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## Clinical Experiences

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Teacher preparation programs face significant challenges in providing secondary mathematics teacher candidates with quality clinical experiences. The problem is two-fold:

1. There is an inadequate supply of quality mentor teachers to oversee clinical experiences. Too few teachers are well versed in implementing the *Common Core State Standards for Mathematics* (CCSS-M; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010), and teachers are especially inexperienced with embedding the standards for mathematical practice into their teaching of content standards on a daily basis. Further, many veteran teachers do not implement the mathematics teaching practices as discussed in *Principles to Actions: Ensuring Mathematical Success for All* (National Council of Teachers of Mathematics [NCTM], 2014) on an ongoing basis.
2. Bidirectional relationships between the teacher preparation programs and school partners in which clinical experiences take place are rare. Such relationships that reflect a common vision and shared commitment to college and career ready standards and other issues related to mathematics teaching and learning are critical to the development and mentoring of new teachers.

The work of Clinical Experience Research Action Cluster (CERAC) encompasses a number of the principles and principle indicators from the 2014 Mathematics Teacher Education Partnership's (MTE-Partnership) *Guiding Principles for Secondary Mathematics Teacher Preparation Programs*, including fostering partnerships between institutions of higher education, schools and districts, and other stakeholders, such as state departments of education, and is focused on preparing teacher candidates who promote student success in mathematics. Moreover, the 2017 Association of Mathematics Teacher Educators' *Standards for the Preparation of Teachers of Mathematics* (AMTE Standards) state:

An effective mathematics teacher preparation program includes clinical experiences that are guided on the basis of a shared vision of high-quality mathematics instruction and have sufficient support structures and personnel to provide coherent, developmentally appropriate opportunities for candidates to teach and to learn from their own teaching and the teaching of others. (p. 26)

In the CERAC, higher education faculty and partner school districts and schools work together to actively recruit, develop, and support in-service master secondary mathematics teachers who can serve as mentors across the teacher development continuum from pre-service to beginning teachers. Moreover, the CERAC helps to ensure that teacher candidates have the knowledge, skills, and dispositions needed to implement educational practices found to be effective in supporting all secondary students' success in mathematics as defined in the CCSS-M and other college- and career-ready standards.

The CERAC consists of 26 university-led teams, each consisting of at least one mathematics teacher educator, a mathematician, and a school partner. The CERAC is divided into three sub-RACs based on the three types of field experiences that we are implementing to meet the goals that we set forth in our primary drivers and our aim statement. The sub-RACs are: Methods, Paired Placement, and Co-Planning and Co-Teaching. Each sub-RAC is implementing Plan-Do-Study-Act (PDSA) Cycles based on their goals and objectives. Teams work together via conference calls, email, and the Canvas platform. They use Dropbox, Google Drive, and Canvas as ways of sharing files and materials. Additionally, they have held face-to-face meetings as a RAC that included breakout meetings for sub-RACs. The sub-RACs have overlap areas that drive and focus the RAC, such as the emphasis on the mathematics teaching practices (NCTM, 2014) and other equitable teaching practices, professional development for mentors related to the *Standards for Mathematical Practice* (National Governors Association & the Council of Chief State School Officers, 2010) and mentoring mathematics teacher candidates, and outcome measures. There are also specific goals to be attained within each of the sub-RACs, and each sub-RAC has developed its own specific research questions.

### **Update on the Collective Work of the RAC**

Since the 2018 MTE-Partnership Conference, the CERAC has been busy implementing the work related to the National Science Foundation-IUSE grant, *Collaborative Research: Attaining Excellence in Secondary Mathematics Clinical Experiences with a Lens on Equity* (DUE-1726998, 1726853, 1726362). The project is led by principal investigators from Auburn University, the University of South Florida, and the Association of Public and Land-grant Universities (APLU). We are implementing an improvement science study to answer the following question: *How does a continuum of collaborative and student-focused clinical experiences, including co-planning /co-teaching and paired placement fieldwork models, impact pre-service teachers' equitable implementation of the Mathematics Teaching Practices (MTPs; NCTM, 2014) across multiple institutional contexts?* The research is being conducted by a consortium of 26 universities, along with their school partners engaged in APLU's MTE-Partnership, which is currently developing and testing three alternative models for clinical experiences using a networked improvement community (NIC) design (Bryk et al., 2015).

