
The Middle Tennessee Mathematics Teacher Education Partnership: Gaining Momentum Across Partners

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The Middle Tennessee Mathematics Teacher Education Partnership (MT-MTEP) is a partnership among two universities and their school and Center partners. Middle Tennessee State University (MTSU), a founding member of the Mathematics Teacher Education Partnership (MTE-Partnership), originated the MT-MTEP with Rutherford County Schools and the Tennessee Stem Education Center (TSEC). In 2018, Tennessee Technological University (TTU) joined the MT-MTEP, expanding the partnership to a regional focus and broadening the work of transformation in Middle Tennessee.

Similar to many mathematics teacher preparation programs across the nation, MT-MTEP has a focus on teacher recruitment and retention, with particular attention to increasing diversity among teacher candidates, in order to address the falling numbers of teachers in our programs. Its Networked Improvement Community (NIC) had made prior progress on establishing relationships among stakeholders, implementing recruiting strategies, and redesigning content courses. With this foundation, the group moved into more earnest discussions about diversity and equity in its programs as it recognized the lack of diversity among its candidates and issues related to equity within the programs. Even though the 2020–2021 academic year brought challenges, MT-MTEP gained momentum in addressing this goal. In this report, the researchers share both successes and struggles on their journey to grow and improve their work with the preparation of secondary mathematics teachers.

Aims and Driver Diagram

The June 2020 MTE-Partnership Conference provided the Middle Tennessee NIC an opportunity to reframe its goals and turn its focus toward issues of diversity and equity. Through discussion of the root cause analysis activity, the group arrived at the following statement:

The underlying problem we will address is twofold and broadly stated as recruitment and diversity. We see these as intertwined problems as we work to increase the diversity in our student population as a piece of increasing overall enrollment through creating a more inclusive program across all aspects of teacher preparation. (MT-MTEP MTEP 2.0 Application)

Building from here, they viewed the work of attending to this underlying problem as long-term work rather than short-term. In their view, a goal focused on diversity and inclusion requires close attention to culture and relationships within programs and is something that requires time to shift. Taking these ideas into account led them to the aim:

By 2025, the Middle Tennessee Partnership will increase efforts related to the equitable teaching of mathematics to better align with AMTE Standards and improve recruitment strategies for secondary education mathematics (6-12 licensure) to (a) increase the number of students majoring in secondary mathematics education by 50%, and (b) increase the number of secondary mathematics education majors from diverse backgrounds so as to be more aligned with the local student demographics. (MT-MTEP MTEP 2.0 Application)

Because this NIC is working across two programs with slightly different demographics, it was important to draft goals that were reasonable and would accurately reflect growth. The aims, drivers, and change ideas developed at the June 2020 MTE-Partnership Conference are displayed in Figure 1.

