple grouping strategies such as small group, paired buddy work, large group, and individual work during guided practice before giving students independent work. Kasey offered wait and processing time often, and when a student seemingly struggled, she asked other students to support that student instead of moving on to another student to share the answer. During independent work, Kasey regularly walked around the class checking on students' progress.

We observed Kasey employing classroom community building appreciations such as giving a "round of applause" to students answering questions. Alternately, she showered individuals with positive comments such as, "Joey, that was fantastic" and "I see people thinking very hard" to support students' effort in their learning process. As part of Kasey's modeling for students, she used polite words with students such as "please" and "thank you" consistently and closed the lesson with "Thank you for working hard scholars, I appreciate you." Kasey used classroom management skills to create an inclusive classroom.

During the middle of Kasey's mathematics instruction, a teacher escorted the two students with disabilities back into Kasey's classroom. Kasey, and all of the students, took this interruption in stride making sure to welcome these two students in their mathematics learning community. Kasey shared concerns during mentoring sessions about her relationship with the special education teacher and her apprehensions about the "drop-in" of students with disabilities

during her mathematics lesson. She described her relationship with the special education teacher as being highly tense with insufficient communication or collaboration between the two of them.

Interpretation of observed IME practices.

For Kasey, advancing IME was a work in progress. Although Kasey partially enacted IME principles #2, presume and assign mathematical competence, and #3, mathematics for and of all, we did not notice ways she enacted principle #1, reframing and relocating disability. Next, we offer glimpses of ways in which Kasey partially enacted the IME principles and ways in which these enactments were hindered.

For IME #2 and 3, she used multiple modes for student learning through oral and visual mathematics instructional practices and conducted regular formative assessments to offer scaffolding during mathematics teaching assisting with increasing student participation. She used positive classroom community appreciations to make all students feel valued during mathematics including using their names to offer individual acknowledgments engaging students to put forth their best effort. That is, mathematics was practiced as a process of thinking and reasoning rather than as a performance of skills that were either right or wrong. Moreover her strategies for grouping students, the ways in which she provided wait and processing time, and making herself available to students by walking around offers a glimpse into Kasey's IME practices. Kasey used these classroom management skills to motivate and support interactive, engaging activities to teach mathematics to all of her students, including students with disabilities.

Kasey did not apply IME principle #1, reframing and relocating disability. IME #1 contribute to the need to make deeper meaning of social forces (Slee, 2010) which perpetuate ableism often due to barriers that prevented access. This led us to consider IME principle #1 as an area of professional growth for Kasey during our induction program. During our mentoring sessions, we discussed potential mathematics resources to supplement her ability to advance IME generally, but with IME principle #1, in particular. These included the books *Becoming an Inclusive Educator* (Danforth, 2014) and *Count Me In! K-5: Including Learners with Special Needs in Mathematics Classrooms* (Storeygard, 2012).

Identifying and addressing barriers to IME practices.

Kasey's barriers were ineffective communication with the special education teacher, new curriculum, and new standards for mathematics mandated for new teachers. Kasey's working relationship with the special education colleague was a barrier observed which she experienced daily preventing her from advancing IME. Kasey also expressed frustration with the mathematics curriculum adopted by her school district. Coincidentally, the state recently began implementing new academic standards in mathematics and reading. The confluence of the external forces of new curriculum and new standards with the internal tensions Kasey faced with being an early-career teacher and having a challenging relationship with her special education colleague created barriers for her implementing IME in her classroom.

During induction program meetings, we focused on these barriers as pressing issues for all participants, including Kasey, and helped to unpack them as part of an induction program mentoring early-career teachers. As a result, the advancement of IME principles was not addressed in its' entirety since we felt the need to reduce the overall stress of the participants by addressing these observed and expressed barriers.

Amy

Amy teaches at an elementary school located in a different part of the city but was also considered an area of high diversity (Table 1). She was a first-year general education elementary teacher at the time of the induction program, teaching third grade, and identifies herself as a White woman. She grew up and attended college in a large Northeastern city in the United States. This teaching position was Amy's first professional job following graduation with a Bachelor's degree in public policy. She spent the summer prior participating in a fast-track alternative education program that is available in many U.S. cities, including the city that Amy taught, but a program that has been harshly criticized (e.g., Ravitch, 2018).

