

MODULE(S²): Mathematics of Doing, Understanding, Learning, and Educating for Secondary Schools

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Problem Addressed & General Approach

The Mathematics of Doing, Understanding, Learning, and Educating for Secondary Schools (MODULE(S²)) Research Action Cluster (RAC) is focused on the development of prospective secondary mathematics teachers' (PSMTs') mathematical knowledge needed for teaching (Ball et al., 2008; Rowland, 2013) within upper-level content courses. The work of the RAC aims to address the identified problems that (a) PSMTs often do not find connection between upper-level mathematics content courses and teaching secondary mathematics (Goulding et al., 2003; Zazkis & Leikin, 2010) and (b) PSMTs must deeply understand the mathematics they are going to teach and learn it in a way that is consistent with expectations of them as teachers (Banilower et al., 2013).

In response to these problems, the MODULE(S²) RAC has collaborated with mathematicians, mathematics educators, and K–12 teachers to design 12 educative curriculum (Davis & Krajcik, 2005) modules in the content areas of Geometry, Algebra, Statistics, and Mathematical Modeling. Each module includes opportunities for PSMTs to engage in mathematical tasks that are set in explicitly pedagogical settings, for the purpose of developing PSMTs' mathematical knowledge for teaching (MKT). The MODULE(S²) RAC iteratively pilots and revises the materials to: understand how to support instructors in implementing the materials; understand the ways in which dissemination of the modules across a wide range of institutions can vary; and improve the quality of the modules, specifically in terms of developing PSMTs' MKT.

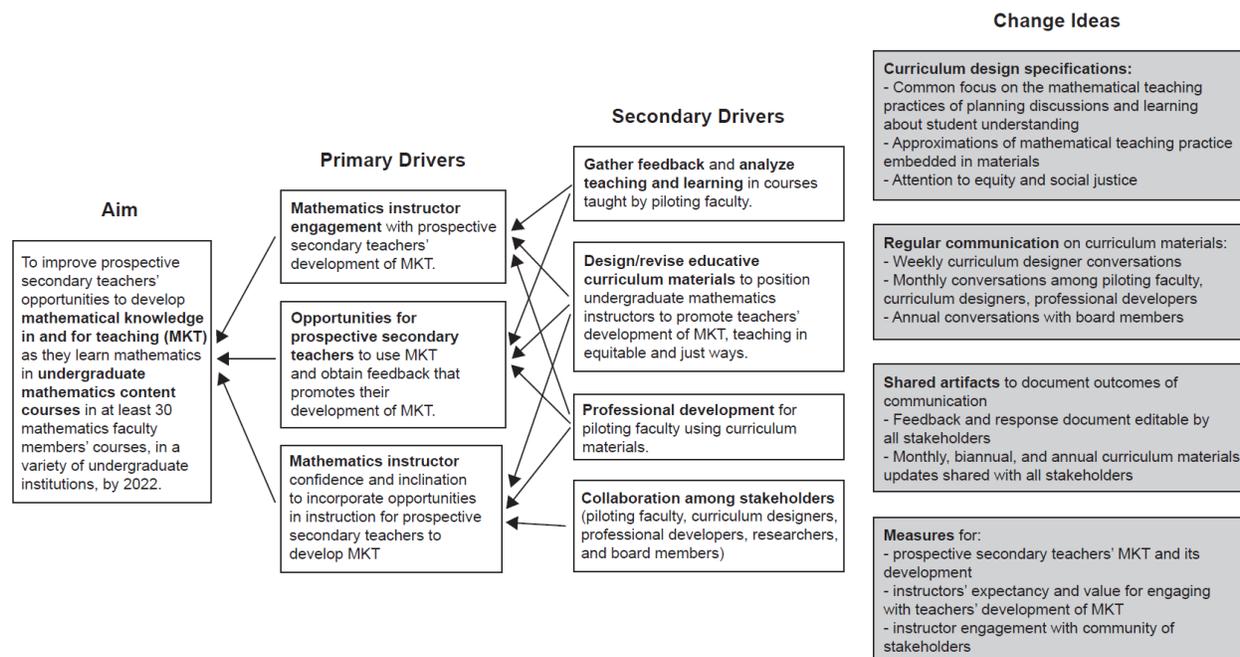


Figure 1: MODULE(S²) Driver Diagram.

