
Transformations Panel

Panelist Alyson E. Lischka

The Middle Tennessee MTE-Partnership: Growth and Opportunities

The Middle Tennessee Mathematics Teacher Education Partnership, a founding partnership in the MTE-Partnership, continues to grow in both its use of and contributions to the research base developing through the MTE-Partnership. Anchored at Middle Tennessee State University (MTSU) and supported by the Tennessee STEM Education Center and Rutherford County Schools, the Middle Tennessee Partnership members provide leadership in the MODULE(S²) Research Action Cluster (RAC) and actively participate in the MATH/Program Recruitment and Retention (PR²) RAC.

Following several leadership changes in the early stages, the Middle Tennessee Partnership has more recently evolved into a clear mechanism for program improvement at MTSU. A direct result of the local partnership has been increased communication across departments and colleges involved in the preparation of secondary mathematics teachers at MTSU. By inviting faculty from a variety of departments and colleges to participate in the work of the MTE-Partnership, our local partnership has grown in strength and begun to implement the tenets of a Networked Improvement Community (NIC; Bryk, Gomez, & Grunow, 2010).

With a focus on data related to recruitment and retention, we have developed a database of every student enrolled in a course in our program, which allows us to follow those students through the program. We use this tool to identify points at which students choose to leave the program, pinpointing areas for improvement in our courses. In addition, the database provides data that increases our understanding of the demographics of our students, which enables us to make informed discussions about equity and social justice initiatives.

To address the recruitment of students into our program, the partnership team has utilized *The Secondary Mathematics Teacher Recruitment Campaign Implementation Guide* (Ranta & Dickey, 2015) generated by the MATH RAC to develop more effective recruiting tools. Our recruitment initiatives now include extensive social media campaigns, a variety of campus events, and a recruitment video. The video, a direct result of the MTE-Partnership connection, is utilized at each MTSU new student orientation held throughout the summer as part of the dean's welcome. As a result of these increased recruitment efforts, we are experiencing a rise in the number of students taking introductory courses in our program.

In addition to recruitment efforts, materials produced by the MODULE(S²) RAC are being implemented in our content courses for middle grades and secondary teachers. Analysis of Praxis data and the concern that prospective teachers are struggling to connect their content learning with teaching spurred faculty to incorporate the materials into courses. The College Geometry instructor uses MODULE(S²) materials exclusively and other course instructors implement materials from the Algebra, Statistics and Probability, and Modeling materials. Across all of the courses, the implementation of these materials has provided a vehicle for rich mathematical discussions that challenge our prospective teachers to consider their learning in connection to the mathematics they will teach. In addition, the materials require prospective teachers to consider how K–12 learners might engage with particular topics and thus challenge the prospective teachers to develop the mathematical knowledge needed for teaching. We have anecdotally observed evidence of these ideas carrying over into methods courses and student teaching and are beginning to gather data that will further demonstrate the effectiveness of this program transformation. A positive indication of the impact of these changes is shown in the fact that all of our graduates for the 2017–2018 academic year graduated with a passing score on Praxis.

Other program improvements generated from participation in the MTE-Partnership and the resulting increased program communication involve diversity initiatives and changes in our student teaching placement model, gleaned from the Equity and Social Justice Working Group and Clinical Experiences presentations, respectively. Our program, in collaboration with the MTSU Intercultural and Diversity Affairs office, instituted a diversity panel discussion in which minority teachers from our area shared their experiences with future teachers, encouraging minority students to enter the teaching profession. The event was well-attended, and we hope to make this an annual event on our campus. Another result of increased communication for our program has resulted in new placement practices for our student teaching placements. Our mathematics education faculty now collaborate with College of Education faculty in placing our students in pairs in schools and assigning one supervisor to work with both intern-mentor pairs in each school.

