

Center for STEM Education Research & Innovation

Strategic Plan Theme: Staff and Faculty Success

Funding Level: Below \$1 million

Facility Needs: No new facilities will be needed

Submitting Unit: APUE

Collaborating colleges/departments/units involved with this proposal.

APUE, MESH/HCommons, STEM education leaders and researchers from across MSU

What is the proposal's big theme or idea?

MSU is a premier institution for STEM education, reflected in very high national rankings in multiple STEM and STEM-related programs. MSU's new state-of-the-art STEM Teaching & Learning Facility has further strengthened MSU's position as a premier institution for STEM education. At the same time, MSU houses perhaps the largest population of STEM education researchers nationally – at least 200 tenure-stream faculty and staff conduct research in STEM education, garnering funding from NSF, NIH, USDA, NASA, DoEd, Spencer Foundation, Gates Foundation, and other nationally recognized competitive grants programs. Many of these researchers are STEM education leaders within their disciplines yet are scattered across the university, from sciences to communication to medicine to agriculture. Although strong initiatives do exist to link faculty across a few colleges (i.e., CREATEforSTEM links CNS and CoEd; EDLI links CNS, CAL, Broad College), MSU has not yet achieved its potential as a multidisciplinary, integrated national leader in STEM education research writ large. The STEM Teaching & Learning Facility also offers an untapped opportunity for investigation of the affordances of a cutting-edge space for achieving STEM learning across many disciplines. The challenges facing STEM education research innovation and excellence are fundamentally tied to a lack of broad community and thus common culture among researchers. Finally, Libarkin has been engaging in Listening Sessions with STEM education researchers across campus. Two important themes have emerged: 1) many researchers would like to understand how their work can impact instruction across campus; and 2) many researchers feel their units (and sometimes colleges) are not well positioned to review the impact of their work. In general, STEM education researchers feel isolated from scholars in other units and are not always able to tie their research back into the STEM teaching and learning mission of the university.

What is the proposal's goal?

We propose a university-wide Center for STEM Education Research & Innovation to provide a conceptual, technological, and physical space for the wide range of researchers conducting STEM education research across MSU. Faculty and staff engaged in STEM education research across MSU need mentorship and career development guidance – especially when they are housed in spaces that lacks deep understanding of what STEM education research is. 1) Conceptual. We envision intellectual innovation arising when researchers become part of a broader STEM education research community. For a few examples, a) Natural Sciences and Lyman Briggs house discipline-based education research (DBER) scholars in biology, geoscience, chemistry, physics, computational science; b) Human Medicine houses medical education researchers; c) Education houses science and technology education researchers; and d) Agriculture & Natural Resources houses agriculture education researchers and scholarship of teaching and learning (SOTL) scholars. Many other STEM education researchers are scattered across campus in spaces like communications, psychology, sociology, and arts. Interdisciplinary scholarship is a vital pathway to developing new solutions for sticky problems, such as the lack of diversity in many STEM fields at MSU. 2) Technological. Technology can connect

us. Rather than creating a new technology from scratch, we suggest adopting an MSU-led technological solution (HCommons) built for the humanities. Incorporating new affordances through software development and community engagement practices can generate a space where STEM education researchers are empowered to collaborate and co-generate solutions to problems emerging in STEM education and STEM education research. A nascent effort to build a technological center for STEM education at MSU has begun here: <https://stemeducationatstate.commons.msu.edu/> 3) Physical. The STEM Teaching & Learning Facility offers a unique opportunity for STEM educators and researchers from across campus to co-investigate and co-innovate. The STEM teaching and learning occurring in the Facility is state-of-the-art and interdisciplinary; this offers opportunity for STEM education researchers from across campus to be invited in to conduct collaborative research on the impact of the Facility on students, faculty, and staff. This effort in turn would feed back into the instruction occurring in the Facility to enhance student success in MSU STEM classrooms and into careers.

We note that the university-wide Center for STEM Education Research & Innovation would not require any adjustment in department or campus efforts in STEM education. Rather, the Center would serve as a connector across these complementary efforts and bring opportunities for collaboration through HCommons and space in the STEM Teaching & Learning Facility. Most importantly, the Center would further promote MSU's national leadership across the entirety of STEM education research.

Define the significance, or impact of your big idea.

Two new administrative positions focused on STEM Teaching, Learning & Education Research recently facilitated over 50 faculty and staff in collaborating on two multi-million dollar STEM education research training and coordination proposals to the National Science Foundation. These collaborations required significant community engagement to build bridges across separated disciplines and – given the lack of connection across scholars – inevitably important voices were left out of the conversation. A university-wide Center for STEM Education Research & Innovation would provide common access to ongoing initiatives and a place for new scholars to find community – a place that is conceptual, technological, and physical offers multiple avenues for engagement. The Center for STEM Education Research & Innovation would assist individuals and units in building greater connection and understanding of the exceptional leadership and innovation occurring across MSU's wide ranging STEM education research initiatives. Perhaps most important, a visible university wide STEM education research presence would allow us to attract, recruit, and retain diverse STEM education researchers tackling pressing issues – namely a lack of access, diversity, and retention – facing STEM disciplines nationally. Offering a centralized identity allows for equity and inclusion among people and in the research that we do.

Who will be impacted?

STEM and STEM-adjacent faculty, staff, graduate students from across colleges STEM education researchers
Students on- and off-campus impacted by MSU STEM education initiatives

What does sustainability for your proposal look like?

Sustainability is commonly considered from social, environmental, and economic considerations – social and economic impacts are anticipated from this effort. We envision social sustainability occurring through increases in social capital for people engaged in the Center for STEM Education Research & Innovation, enhanced opportunities to learn diverse research methods, and emergence of cohesion across the community of STEM education researchers at MSU. Economic sustainability implies long-term growth without negatively impacting other areas (like community). We envision economic sustainability through 1) HCommons support through MESH as well as multiple innovation grants; 2) minimal capital outlay to support program evaluation, community building activities, and HCommons innovations specific to community needs; and 3) Increases in MSU's ability to access large, collaborative grants in STEM education (i.e., USDA Higher Education Challenge Grants; NSF STEM Centers).