Throughout the 2018–19 academic year, members of the RAC continued implementing the project. During the 2019 Conference, RAC members reflected on their data collection plan; were led by the Equity and Social Justice Working Group liaisons in a discussion about deficit ideology and courageous conversations, which are terms related to equity lens of work; revised our driver diagram to make equity issues related to the students with whom the teacher candidates interact more explicit; discussed what RAC members gleaned from the conference that could help them in ensuring that teacher candidates across the 26 teams are developing equitable teaching practices and other skills that the teacher candidates need in order to facilitate their students' mathematics growth; and worked on populating Canvas with our materials and acclimating RAC members to the Canvas platform. RAC members also discussed challenges related to the goals that they have set for themselves as a RAC and for the grant and found some solutions. Figure 1 shows the revised driver diagram.

In addition to working on the grant during the academic year, members of the RAC submitted six chapters to a MTE-Partnership book (Martin, Lischka, Smith, & Lawler, in press) related to clinical experiences. The submissions are listed in Table 1.

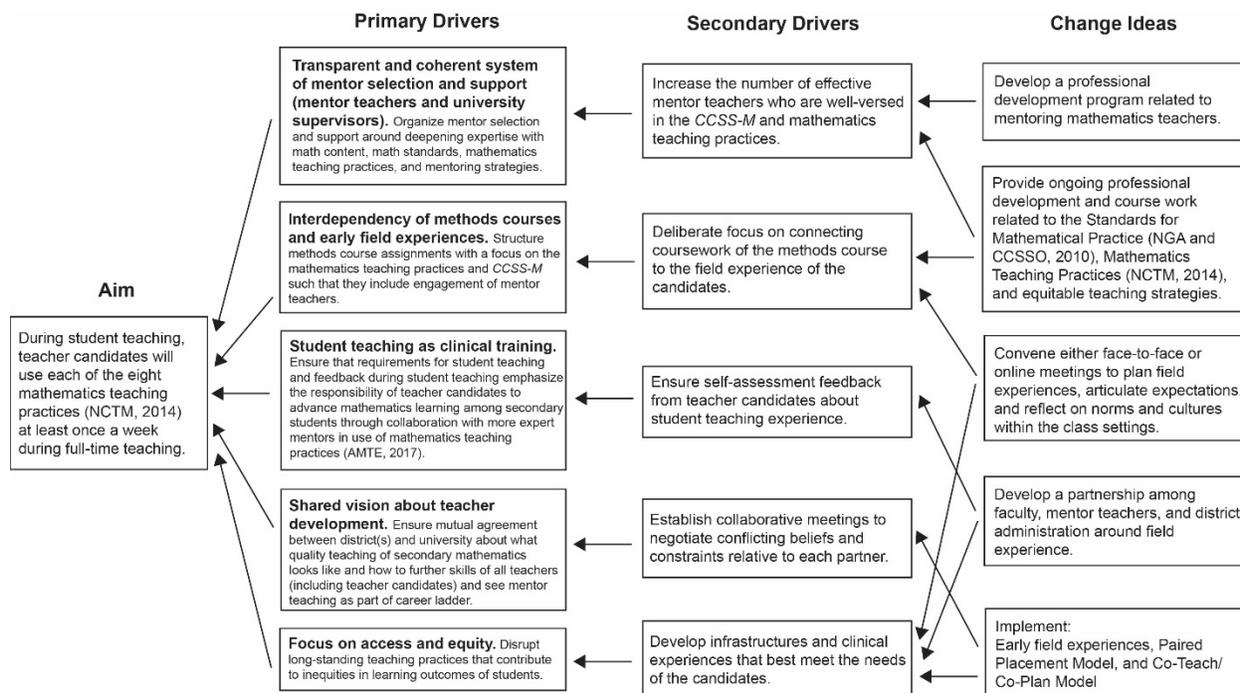


Figure 1. The revised CERAC Driver Diagram.

Table 1

*CERAC Chapters in MTE-Partnership Book*

Authors	Title
Strutchens, M. E., Erickson, D., Sears, R., & Zekowski, J.	Clinical experiences for secondary mathematics teacher candidates
Strutchens, M. E., Sears, R., & Zekowski, J.	Improving clinical experiences for secondary mathematics teacher candidates
Zekowski, J., Yow, J., Ellis, M., & Waller, P.	Engaging mentor teachers with teacher candidates during methods courses in clinical settings
Grady, M., Sears, R., Stone, J., & Biagetti, S.	Using co-planning and co-teaching strategies to transform secondary mathematics clinical experiences
Strutchens, M. E., Whitfield, J., Erickson, D., & Conway, B.	Fostering collaborative and reflective teacher candidates through paired placement student teaching experiences
Mangram, C., Clarke, P. A. J., Waller, P. P., Ellis, R. L., & Castro-Minnehan, C.	Focus on improving clinical experiences in secondary mathematics teacher preparation

Members of CERAC also participated in a poster session, presentation, and webinar about the RAC as a whole:

Strutchens, M. E. & Sears, R. (January, 2019). *Collaborative research: Attaining Excellence in Secondary Mathematics Clinical Experiences with a Lens on Equity* (Poster). Joint Mathematics Meeting, Baltimore, MD.