Learning from the MTE-Partnership has propelled progress in our local partnership in many ways and, at the same time, demonstrated areas for further growth. As our local partnership continues to seek improvement, we have several challenges ahead. First, the increased interest generated through our recruitment efforts does not always draw students with strong academic records. We are continuing to seek ways to support students who show great potential as mathematics teachers but have weaknesses in their mathematical histories. These conversations require not only collaboration with education and mathematics education faculty but also the mathematicians who will need to support their mathematical development. Second, as we attract more students who are English-language learners, learning how to support them through successful completion of Praxis requirements becomes another challenge. Third, although our communication concerning student teaching placements has improved, we are still lacking skilled mentor teachers to work within schools. As more of our graduates become eligible to serve in this role, we hope to develop a larger cohort of mentor teachers with whom we can place our student teachers. This also points to the need for a deeper collaboration between our university and school partners.

As we look forward to next steps for our Middle Tennessee MTE-Partnership, we are excited to begin talks with Tennessee Technological University as they consider becoming a member of our partnership. We look to other multi-institution collaborations in the MTE-Partnership to guide us as we move forward in these talks and consider how the collaboration can benefit both institutions and the greater Middle Tennessee area.

Panelist Jeremy Zelkowski

Transforming the University of Alabama's Secondary Mathematics Teacher Preparation Program

Since the start of the 2010–2011 academic year, prior to the onset of the Mathematics Teacher Education Partnership (MTE-Partnership), our program at The University of Alabama (UA) has received extensive revisions in collaboration between the faculty from both the mathematics, and curriculum and instruction departments. The strength behind our transformation is the 10-year partnership (to-date) between our faculty of these two departments. We also began an outlay of setting the program up for the National Council of Teachers of Mathematics (NCTM) Specialized Professional Association (SPA) accreditation process with data collection that began in the 2011–2012 academic year. While many changes have occurred that have been positive which we report on, additional changes continue that require administrative support and external funding support. We present an overview of this transformational work, as well as our struggles in moving forward.

Starting the Transformation

When the Conference Board of the Mathematics Sciences (CBMS) published *The Mathematics Education of Teachers II* (MET II) in 2012, our program had already been working at making small modifications based on the MET I from 2001 using existing structures (CBMS, 2001, 2012). Drs. Jim Gleason and Jeremy Zelkowski began their

collaboration a few years earlier. The first programmatic changes included revising the mathematics education math major track of courses to align more closely to the MET I, as well as sequencing mathematics methods courses with a developmental trajectory in place. We also focused heavily on changing prerequisites to courses. That is, we added specific mathematics course prerequisites that are required before students can begin their final two years in the program. We noticed many students taking courses sporadically. At the start of the third year (upper division), many students entered their first methods courses yet to complete basic Statistics, the Calculus sequence, and/or the intro to proofs / Discrete Mathematics course. At the time, the program had only a single content course specifically designed and required for secondary mathematics teachers, a Geometry course. The remaining courses in the math major were math major courses.

Establishing the UA West Alabama Partnership Goals

At the onset of the MTE-Partnership, we worked to have our deans, provost, local in-service center, and two school-system partners comprise our partnership team. Our new focus would be addressing the MET II and the MTE-Partnership Guiding Principles while paying particular attention to the NCTM SPA requirements. In our partnership goals, we targeted four major areas for improvement. First, we set to develop of a sequence of capstone *advanced perspective* mathematics courses our third-year candidates would complete. Second, during the same academic year, we sequenced two math methods courses—both with introductory clinical field placements—alongside general secondary education program requirements. Third, we sought external funding to begin working with a team of local partnership math teachers in a Professional Learning Group (PLG) focused on the implementation of the mathematical practice standards of the common core in their teaching. This group would become the preferred teachers to place teacher candidates within the field. In addition, the PLGs participated in a broader project that developed the Mathematics Classroom Observation Protocol for Practices (MCOP²; Gleason, Livers, & Zelkowski, 2017). Last, we sought to improve the structural components of how the final two years of the program would be offered (as a cohort) with benchmarks that teacher candidates were required to meet at the end of each semester in order to move forward.

