

## **Scholarship Narrative for Full Professor Gabriel Matney, Associate Professor of Mathematics Education**

I first became a professor in 2004 when I worked for the University of Arkansas in Fort Smith. During my time at UAFS I was promoted to Associate Professor. I later applied and was hired at Bowling Green State University (BGSU) as an Associate Professor. For the purposes of being considered for Full Professor I will only discuss my scholarship work since arriving at BGSU in 2011, however, the broader scope of my professional career is evident in my vita. In the School of Teaching and Learning at BGSU the expectation for work is six courses per academic year, plus scholarship and service. This is allocated as 50% teaching, 30% scholarship, and 20% service.

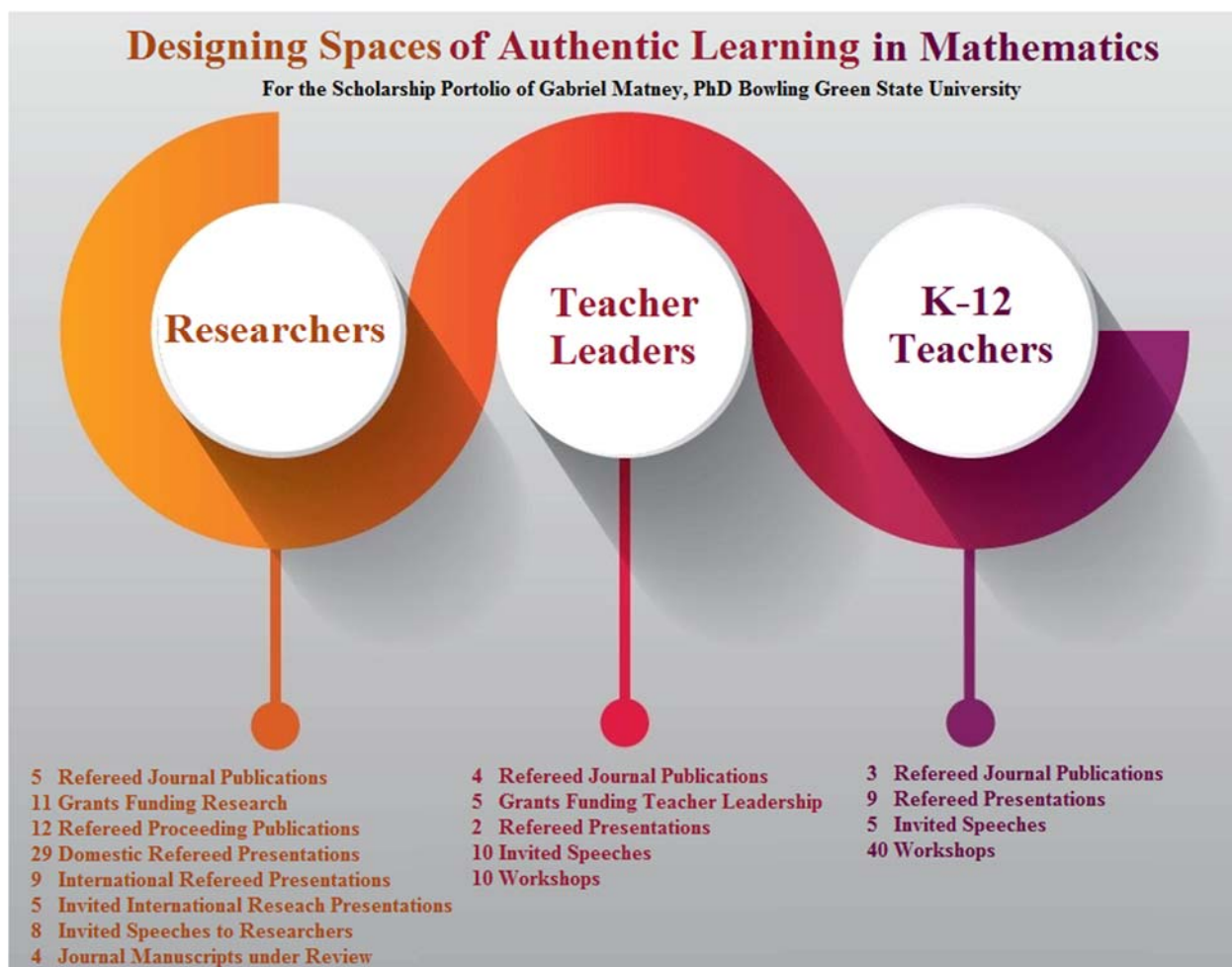
For the 30% of my time dedicated to scholarship I have produced twenty four peer-reviewed scholarly publications; twelve peer-reviewed journal manuscripts (8 first author, 3 solo author) with four more under review and twelve peer-reviewed proceedings (5 first author, 1 solo author). I have written seventeen funded grants (14 external, 3 internal) totaling \$4,794,731, forty nine peer-reviewed paper presentations to professional societies (29 first author), eleven invited papers read to professional societies (4 first author), twenty six invited talks (8 international universities, 18 domestic), five keynote speeches for conferences (2 international, 3 domestic), and led 56 mathematics teaching related workshops that are built on the knowledge gained from the above research. I was the editor for the annual research proceedings of the Research Council on Mathematics Learning and since 2015 I have been working on the Editorial Board of the Investigations in Mathematics Learning research journal.