Amick, L., Franz, D., Lischka, A., McNamara, J., Smith, W., & Strutchens, M., Discussants: Lawler, B. & Martin, W. G. (April, 2019). *Research Symposium: Collaborating to Improve the Preparation of Secondary Mathematics Teachers*. National Council of Teachers of Mathematics Research Conference, San Diego, CA.

Strutchens, M. E., Sears, R., & Zelkowski, J., (May, 2019). *Clinical Experiences Research Action Cluster*. MTE-Partnership Webinar Series.

Members of the CERAC also submitted a proposal to present our work at the Association of Mathematics Teacher Educators 2020 annual conference. We will probably do another poster session at the Joint Mathematics Meeting.

Consistent with the whole RAC goals, each of the sub-RACS worked on materials that they had already been developing and began thinking about PDSA Cycles that they would like to run in the fall to continue improving their products and processes. What follows are brief summaries of the work of each of the sub-RACS since the 2018 MTE-Partnership Conference.

#### **Methods Sub-RAC**

The methods sub-RAC has focused our work on the development of modules that educate teacher candidates on critical components of the teaching and learning of mathematics, as well as adding a critical component of engaging the mentor/cooperating teacher in an activity that culminates the modules' activities. Each module has three activities, providing methods course faculty flexibility in how much class time needs to be devoted to the module.

**Mathematical Practices Module #1:** The Methods sub-RAC finished the multi-year effort to develop the Mathematical Practices (NGA & CCSSO, 2010) Module #1 in 2017. It was made available for use across the entire MTE-Partnership for the 2017–18 academic year. Jan Yow of the University of South Carolina is providing methods faculty the information and materials. She began tracking MTE-Partnership use of this module in late 2018 as a means to understand contextual usage of the model. This module focuses on faculty engaging teacher candidates in a quadrilaterals' activity in which teacher candidates understand what engaging in the Standards for Mathematical Practices look like as students, watching a related short video with their cooperating teachers, and discussing the mathematical practices enacted in the classroom with students. Multiple surveys are included for faculty to collect pre-service teacher work, as well as a survey from their mentor teacher.

**Lesson Planning Module #2:** The work on this module has been through three PDSA Cycles. The module team solicited pilot sites for the 2018–19 academic year, collecting data for study, with revisions to the module ongoing in July 2019. Data analysis is not complete but we anticipate providing the module for MTE-Partnership use for the 2019–20 academic year. This module focuses specifically on lesson planning featuring the mathematics teaching practices of *Principles to Actions* (NCTM, 2014) accompanied by a lesson planning rubric focused on the Mathematics Classroom Observation Protocol for Practices (MCOP<sup>2</sup>; Gleason, Livers, & Zelkowski, 2016). The lesson planning rubric is used by teacher candidates and mentor teachers to evaluate the planned lesson, revised lesson, and the implemented lesson. Minor revisions were made from Fall 2018 data with additional modifications from Spring 2019 data ongoing.

Student Feedback Module #3: The work on this module has gone a year beyond the initial development in the PDSA Cycle. It is being developed by Belinda Edwards, Patrice Waller, and Holly Anthony. Pilot sites are being solicited for the 2019–20 academic year in order to collect data to study and make revisions. The pilot sites include methods instructors from four different university partnership teams. The timeframe for full partnership rollout is planned for the 2020–21 academic year. This module focuses specifically on the value of providing students high-quality feedback as a teaching practice in relationship to mathematical goals to improve student learning outcomes.

### **Co-Planning/Co-Teaching Sub-RAC**

During the 2019 MTE-Partnership Conference, the Co-Planning and Co-Teaching (CPCT) sub-RAC studied the results of the previous PDSA Cycle, determined how to proceed into the next PDSA Cycle, reflected on means to refine data collection efforts, and considered dissemination efforts for the 2019–20 academic year. Additionally, the team members acknowledged institutional constraints and considered how to sustain and improve on collaborative efforts for the next year.