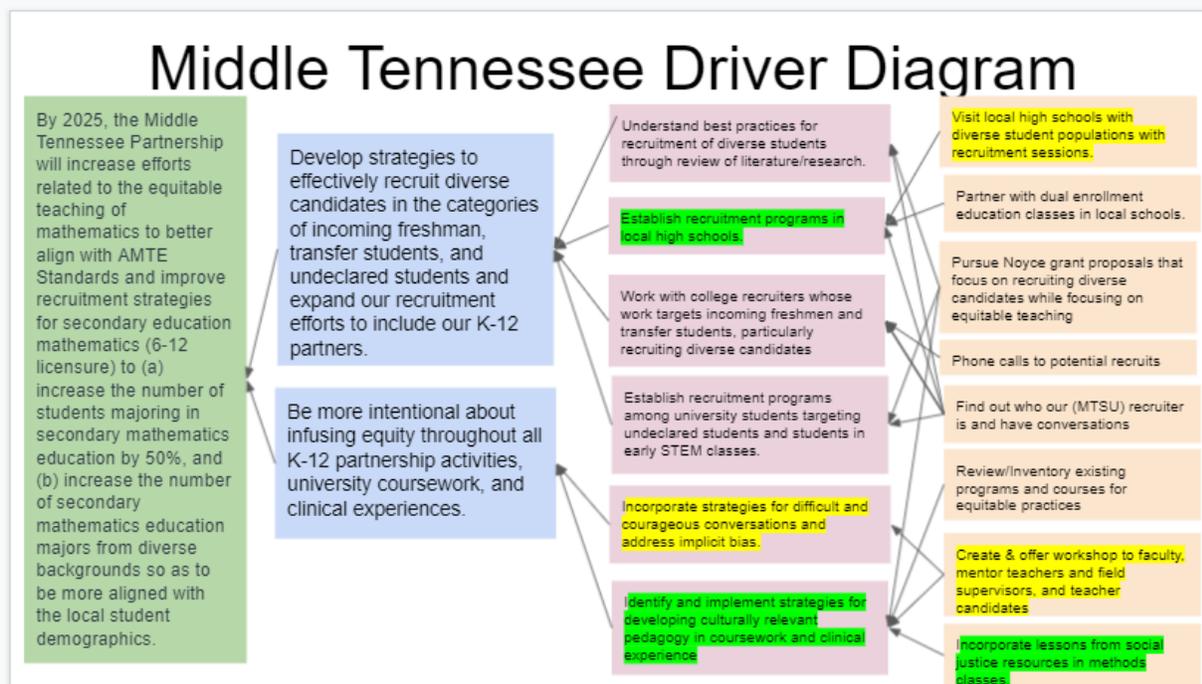


Figure 1. MT-MTEP Driver Diagram.

Note: The green box is the aim, blue boxes are the primary drivers, purple boxes are secondary drivers, and pink boxes are change ideas. Highlighted statements indicate change ideas and secondary drivers for which progress has been made or initiated in 2020–2021.

Successes and Struggles: Gaining Momentum Toward the Aim

The 2020–2021 academic year (i.e., COVID-year) brought both successes and struggles in moving toward the NIC's goals through implementation of strategies included in its change ideas. Here are highlighted some of the strategies (with both successes and struggles) and a glimpse of the multi-faceted way in which they are moving their programs closer to the aim—and closer to alignment with the *Standards for the Preparation of Teachers of Mathematics* (Association of Mathematics Teacher Educators, 2017) and *MTEP Guiding Principles* (MTEP, 2014).

Social Justice Lesson Sequence in Mathematics Methods

After identifying a need for activities focused on social justice and equity in methods courses, members of MT-MTEP involved in mathematics methods instruction developed a sequence of activities focused on teaching mathematics for social justice to be implemented in secondary methods courses. One member drafted the sequence and then other members reviewed and provided feedback, which was recorded in the first Plan-Do-Study-Act (PDSA) cycle for this initiative. The sequence includes readings to orient teacher candidates to the role of mathematics teaching in conversations about equity and inclusion (e.g., National Council of Teachers of Mathematics [NCTM], 2014, 2018; Spencer & Hand, 2015). The activity sequence also includes opportunities for teacher candidates to examine their own biases through a Multi-Cultural Mathematics Dispositions Survey (White

et al., 2012), and to practice writing and enacting mathematics lessons to explore social justice (Berry et al., 2020). Feedback collected in the study portion of the PDSA cycle revealed additional opportunities and aspects to include in the activity sequence, which were added prior to the initial implementation.

Following the drafting of the lesson sequence, the sequence was implemented once at each institution in MT-MTEP, MTSU and TTU, in Fall 2020 and Spring 2021, respectively. Each implementation was accompanied by its own PDSA cycle to gather data on the implementation. Data collection in the Fall 2021 implementation at MTSU was slightly hampered by COVID restrictions and adjustments to account for quarantines during the semester. Despite these struggles, data indicated that prospective teachers who engaged with these activities were inclined to use social justice topics in teaching following the activities and felt they had more tools with which to engage their own students in difficult conversations. Although not part of the data collection for this PDSA cycle, instructors at MTSU noted that at least two of the participating prospective teachers initiated social justice lessons with their students in teaching practica during Spring 2021, unprompted by any requirements to do so. Even with this success, instructors also noted the difficulty in engaging prospective teachers in conversations about social justice and equity and reflected on ways to improve this aspect of the sequence implementation.

In Spring 2021, the activity sequence was implemented at TTU with revisions that resulted from the first implementation PDSA cycle. A practitioner reading was added (Izard, 2018), and final reflective assignments were altered to fit the needs of the course structure. Although the sequence has been implemented, analysis of the study portion of the PDSA cycle is incomplete. Further reflection and revisions of this strategy will take place in Summer 2021 prior to a third implementation cycle in Fall 2021 at MTSU.

Developing Culturally Relevant Pedagogy in Coursework and Clinical Experience

The MT-MTEP's secondary driver "identify and implement strategies for developing culturally relevant pedagogy in coursework and clinical experiences" was the focus of two change ideas in the 2020–2021 academic year: teaching trios on equitable teaching strategies and de-tracking conversations in the partner school system. This rather large secondary driver is one that spans multiple spaces in teacher preparation, from education courses to mathematics content courses to experiences in schools. As such, the researchers are taking a multi-faceted approach to progress in this area.