My scholarship is situated in the notion of *designing spaces of authentic learning in mathematics*. I began my research career studying “The Clearings of Authentic Learning in Mathematics” (Matney, 2004) and the research projects I work on continue this line of inquiry and serve to help me further triangulate the findings of my dissertation. The spaces educators design are a kernel of what is possible in the teaching and learning moment and that makes these spaces and their designs an essential element of research. If one designs the space to be a rigid pathway, it stifles authentic learning, thought, and creativity. On the other hand, if the designed space has little to no trajectory it may stifle meaningful collaboration of social knowledge, development of societal commonalities, and yield unclear outcomes. My research has found the open/closed space dualism to be problematic when considered in the light of student and teacher experiences. Therefore, my meaning for *designing spaces of authentic learning in mathematics* may be thought of as a search for teaching moments that allow each learner to live in the between-ness of such dichotomies. As I explain below, each research study and grant project I work on helps provide important evidence for the field to consider as we seek to understand what it means to learn authentically and teach in ways that promote meaningful learning ecologies and experiences for students.

### **Evidence of Scholarship**

I have selected five scholarly artifacts in line with the expectations of the School of Teaching and Learning's Promotion documents. Although these five artifacts do not represent the whole of my scholarly activity they do exhibit a clear core of my work, showing both the breadth and depth of my scholarly activity. They provide a picture of my involvement in research that promotes the field's understanding of designing spaces of authentic learning in mathematics. They also demonstrate the kinds of scholarship I have done: qualitative and quantitative; research on individual projects, grant related projects, and team projects; international and

domestic research; research conducted with K-12 students, pre-service teachers, and in-service teachers; grants that promote research about effective teaching and learning of mathematics; manuscripts for the research community, teacher leaders, and teachers. The graphic in Figure 1 is a visual representation of my professional scholarship and demonstrates the focus of scholarly efforts according to three primary communities in our field: mathematics and education researchers, mathematics teacher leaders, and mathematics teachers.



**Figure 1: Dissemination of Research to Three Primary Communities of Mathematics Education**

**Artifact #1 Peer-Reviewed Research Publication for Mathematics Educators:  
*Peer Mentoring Professionalism among Preservice Mathematics Teachers: Safe Spaces for Community Teaching Practice (Matney, 2017)***

In pursuit of understandings related to designing spaces of authentic learning in mathematics I have worked both domestically and internationally to research what this means for pre-service teachers, in-service teachers, and students. The artifact represented here is a focus on spaces for pre-service teachers (PSTs). It was conducted as a three-year longitudinal qualitative study on a mathematics teacher preparation program in south-east Asia. The PST program contains a unique requirement for all PSTs to design and enact several day-long informal learning experiences for K-12 students at schools in the local community. These informal learning experiences are also used by the program as an expectation that older PSTs peer mentor

newer generations of PSTs who come into the program share what they have learned. The program requirement allows PSTs to have a safe space to practice significant elements of the teaching profession with the expectation of success and failure squarely on the PSTs shoulders for the benefit of their professional learning. Within this space PSTs developed as individual teachers and as a professional learning community to seek out ways to improve student learning of mathematics.

The article is being published in *Investigations in Mathematics Learning* (IML). Articles for this journal undergo a double-blind peer review process. The journal has been published since 1978 by the Research Council on Mathematics Learning. Originally the journal was titled of *Focus on Learning Problems in Mathematics*. Then, in 2008 its name changed to IML due to a change of publisher. The journal has an acceptance rate of 20% and is well respected among research journals in mathematics education as evidenced by the Utah Report on Venue Study (2008). I was a solo author on this manuscript contributing 100% of the effort.

**Artifact #2 Externally Funded Grant for Research on In-Service Teacher Professional Learning: *Common Core for Mathematical Proficiency in Elementary & Middle Schools - (CO)<sup>2</sup>MP* (Matney & Bostic, 2014-2018, see vita)**

In 2010 Ohio adopted the Common Core State Standards (CCSSI, 2010). In 2011 I began writing grants to research how teachers in the Common Core era were making sense of the new standards and to help teachers grow in ways that would promote their students' mathematical proficiency. The artifact here was written to provide research based evidence about a particular system of professional learning called the *(CO)<sup>2</sup>MP* program. Specifically, the grant quantitatively researches the extent to which teachers' knowledge of mathematics, mathematics proficiency, and instructional promotion of mathematics proficiency improves through the long term professional development of over 120 hours. The research from this grant is helping to provide the field with data and evidence about helping K-8 teachers better design the spaces of instruction that promote students' mathematical proficiency. I developed the *(CO)<sup>2</sup>MP* grant as PI alongside my Co-PI, Dr. Jonathan Bostic. The grant was funded as part of the competitive selection process by the Ohio Mathematics and Science Partnership. Each year the grant underwent additional selection review as continuation of the grant was not guaranteed. The *(CO)<sup>2</sup>MP* grant was awarded additional years of research and implementation because it satisfied the condition of having quantitative evidence verifying the significance of the programs ability to improve teachers' and students' mathematical knowledge. *(CO)<sup>2</sup>MP* was funded for four years for a total of \$1,858,362. Full details of the grants goals, research questions, and structure are included in this artifact via its original write up and design as well as the external evaluators report on evidence of the project's impact on K-8 students and teachers.