Enacting the Goals to Transform the Program

Our first goal of developing and offering a sequenced set of capstone content courses began with piloting and integrating changes in the existing History of Mathematics course with the content areas of function, number systems, rings, and integral domains. The course served as the prerequisite to the Geometry course focused on transformations (see Zelkowski, Campbell, & Gleason, 2018). By the start of the 2014–2015 academic year, we changed the program’s mathematics major by inserting the new capstone course in place of the History of Mathematics course. The historical aspects of the NCTM SPA standards are still included across both courses, as adding a course was not possible and replacing a course was our only option.

The second goal focused on the sequencing of math methods courses with the intent of taking teacher candidates from novice lesson planners to well-prepared, proficient unit planners and implementers of high-quality mathematics lessons. We sequenced three methods courses prior to student teaching internships with a major individual SPA assessment at the conclusion of each semester. The first methods course focused on lesson planning with technology where appropriate technology use is the focus. The second course focused on the content of lesson questioning and tasks. The third included a five- to 10-day unit of instruction focused on making connections and sequencing content while considering the use of technology, questioning, and tasks. Teacher candidates must successfully score well on three live observations of enacted lessons to qualify for the student teaching internship (Zelkowski & Gleason, 2016).

The third program transformation goal included building a high-capacity network of teachers who would supervise teacher candidates during clinical field placements. We secured five years of funding with two grants to

work with about 26 teachers. In working with our two local school systems, we spent the better part of five to seven days each summer and four to five PLG days during the school year, working with these teachers. To date, half of these teachers remain locally, with an additional few other teachers lacking the state required credentials to host student teaching interns. At the onset of starting the PLG, the development of the MCOP² allowed for a shared vision of how teacher candidates would be assessed by both program faculty and supervising mentor teachers. The MCOP² work was the highlight of this goal. While this goal has been partially met, when we have a large group of interns, the network is not large enough to provide the highest-quality experiences for interns and earlier clinical students.

The last goal was putting the structure of the program together so that courses were well-sequenced with a programmatic design for a two-year set of preparation courses for undergraduate and alternative-masters certification seekers. In either pathway, we have eliminated the idea or option of a 12- to 16-month pathway. We only offer a four-semester, two-year sequenced pathway of mathematics and methods courses to gain an initial teaching credential. The common courses in each semester for all teacher candidates helps build continuity, community, and professional relationships that well-prepared beginning teachers need. Teacher candidates in each cohort are enrolled in 12, 10, and 9 hours together specifically in each semester prior to the internship. These 31 hours are specific to mathematics education students only (bachelor and post-baccalaureate). In some instances, general secondary education coursework and other mathematics courses may result in teacher candidates enrolled in as many as 46 hours over these three semesters.

Meeting the Goals and Areas of Improvement

While we felt strongly about the ability to transform the programmatic coursework and other related components, changes in administration since the UA partnership was established and traditional views of secondary education have made it difficult for a full transformation to be made. With regard to the four MTE-Partnership Guiding Principles, we feel our team has helped fuel principle #1 at the national level. We have partially met principles #2 and #3, as some data has not been provided at the college level to accurately assess programmatic effectiveness to the greatest extent possible. At times, we have received some administrative resistance to making programmatic changes that differ significantly from other secondary education disciplines. This has hampered our efforts to serve as a national framework for programmatic design with changes that meet the stated goals. Our partnership, we believe, has been active with respect to principle #4 by disseminating the results of our investigation of programmatic design and its impact on teacher candidates' knowledge and abilities entering the profession.

Summary

Many aspects of UA's secondary mathematics teacher preparation program have been transformed to align with the MET II, NCTM SPA, MTE-Partnership Guiding Principles, and the Association of Mathematics Teacher Educators' Standards for Preparing Teachers of Mathematics (2017). We have produced strong evidence of programmatic impact on the Praxis II math exam and edTPA assessment, while lacking some additional measures that may shed more light on identifying which changes produced which effects. Interns' long-term teaching practices are influenced by the extent to which cooperating teachers embrace and demonstrate a commitment to the NCTM eight teaching practices when interns are placed full-time in their classrooms. The MCOP² development has provided other MTE-Partnership teams a low-to-no-cost, well-validated, observational protocol to assess teacher candidate progress during preparation. While we acknowledge our successes with adding contributions to the MTE-Partnership, internally we also acknowledge the struggles to transform the program to the level of the MTE-Partnership gold-standard.