Equitable Teaching Strategies in STEM Education Teaching Trios

Faculty across MTSU's College of Basic and Applied Sciences participated in a faculty learning community focused on inclusive teaching strategies in STEM courses. Two faculty in the mathematics department participated in this community, with the intent of bringing conversations about equitable teaching strategies to the foreground in the department in the future. The teaching trios structure included readings about equitable teaching in STEM disciplines, conversations about the readings and other experiences, observations of colleagues teaching with a focus on equitable teaching strategies, and development of observation protocol to support reflective discussion about teaching practice.

As in other work, there were both struggles and successes. The community began with three faculty members from the mathematics department but dropped to two when additional teaching requirements and responsibilities due to COVID restrictions became too much for the third member. However, the remaining two members engaged in fruitful discussion to make sense of ways in which other mathematics faculty might be open to discussions about equitable practice. A reflective teaching protocol that brings attention to equitable teaching practices was developed to be used at a later time with the whole department. In addition, the faculty members were able to use examples from observations of their own teaching to clarify particular practices in mathematics

classrooms that can be inclusive, or not, of diverse learners. For example, the ways in which mathematics instructors use the ideas put forth by learners during a mathematical discussion can either serve to invite learners into the community or send the message that their ideas are not welcome. These discussions and observations have laid a foundation for bringing discussion of equitable teaching to attention in the 2021–2022 academic year, with the hope of eventually moving toward more culturally relevant pedagogy in content courses for all mathematics learners.

De-Tracking Conversations in Local Schools

Recognizing that systemic structures in schools can serve as barriers to equitable instruction for each and every student, the MT-MTEP school partner, Rutherford County Schools, initiated an equity committee in the school system with the support of MT-MTEP personnel. The committee includes representatives from every high school mathematics department as well as connections to administration and parent groups. Conversations of the equity committee centered on equity for students and advocating for each and every student, with a focus on tracking that currently exists within some schools in the system—and ways in which de-tracking might be accomplished. The researchers consider this activity as a change idea attending to multiple secondary drivers: incorporate strategies for difficult and courageous conversations, address implicit bias, and identify and implement strategies for developing culturally relevant pedagogy in coursework and clinical experiences. The activity of the committee is an effort to engage in difficult conversations about the role and benefits of tracking across all stakeholders. Beyond just discussion, the committee has made strides toward de-tracking in some schools. By partnering with and standing alongside our school system in this process, the MT-MTEP personnel are also ensuring that prospective teachers have classrooms in which they can participate in field experiences where culturally relevant pedagogy and equitable teaching strategies are the norm.

Work of the equity committee has progressed to include plans for four high schools within the system to engage in (or continue) some level of de-tracking in the 2021–2022 academic year, including one school which plans to completely de-track the freshman level mathematics course by only offering one level of Mathematics I (as opposed to the four levels offered in some schools). Plans for this school include rolling out the de-tracked courses by adding one grade level each year following the 2021–2022 school year. Drawing on connections and resources within MTEP, Rutherford County Schools will provide professional development, delivered by experts within the MTEP network, to the participating schools in Summer 2021. Experts are also consulting on data collection plans that will support the acceptance (and eventual growth) of this practice across the school system.

Each of these strategies lays the foundation for this NIC to work toward engaging in difficult conversations about equity and providing equitable teaching strategies across its preparation programs and in the area school.

Recruitment in Schools

With recruitment of students into these programs as a continual need, the MT MTEP worked to find new ways to recruit throughout this year. Although it had a variety of events and efforts already used to recruit on-campus students, this year the group wanted to reach a broader audience. In particular, they are working to find ways to go into area high schools to interact with students. Due to COVID, some of these plans were restricted or altered to accommodate health protocols. Even so, working with Rutherford County Schools, MTSU established a recruitment seminar for high school students and offered it in May 2021. In this first iteration, MTSU learned how to structure such a remote event, how to spread the word to connect with students, and how to invite alumni of the MT MTEP program to participate in this activity. Though participation was low, the researchers see great

potential for ways in which such remote recruitment events might be carried out in the future, allowing the MT MTEP to recruit from a broader pool of students prior to their arrival on a university campus.

Future Goals

As our aim and driver diagram indicate, the MT MTEP is only completing the first year of work toward a five-year goal. There have been successes and struggles, but across all efforts the group is seeing the benefits and affordances that working as a local NIC can provide. This year, the NIC has been more active across multiple sites than ever before. Specific goals that the group has for the next year include continuation of the next iterations of strategies outlined in this report, along with efforts to build a community of practice among secondary teacher alumni and current students (which will be funded by a grant); collaboration between MTSU and TTU to engage prospective teachers in a poverty workshop (an experience-based activity that builds awareness of the culture of students living in poverty); and additional efforts to make connections with diversity and equity efforts on MTSU campuses to bolster the MT MTEP work. As the group learns to collaborate in more productive and fruitful ways, it hopes to see that progress correspond to growth and strengthening in both of the preparation programs and in the local school systems.

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