The CPCT team members reviewed the PDSA objective for 2018–19 that focused on the extent professional development training increased the likelihood that instructional pairs (collaborating teachers and interns) used the six co-planning and co-teaching strategies, and enacted equitable teaching practices during clinical experiences. The team acknowledged that providing professional development training on the co-planning and co-teaching strategies, and means to attend to equity in secondary mathematics, was quite helpful. The professional development training clarified what was expected and modeled the desired mathematical processes and practices. Moreover, instructional pairs that were not able to attend the face-to-face meetings were encouraged to view videos ([http://cream.coedu.usf.edu/Research/Attaining\\_Math\\_Excellence-Videos.html](http://cream.coedu.usf.edu/Research/Attaining_Math_Excellence-Videos.html)) of the training to enhance the nature of their enactment of co-teaching strategies during clinical experiences. The results from the MCOP<sup>2</sup> suggested that few participants obtained above-average ratings on all items; hence, the attention instructional pairs place on enacting equitable teaching practices could be enhanced. To support the teacher candidates' professional growth, one institution (Georgia State University) used the result of the MCOP<sup>2</sup> to facilitate cognitive coaching and reflection activities such that the candidates identified means to enhance their instructional practices.

As a result of the lessons learned from 2018–19 PDSA Cycle, the 2019–20 cycle will place greater attention on co-planning that promotes equitable learning opportunities. Particularly, the team will create training materials that focus on co-planning and will reflect on their actions as mathematics teacher educators as well as how their teacher preparation programs support equity. Thus, they will create videos that focus on co-planning, and they will engage in a self-study as mathematics teacher educators. To capture how they attend to equity at their institutions, they will audio-record their CPCT meeting discussions. The CPCT team also will monitor the data garnered from the MCOP<sup>2</sup> and consider means to improve the ratings teacher candidates receives.

To further streamline the data collection the team suggested that the Mathematics Teaching Practices survey be combined and collected as part of the pre-service teacher survey pre-survey, pre-service teacher post-survey, and as a standalone survey, at least once in the middle of the clinical experiences. Thus, the Mathematics Teaching Practices survey will continue to be collected three times; however, the schedule as to when the data will be garnered was refined. Additionally, the team agreed to discontinue the use of the CPCT Equity Checklist because the instrument did not adequately account for variance in the nature of clinical experiences across institutions. Therefore, the team sought to ensure they collected the data required for the grant (MTP survey, MCOP<sup>2</sup>, completer survey, and focus group interviews), while also reflecting on instructional pairs use of co-planning and co-teaching strategies with a lens on equity via the CPCT pre-survey and post-survey.

The CPCT team identified conferences to attend, and articles they intend to submit during the 2019–20 academic year. Thus far, the team has submitted conference proposals to the National Council of Teachers of Mathematics and the Association of Mathematics Teacher Educators. The team also intends to submit a proposal to the International Congress of Mathematics Education. Additionally, the team plans to publish two articles focusing on developing teacher candidates' equitable teaching practices, and on how the apprenticeship of learning framework could be used to support the implementation of co-teaching during clinical experiences.

As discussed above, the CPCT team considered new objectives for their upcoming PDSA Cycle for the 2019–20 academic year, and the CPCT teams are striving to advance their research and scholarly activities. Being cognizant of institutional constraints, the team members have decided to embed some of the data collection instruments into course assignments and syllabi in order to sustain the work of the sub-RAC over time. Moreover, since some team members are being assigned other professional responsibilities within their local context, it is critical to develop means to sustain the change ideas at the institutional level, rather than at the faculty level.

### **Paired Placement Sub-RAC**

Since the 2018 MTE-Partnership Conference, members of the paired placement sub-RAC have been implementing the paired placement model within their universities using instruments and protocols related to the CERAC IUSE grant. These included facilitating orientation sessions and workshops for teacher candidates and mentor teachers, updating syllabi based on previous PDSA Cycles, and updating other resources for implementation of the model. The paired placement team conducted PDSA Cycles and collected data to answer their questions relative to partnering with regional schools, co-teaching and co-planning, and the observational task protocol. In February 2019, Charmaine Mangram and Basil Conway IV joined the paired placement sub-RAC leadership team.

During the MTEP 2019 Conference, members of the paired placement sub-RAC made contributions to the conference's presentations and proceedings. Furthermore, during the RAC breakout sessions, members of the paired placement sub-RAC moved materials for implementing the model to the Canvas platform and are currently rearranging sub-RAC materials in a way to increase efficiency of shared cloud space by integrating Google Drive with CANVAS. Currently, the sub-RAC is creating a website (or living document) that will help us disseminate materials to a broader audience and help us to determine how well institutions are able to implement the model with integrity within their context.

Overall the CERAC has had a productive year and has made plans for a productive 2019–20 academic year. Others can get involved in implementing the materials developed by the sub-RACs by contacting the sub-RAC leaders: Marilyn Strutchens, Charmaine Mangram, and Basil Conway (Paired Placement); Jeremy Zelkowski and Belinda Edwards (Methods); and Ruthmae Sears (CPCT).

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