Panelist: Ruthmae Sears

University of South Florida MTE-Partnership Team Summary

The University of South Florida MTE-Partnership Team has undertaken initiatives to address the MTE-Partnership Guiding Principles. These efforts and their outcomes are summarized below by the various principles. Additionally, areas that hold promise, as well as challenges that USF mathematics education program are currently facing are identified.

Partnerships as the Foundation

As our team engages in partnerships across the university, we have been faced with institutional challenges. Particularly, we were impacted based on the reduction of mathematics education faculty, who left the university and their position was never replaced.

Nevertheless, we are committed to our collaborative ventures with the mathematics department and the College of Arts and Sciences. The pedagogy (mathematics education) and content (mathematics) faculty frequently engage in dialogue about means to develop our pre-service teachers' content knowledge and ensure that our pre-service teachers are able to pass their state certification examination. These interdisciplinary conversations have resulted in collaboration on posters and papers.

Commitments by Institutions of Higher Learning

The university's commitment to pursue a STEM focus resulted in faculty and students attending STEM training and serving on STEM curriculum enhancement initiatives. Additionally, USF's NSF sponsored STEER grant sought to promote evidence-based teaching that is student-focused. STEER offers support, recognition, and opportunities for faculty interested in adopting evidence-based teaching. This initiative has resulted in Teaching Assistants (TAs) training for STEM labs that emphasized student learning rather than solely covering the course curriculum. This grant further supported an institutional investment in developing effective teachers who exhibit effective instructional practices.

Commitments by School Districts and Schools

The faculty partnered with the local school district and Title 1 schools to provide pre-service teachers increased exposure to the challenges and complexities of teaching mathematics in a middle and high school environment. Additionally, teachers and administrators at local schools are encouraged to provide feedback on content that needs to be addressed in the middle and high school methods classes. As a result of their insights, greater attention was placed on developing pre-service teachers' content knowledge, ability to attend to equity within the classroom setting, and being culturally responsive. The focus on developing content knowledge aligns with the collaborative efforts between the mathematics education and mathematics faculty. Moreover, our partnering school district (Hillsborough County) identifies mentor teachers based on performance evaluations. This results in high-performing teachers with proven records of success working with our pre-service teachers.

Candidates' Knowledge and Use of Mathematics

Concerted efforts to attend to Common Core State Standards for Mathematics content standards and Standards for Mathematical Practice, in content and pedagogy courses developed pre-service teachers' mathematical knowledge and ability to apply mathematics in multiple settings.

Additionally, the faculty have sought to embed the use of technological tools more readily into the Methods courses, thus fostering the development of technological pedagogical content knowledge. For example, pre-service teachers are exposed to various technological tools, such as TI-Nspire, Vex Robotics, and Desmos. The use of technological tools increased the likelihood that pre-service teachers were willing to engage with higher-level cognitively demanding mathematical tasks.

Professionalism, Advocacy, and Leadership

Discussions in Methods classes raised awareness of the need to reflect on mathematical identities. Additionally, pre-service teachers are also encouraged to demonstrate personal integrity, and be mindful of how implicit bias can affect learning experiences. They were also encouraged to take leadership roles and reflect on their agency within the academic environment.

Clinical Experiences

Pre-service teachers are afforded an opportunity to engage with middle and secondary school environments in their methods courses, practicum, and final field experiences. As a result of a recent NSF funded grant (Collaborative Research: Attaining Excellence in Secondary Mathematics Clinical Experiences with a Lens on Equity) our faculty became aware of the need to increase the amount of time allocated for clinical experiences earlier in the secondary (Grades 6–12) mathematics education program.

Student Recruitment, Selection, and Support

Recruitment is primarily done by the advisement office. Nevertheless, due to enrollment concerns, faculty are encouraged to participate in recruitment efforts and reflect on the selectivity criteria, while maintaining the standards of the discipline.