Classroom practices

During a spring morning in an urban third-grade classroom, Amy began instruction of 15 of 24 students since nine of her students were receiving individual mathematics instruction in a special education classroom. Amy began her mathematics instruction with students sitting at their desks addressing them as a large group while she passed out a worksheet to students one by

one. Amy verbally reminded her 15 students of prior instruction by defining two of the mathematical words on the worksheet. The students wrote the definitions of these two words on their paper as she orally stated the definitions. Amy asked students to try to remember the definitions for the next two terms on their worksheet and write them down. Amy gave students about three minutes to complete this task then asked students to share their definitions of the next two mathematical terms. Amy offered positive encouragement, "Good job," only when students' definitions were correct. Amy did not offer wait time to students moving quickly on to another student if a student struggled to provide the correct definition. After Amy got the correct definitions for the two mathematical words, then she transitioned students into completing the rest of the worksheet as independent work. The worksheet had five remaining mathematical terms on the handout. She informed students to use "voice level zero" during their independent work. When George said, "Oh gosh", Amy went to his desk to inform him that he was not "meeting her expectations". She told him he needed to move to the back of the room. George stared crying but did not follow her instructions. Amy did not make him move and instead walked back to the front of the room.

Amy walked around the classroom checking on students work. After 10 minutes, Amy told the students to "Put your pencils down." She began counting down from five, and when she got to zero, she asked students to share their definitions from the worksheet. Only two students raised their hands to answer Amy while Matt curled up in a ball in his chair (a glance at Matt's worksheet showed that he had not finished the assignment). No other students raised their hands to answer Amy's request for definitions. Amy ended the lesson after the two students with raised hands shared all five of the definitions with the class. She informed the other students to either finish their handout or read quietly. George and Matt never re-engaged with their worksheets. At this point, Amy remained at the front of the room unless she needed to move to attend to students who were challenging behavior rules.

Interpretation of observed IME practices

For Amy, advancing IME was very limited for IME principle #2, presume and assign mathematical competence. IME principle #1, reframing and relocating disability, and IME #3, mathematics for and of all, were not observed in her classroom teaching. Next, we offer

glimpses of ways in which Amy enacted IME principles and ways in which IME principles were hindered.

For IME #2, Amy had a limited understanding of presuming and assigning mathematical competence. During induction meetings, Amy stated that she was sure that all students were getting the support in mathematics they needed to be competent in mathematics even the students pulled out of her classroom. Amy noted that although she did not have a relationship with the special education teacher regarding her students receiving individual instruction, she did not report any concerns associated with their mathematical competence. We didn't observe Amy enact IME principles #1 or #3 in her classroom.

Overall, we observed very limited instances of any IME practices in Amy's teaching. Amy used large group guided practice before assigning independent work to students, but she didn't use any other grouping strategies or pedagogical skills to engage or motivate students to learn. Amy provided limited opportunities for student to grapple with the mathematics questions or to share their reasoning before making students provide an answer. Amy practiced mostly teacher-centered instruction, and authoritarian, stringent, and sometimes, punitive classroom management skills in her classroom. She was inconsistent with her affect with students showing instances of possible remorse for lashing out at students then periods of a warmer affect abruptly changing back to having no affect while stating the need for students to maintain strict adherence to her expectations.

Identifying and addressing barriers to IME practices

We identified several pressing barriers to IME practices for Amy. However, we were met with challenges conveying these to her as she did not acknowledge these barriers existed. During the mentoring meetings, Amy displayed confidence in her teaching skills. She felt her teaching was going well beyond a few struggles and issues. Additionally, Amy did not express issues with the new mathematics curriculum nor with the new state academic standards for mathematics when her peers would turn the conversation during induction meetings to frustrations with new curriculum and standards. Although we focused on mentoring and supporting early-career teachers during induction sessions in attempt to reduce their overall stress and to provide a venting space, Amy did not share having any stress related to teaching.

In general, Amy felt confident in her ability to teach, manage her classroom, and advance IME principles. Rather, on several instances, Amy offered her thoughts and attempted to provide peer-to-peer mentoring to other participants as they disclosed their struggles with the group. Our last effort to reach Amy with how to advance IME in her classroom was to further discuss and unpack what IME may “look, feel, and/or sound like” during the last session, without necessarily singling out her teaching practices. Moreover, because the induction program was relatively short and was coming to a close, we identified and purchased additional resources on inclusive education and IME to share with the participants. These included disability awareness building resources such as story books (e.g., *Way to go Alex!* (Pulver, 1999)) and tactile mathematics resources (e.g., magnetic base ten manipulatives).

Reflections

In this article, we shared experiences and observations related to a year-long teacher induction program focused on professional learning and mentoring created to advance IME with early career, urban elementary teachers. Overall, Kasey and Amy’s vignettes reflect starkly different classrooms and point to the need for changes in supporting and mentoring early career teachers especially when noting the similar demographics of their schools and their different paths to become teachers.