Work of this RAC is structured according to its driver diagram (see Figure 1). For the last three years, the RAC has focused on the development of materials and understanding how to support piloting instructors in the enactment of the materials. That work continues as we prepare for the final iteration of piloting in 2021–2022. In addition, the RAC is turning attention to broadening the dissemination of the materials and supporting programs in implementing the MODULE(S²) materials as part of program transformation efforts.

Current Progress

With interruptions in instruction and academic work due to COVID-19, the project team re-evaluated timelines and made plans to shift its focus for 2020–2021. Instead of piloting in two content areas as planned, the team paused major piloting efforts and turned its attention to data analysis, revision of materials, and shifting its professional development model to an online format.

Data collection from piloting efforts has now accumulated enough data to begin answering questions related to the implementation of the materials such as those involving: PSMTs' MKT as influenced by engaging with the materials, comparisons across PSMTs' expectancy and value for using core teaching practices as influenced by engaging with the materials, and the ways in which piloting faculty engage in professional learning for the materials. One such report can be found in this proceedings (see Strayer et al., this volume) and others are cited on the *Presentations and Publications* page of the MODULE(S²) website (www.modules2.com). As we move forward, we expect that courses in which the MODULE(S²) materials are implemented can be a rich site for investigation of questions that inform program transformation in content courses.

Each instance of piloting implementation provided feedback from both the instructors and the prospective teachers in their classes (in the form of surveys and assignments collected), in essence this is data for the Study portion of the Plan-Do-Study-Act cycles for the writing of the materials. The MODULE(S²) team uses this feedback to revise the materials. With a pause in extensive piloting, project team members took up existing feedback to incorporate improvements in the materials.

Finally, the pause in piloting due to COVID-19 provided time for the MODULE(S²) professional development team to convert its prior in-person professional learning segments to remote experiences. The team has prepared a series of asynchronous and synchronous virtual activities to be delivered through its Canvas space to support the 2021–2022 piloters. Plans moving forward include considering ways these activities may live on in an asynchronous virtual support environment for the community of MODULE(S²) materials users we hope to develop.

The MODULE(S²) RAC meeting at the 2021 MTE-Partnership Conference will build on discussions held at the 2020 MTE-Partnership Conference. The major results of the 2020 Conference discussions were: identifying the potential for this RAC to advocate for the transformation of mathematics courses to use MODULE(S²) materials and be considered appropriate for all mathematics majors; identifying the need for making literature related to discussion-based courses available to the MTE-Partnership institutions; and identifying ways the MODULE(S²) materials could be used to bring attention to issues of social justice and racism (Lischka & Czap, 2020). The RAC did not meet during 2020–2021, thus these conversations will be continued at the 2021 MTE-Partnership Conference. In particular, the RAC will move forward with drafting resource briefs to provide support to MTE-Partnership institutions interested in taking up or continuing program transformation in content courses. Briefs will include resources and suggestions to support implementation of MODULE(S²) materials and will be published in Canvas upon completion.

Resources

A selection of MODULE(S²) materials is currently available for download at www.modules2.com, along with promotional videos and other information about the MODULE(S²) project and the research produced. At the website, interested instructors also can learn how to access materials. The final year of piloting across all four content areas will be conducted in 2021–2022. Following the completion of piloting, all materials, along with professional development modules to support implementation, will be made freely available in Canvas for any instructors who request access through the MODULE(S²) website. The briefs produced by the RAC in the 2021 MTE-Partnership Conference will be published to the MTE-Partnership Canvas page, for use by all MTEP institutions.

Opportunities for Engagement

The MODULE(S²) RAC invites members to join conversations about the future work of this RAC. Please contact Alyson.Lischka@mtsu.edu if you wish to be included in these conversations. Use of the MODULE(S²) materials can be accessed through www.modules2.com.

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