Beginning and In-service Teacher Support

We currently do not provide continued support for beginning and in-service teachers without grant funding. We have a Robert Noyce Fellowship that funds Teacher Fellows.

Tracking Success

The state of Florida rates teacher education programs based on their graduates after five years upon completion. USF was ranked No. 1, due to the success of their graduates who worked in the state of Florida.

Promising Areas of Future Action

Collaborating with the College of Arts and Sciences faculty and infusing technology into mathematics education is quite promising. Hence, grants can be sought to further support these ventures.

Challenges

Admittedly, due to limited faculty on staff, the extent to which transformative ideas could be implemented is impacted. Thus, the mathematics education program could benefit from hiring new mathematics teacher educators.

Additionally, we can seek to increase the amount of time allocated for field experience within our secondary program. Thus, working with MTE-Partnership provided insights as to how other institutions address this concern, and provided models for us to emulate.

Moreover, declining enrollments have implications on our means to recruit and retain mathematics teachers. Hence, we need to reflect on means to support individuals who have a desire to pursue a career in mathematics education.

Panelist: Mark Ellis

California State University, Fullerton MTE-Partnership Team Summary

California State University, Fullerton (CSUF) is part of the 22-campus teacher preparation network of the CSU system, which also comprises the CSU MTE-Partnership team. CSUF has a rich local context within the partnership. The local work we have done has helped in a bidirectional sense—we have been able to secure additional funding and then use that funding (e.g., S.D. Bechtel, Jr. Foundation) to develop more partnerships and collaborations.

Importantly, though the MTE-Partnership is focused on the preparation of secondary teachers of mathematics, we have expanded that to include the work of preparing and supporting teachers of mathematics K–12. Through this work, we have been able to envision teacher preparation development as a continuum over time instead of isolated incidences of learning. Through the Bechtel Foundation grant, CSUF developed a shared vision within their own institution and in partnership with three local school districts that allowed for more explicit conversations across the local partnership, especially focused on the qualities of a well-prepared teacher of mathematics and the practices of mathematics teachers who support each and every K–12 student with learning mathematics.

One important tool that is now used across credential-program methods coursework and field observations, as well as within district partner professional learning work, is the Mathematics Classroom Observation Protocol for Practices (MCOP²; Gleason, Livers, & Zelkowski, 2015), a rubric grounded in the Standards for Mathematical Practice. This work will be further enhanced through a NSF Noyce Master Teaching Fellowship grant received in 2017 to work with 20 secondary teachers of mathematics (half of whom come from CSUF MTE-Partnership partner districts) to strengthen practice within their own classrooms. These 20 MTFs in the Advancing Teachers of Mathematics to Advance Learning for All (see <http://atmala.weebly.com>) will serve as mentors to CSUF teacher candidates using the co-plan, co-teach model and will support district efforts to transform mathematics teaching by developing and facilitating microcredential modules aimed at building proficiency with specific instructional skills related to culturally responsive mathematics teaching.

New faculty have been another important contributor to the success with program transformation. Since 2014, CSUF has hired four tenure-track mathematics education faculty within the departments of Mathematics and Secondary Education—with plans for a search for an Elementary Mathematics Teacher Education faculty in 2018–2019. From their start at CSUF, these faculty have been part of the MTE-Partnership conversations about elements of program transformation (e.g., co-plan/co-teach; district partnerships)—these became normalized conversations. Collaboration among mathematicians and mathematics educators across departments and colleges as well as between university and school-district partners came to be seen as the norm. A recent example of this came when discussing how to generate more enrollment in optional (but valuable) mathematics courses for future elementary and secondary teachers; in less than an hour the Departments of Mathematics, Elementary, & Bilingual Education and Secondary Education agreed to leverage existing funds to create a scholarship program for students who complete with a B- or better at least three of the four targeted optional courses. Having new deans in both colleges at the start of the 2016–2017 academic year aided in solidifying the program transformation because they understood the transformed program as something that was typical.