Some of the complexities and challenges that highlight the inclusive mathematics induction program were impacted by context-specific and systemic constraints. Also, these challenges and complexities may have impeded efforts toward advancing inclusive mathematics practices. For example, ableism is a systemic issue in many international communities. Moreover, our interactions with and observations of participants during the induction program caused us to reflect deeply on the need for targeted professional learning, mentoring, and an effective induction program for early career teachers. In this section, we reflect and offer suggestions on key areas from the data gathered during our induction program related to (a) making deeper meaning of IME principles and (b) effective induction programs.

Making deeper meaning of IME principles

We interpreted that early career teachers faced challenges during the induction program related to supporting inclusive mathematics education. IME principles #1, reframing and

relocating disability, IME #2, presume and assign mathematical competence, and IME #3, mathematics for and of all, were new concepts as was some of the UDL principles shared with the participants.

The lack of opportunity to collaborate with special education teachers seemed to affect the ability of our participants to advance IME principles. It is important for early career teachers to have access to professional learning opportunities and mentoring to become an inclusive mathematics educators. Since students with disabilities are part of the general population, they should be included in learning with their peers in a general education classrooms.

An understanding of the three IME principles needs to be included in a revised and re-vamped induction program when the UDL framework is covered. This would decrease marginalizing practices in general education classrooms and support the creation of inclusive learning environments, including advancing inclusive mathematics principles. Overall, we observed all six participants demonstrate an emerging understanding of the principles of IME, namely IME #2, presuming and assigning mathematical competence. We initially covered principles #1 and #3 with participants also, but their focus on many other early-career teaching issues made it difficult to cover all three principles of IME comprehensively. Our move to provide additional resources near the end of the induction program was aimed at a longer-term commitment towards their professional learning. These resources supported both general teaching issues such as implementing the new mathematics curriculum and IME principles for evaluating how participants can create a deeper meaning of inclusive practices. Implementing the principles of IME in their classrooms takes time and space with peer-to-peer mentoring, discussions of social forces that act as barriers, and appropriate resources to make a deeper connection to IME principles. Next we identify and discuss features of facilitating an induction program to further support the advancement of IME.

Induction Program and Mentoring

For facilitators of induction and professional learning programs, introducing tools is an essential component to focus the session for participants and leverage their knowledge of inclusive mathematics education. Teachers typically desire to advance their mathematics pedagogy through connections with familiar people and practices. In turn, a central role of the facilitator in an induction program or mentoring opportunity is not only about disseminating

knowledge but also serving as a mediator to ensure the exchange of knowledge while offering tools for success. This form of learning is not linear by nature, but involves addressing tensions (Tan & Thorius, 2018), and unlearning. Early-career teachers, all teachers, would benefit from focused mentoring and facilitated conversations in areas needing growth. Amy and Kasey represent most early career teachers whom are at different stages of professional development learning making the facilitation of conversations crucial for advancing individual and collective learning, especially as it relates to IME (Tan & Thorius, 2018).

Another feature of facilitating an induction program is providing the time and space for participants to discuss issues creating barriers and challenges as early-career teachers. The peer-to-peer mentoring and discussions assist in meaning making for not only IME and the teaching profession but for the facilitators to understand issues affecting the participants. During induction program meetings, we learned that participants were frustrated with the forced implementation of a new mathematics curriculum by the school district without professional support or resources for effective implementation of the curriculum. As participants discussed and affirmed one another's feelings about the lack of resources, participants brainstormed solutions. Based on our induction program, it seems to suggest that mentoring, either as a facilitator or as a peer, is an effective means of supporting early career teachers.

Conclusion

While supporting teachers in contexts such as the ones we reported are somewhat unique, the challenges of inclusive teacher education is shared across the globe (Artiles, Kozleski, & Waitoller, 2011; Waitoller & Artiles, 2013). Yet, literature about inclusive mathematics education has been and continues to embrace paradigms which neglect the role of the educator in the learning process (Lambert & Tan, 2017; Tan & Lambert, in press). The work we described here aims to elevate the role of educators and counter ableism practices. We add to the small, but growing field of IME scholarship taking place both in U.S. (Greenstein & Baglieri, 2018; Lambert, 2015; Padilla & Tan, in press; Tan, 2017b; Tan & Thorius, 2018) and across the world (Eriksson, 2008; Göransson, Hellblom-Thibblin, & Axdorph, 2016; Hostins & Jordão, 2015; Moscardini, 2014). We recommend that researchers continue to expand this growing body of knowledge to advance an understanding of IME across all phases of teacher professional learning, but most especially with mentoring of early-career teachers.

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