One set of challenges everyone has faced involves time: the time for planning; the time for implementing; the time for collecting data about the implementation; and the analysis of the data and revisions to the implementation model. For example, Plan-Do-Study-Act (PDSA) cycles take time. However, as this work becomes more routine and less novel, these actions are less burdensome. Another challenge remains the time required for some long-time faculty to embrace the transformed program as the new normal, but this will be helped in part through the efforts of two of the recently hired faculty in Mathematics, Alison Marzocchi and Roberto Soto, who received a SEMINAL grant to support their work on brining active learning strategies into Calculus courses over the next several years.

Zooming out to think about the CSU MTE-Partnership group, having the support of the statewide network of the 22-campus CSU team has helped address the challenge of time through leverage collective expertise and realizing there is strength in numbers. Through annual convenings at the CSU Chancellor's Office, faculty from throughout the CSU system have had opportunities to share strategies, resources, and form new collaborations that support teacher preparation efforts. Among the insights gained from conversations across the 22-campus

network was the realization that some campus credential programs did not require content specialists to do supervision of teacher candidates. When this surfaced in a survey generated by the CSU MTE-Partnership team, it provided faculty with substantive data to bring to local campus administrators to advocate for program changes. Collectively, it is essential that program quality not be negatively impacted by different contexts.

These convenings also have allowed us to have a louder voice within the CSU system. One example is the success with advocating for the addition of 16 mathematics-specific items to a statewide exit survey given to all credential program completers; hearing that through CSU MTE-Partnership mathematics teacher preparation faculty would be routinely examining such data for program improvement, the committee charged with updating the survey agreed to include these additional items. Data from this survey will allow faculty to look deeper into their programs both locally and across institutions using a recently launched data dashboard on the CSU's Educator Quality Center's website: <https://www2.calstate.edu/impact-of-the-csu/teacher-education/educator-quality-center/edq-dataview-dashboards/Pages/default.aspx>.

Panelist: Wendy M. Smith

NebraskaMATH STEP: Secondary Teacher Education Partnership

NebraskaMATH STEP joined the MTE-Partnership as a partnership among the three University of Nebraska campuses that have teacher preparation programs, along with the public school systems in those cities (Lincoln, Omaha, and Kearney). Prior to the MTE-Partnership, the Center for Science, Mathematics and Computer Education (est. 1990) had built a statewide partnership with public school districts and intermediary education agencies (called Education Service Units [ESUs]), focused on mathematics teacher professional development.

When Research Action Clusters (RACs) first formed, the Nebraska partnership joined the Active Learning Mathematics RAC (ALM RAC). Subsequently, members of the Nebraska partnership have also worked with the MODULE(S²) RAC, STRIDES RAC, Equity and Social Justice (ESJ) Working Group, and Transformations Working Group. Additionally, Nebraska has been engaged in local efforts to form a statewide Networked Improvement Community (NIC), to translate the work of the MTE-Partnership into local efforts to align programs with the new Standards for Preparing Teachers of Mathematics (AMTE, 2017).

Active Learning Mathematics RAC

The University of Nebraska-Lincoln (UNL) and University of Nebraska at Omaha (UNO) were founding members of the ALM RAC and received funds from the Helmsley Charitable Trust as part of MTE-Partnership. Funds on both campuses were used to launch a Learning Assistants (LAs) program (hiring undergraduates as assistants in freshmen-level mathematics courses to help facilitate active learning). Prior to ALM RAC, UNL was already working to improve freshmen-level courses below Calculus (Intermediate Algebra, College Algebra, Trigonometry, and College Algebra and Trigonometry). Prior to reforms, UNL had some measures of coordination, including: common syllabus, common exams, and common grading of common exams. Since 2011, changes at UNL have been extensive, including: hiring a full-time director of first-year mathematics to coordinate courses below Calculus; teaching courses in renovated rooms with movable tables/chairs and wrap-around whiteboards; hiring LAs; creating common lesson plans that incorporate active learning and group-work structures; adding time to courses without changing the credit hours (75-minute classes instead of 50-minute classes); and graduate student professional development (before-semester workshop and course during first year as an instructor of record).

In conjunction with these reforms, the Department of Mathematics began collecting (and gaining access to) extensive student data in order to measure student success, including passing rates, course-taking trajectories, and attitudes. Efforts have been very successful, raising passing rates (C or better) from around 60% to consistently around 80%. Additionally, efforts have expanded from Precalculus courses to Business Calculus, Calculus 1, and

Calculus 2, and a second professor of practice will begin in Fall 2018 to share in the coordination and mentoring duties. Future efforts include ongoing refinement of courses, exploring online exam options (not just multiple-choice items), and expansion of active learning structures into additional courses.

UNL is also a collaborative partner in the research grant SEMINAL: Student Engagement in Mathematics through an Institutional Network for Active Learning. Through this grant, the research team is seeking to understand the contextual and leadership factors that initiate and sustain institutional change in ways that increase student engagement and success in freshmen-level mathematics.

MODULE(S²)

UNL also became active in MODULE(S²), with Yvonne Lai as a core member of the subset of the RAC that received a grant from NSF. Lai has led the efforts to create the algebra module, and she has piloted and assisted with other modules as well.

STRIDES

UNL has been involved with STRIDES, particularly focused on retention. Initial efforts were made to understand the support received and needed by teachers within the first three to five years of teaching. The UNL group has worked to develop measures and collect data related to these supports in order to develop induction programs.

Recent Efforts: Equity and Social Justice Working Group

UNL has recently been active in the ESJ working group. This work has focused on identifying the problem space related to preparing secondary mathematics teachers to work in diverse settings. Specifically, the working group has developed definitions for diversity, equity, and social justice, with UNL higher education and K–12 partners contributing to the definitions of diversity and social justice. In addition, this work has spurred more intentional conversations across UNL secondary math education faculty and faculty in multicultural education, and it has prompted more intentional work across our secondary mathematics education professional coursework (two methods courses, associated practicum, and student teaching and student teaching seminar). For example, NCTM (2014)'s *Principles to Actions* Access and Equity principle has become a focus in the first of two methods courses, is emphasized in the second methods course when students are in an associated practicum in a diverse school and is the main focus in the student teaching seminar. This seminar primarily focuses on access, equity, and identity. In addition to *Principles to Actions*, the course texts include Fernandes, Crespo, and Civil's (2017) *Access and Equity Promoting High Quality Mathematics Instruction Grades 6–8* and Aguirre, Mayfield-Ingram, and Martin (2013)'s *Impact of Identity in K–8 Classrooms: Rethinking Equity-Based Practice*. Throughout the professional sequence, prospective teachers are required to reflect on their own experiences learning mathematics and interrogate their assumptions about what it means to do mathematics and what that looks like for their students.

Recent Efforts: Statewide NIC

UNL has been part of MTE-Partnership's Transformations Working Group. In 2017–2018, NebraskaMATH STEP has grown in two directions: encompassing most of the 16 colleges and universities that prepare teachers in Nebraska and expanding to consider pre-service preparation of elementary teachers in addition to secondary teachers. These two changes were closely related; only UNL has a large enough student and faculty population to have separate elementary and secondary mathematics teacher preparation; in the other institutions, the same faculty may teach elementary or secondary mathematics and/or methods courses.

At the September 2017 statewide NCTM affiliate meeting, the existing NebraskaMATH STEP group convened to discuss this potential expansion. At a first meeting in October 2017, representatives from 11 of the 16 teacher preparation institutions, the Nebraska Department of Education, and five of the largest school districts met. In addition to mathematicians, mathematics teachers, and mathematics teacher educators, there were also

special education and English-language learner faculty and district personnel. The purpose of this meeting was to try to form a statewide NIC to work toward the new Association of Mathematics Teacher Educators' (AMTE) Standards for Preparing Teachers of Mathematics (2017). The 34 attendees were excited to work together toward these aspirational standards, with UNL providing leadership and logistical support.

After an overview of the NIC process, the group brainstormed the problem space and then had discussions to determine priorities. Working groups formed around each priority: math dispositions, teacher preparation programs, clinical experiences/cooperating teachers, and partnerships. The overall mood of the group was excitement to be collaborating across institutions, particularly on the part of K–12 personnel, who in the past have not been a large part of the conversation about improving teacher preparation. The colleges and universities have a fair amount of rivalry, because most are recruiting from the same pool of in-state students, and the state schools are often forced to compete with one another for state resources. Faculty and district personnel were glad to be working directly with one another, without waiting for official institutional collaboration. We discussed possibilities such as joint programs where students could take classes from different campuses; however, such possibilities are far in the future after the working groups make some progress.

The math dispositions group wanted to better understand the attitudes of future teachers in our programs, so we developed and piloted a survey in winter 2017–spring 2018. The results of the open-ended items were used to develop some word-clouds to represent the responses. These word clouds then were used for program representatives to discuss how programs might be revised to develop more positive attitudes toward mathematics, particularly for prospective elementary teachers.

The teacher preparation programs group was designed to survey the preparation programs in the state to determine the status quo. Depending on many factors, programs at different institutions are quite different in terms of the number and sequence of courses and field experiences. As a first step toward borrowing the best from each institution, there was a desire to know and understand what each program does. Conversations included people sharing strengths of their programs. For most people, this was the first time there was an organized way to learn about what other Nebraska programs are doing. Most programs deal with small numbers (one to five secondary mathematics teachers graduating in a year), which leads to particular challenges in offering courses specific for future mathematics teachers.

The clinical experiences/cooperating teachers working group was focused mostly on developing some type of shared cooperating teacher training (likely online); at present, the most any cooperating teacher is required to do in terms of training is to attend a district-sponsored orientation put on by the human resources department and is more about nuts-and-bolts (and things like sexual harassment) and not about how to mentor a novice mathematics teacher. The working group's first steps are to gather data from stakeholders to develop a shared vision for high-quality mentor teachers in mathematics. Following that, school personnel and university faculty plan to work together to design workshops for mentor teachers.

The partnership's working group decided to work on leveraging expertise on both sides of the K–12—higher education partners, and develop more opportunities to converse, including at the Nebraska Association of Teachers of Mathematics, the state administrator days, and other local conferences and workshops. A first step is to develop “conversation starters” to help get partnerships started. This group also discussed partnerships within and across higher education, particularly how to connect math and education departments, as well as special education and English-language learning. The working group noted that while the bureaucratic processes are prohibitive, establishing strong partnerships is worth doing in order to better prepare and support novice mathematics teachers.

A subset of the overall state group met in conjunction with the M4 conference (a mathematics education conference for Nebraska, Iowa, Kansas, and Missouri) in March 2018. Working groups reported on progress and next steps. The group next plans to meet in September 2018, at the state's Nebraska Association of Teachers of Mathematics meeting.

References

- Association of Mathematics Teacher Educators. (2017). *Standards for preparing teachers of mathematics*. Raleigh, NC: Author. Available online at <https://amte.net/sites/default/files/SPTM.pdf>
- Bryk, A. S., Gomez, L. M., & Grunow, A. (2010). *Getting ideas into action: Building networked improvement communities in education*. Stanford, CA: Carnegie Foundation for the Advancement of Teaching. Retrieved from <http://www.carnegiefoundation.org/spotlight/webinar-bryk-gomez-building-networkedimprovement-communities-in-education>
- Gleason, J., Livers, S. D., & Zekowski, J. (2015). Mathematics classroom observation protocol for practices: Descriptors manual. Retrieved from <http://jgleason.people.ua.edu/mcop2.html>
- Ranta, J. & Dickey, E. (2015). *Secondary mathematics teacher recruitment campaign implementation guide*. Marketing to Attract Teacher Hopefuls (MAT) Research Action Cluster, Mathematics Teacher Education Partnership. Retrieved from: http://docs.wixstatic.com/ugd/d9be3d_ca68f51bb5bc4152a42b3fa52dd985c5.pdf