**Artifact #3 Peer-Reviewed Research Publication for Mathematics Teacher Leaders: *Leveraging Modeling with Mathematics-focused Instruction to Promote Other Standards for Mathematical Practice* (Bostic & Matney, 2016)**

The artifact presented here is an example of how my focus on designing spaces of authentic learning in mathematics connects with both my research and my grant writing. The manuscript shares research with teacher leaders about how and why a focus on Modeling with Mathematics (Standard for Mathematical Practice #4) promotes other standards. The research was conducted with teachers and students from our grants (see Artifact #2) and this is one of ten peer-reviewed publications that spawned from grant related research (5 peer-reviewed journals and 5 proceedings). The research is an example of a mixed methods methodology that explores the data quantitatively first and then parses out qualitative lenses to deepen understanding of the

quantitative relationships. Implications of the research are shared. In order to share these results broadly among teacher leaders and other professional development providers the article was published in the *Journal of Mathematics Education Leadership* with an acceptance rate of 15%. I co-developed the research and the manuscript with Dr. Bostic and we split the share of work 50% each for this research. I have also published 3 other articles for teacher leaders building off of the grant related research on teachers' professional learning.

**Artifact #4 Peer-Reviewed Publication for Teachers: *Seeing spots and developing multiplicative sense making* (Matney & Daugherty, 2013)**

The artifact shared here is an example of sharing classroom-based research on the design of spaces for authentic mathematics learning with practitioners in K-12 settings. Through my classroom-based research with students I have been able to provide publications to school teachers with peer-reviewed publications that specifically address unique ways of engaging students in the learning of mathematics. In the case of this article, I provided a space specifically designed to help students authentically derive the multiplication algorithms for themselves. The article provides teachers with student work samples and a specific set of dot-array tasks and questions to reengage their students in thinking about the multiplication algorithms they have been taught but few understand. The article was published in *Mathematics Teaching in the Middle School* so as to disseminate the ideas to a large middle school teacher audience of more than 30,000. The acceptance rate for this issue was 20%. I was the first author on this manuscript, contributing 90% of the effort and I co-wrote it with Brooke Daugherty who contributed 10% of the effort.

I continued my work to help teachers better understand designing spaces for authentic learning in mathematics by discussing the issue of students' mathematical fluency in an article entitled "Early Mathematics Fluency with the CCSSM". Although the mathematics education community has done well to define mathematical fluency, through research and NCTM publications, there remains a great chasm between that body of work and how teachers view the teaching of fluency. The article specifically aimed to breach that chasm by sharing teaching spaces that promote students attainment of procedural fluency. I used the structure of the CCSS to lay out a ground work by which teachers can teach mathematics for fluency. The article provides teaching caveats and student work to give a solid vision of mathematical fluency grounded in classroom instruction. The article was published in *Teaching Children Mathematics* so as to disseminate the ideas to a large elementary school teacher audience of more than 28,000.

**Artifact #5 International Research; Peer-Reviewed Publication for Researchers: *Establishing Validity of the Thai Mathematics Teaching Efficacy Beliefs Instrument* (Matney, Panarach, & Jackson, 2016)**

Research I've conducted has found that classroom ecology and social norms are important pieces in the emergence of authentic learning (Matney, 2004; Matney, Jackson, Bostic, 2013). I am furthermore intrigued by the way different cultures shape what might be possible in establishing the emergence of authentic learning of mathematics. I continue to explore how culture shapes learning and the ways differing world-views shape the way countries think about authentic learning. In the fall of 2011 I traveled to KPRU to establish a university partnership and research projects that would have local and international impact. I helped KPRU's Dr. Panarach with their Mathematics Education program where we designed a program to prepare Thai preservice teachers to teach mathematics in English. From these endeavors I designed a research agenda to better understand the elements of mathematics education in Thailand and to develop a reliable and valid instrument for Thai preservice teacher efficacy.

The artifact shared here provides evidence of leading an international team of researchers to design, validate, and publish a research instrument. The research is mainly quantitative in nature and provides viable validity evidence for the use of the T-MTEBI instrument in future research projects with pre-service mathematics teachers in both Thailand and the United States. I was the lead designer of the research project and lead author of the manuscript contributing 60% of the work, with Dr. Panarach and Dr. Jackson contributing 25% and 15%, respectively. The article was published in *School Science and Mathematics Journal*. The instrument will allow us to gather comparative evidence across cultures about pre-service teachers' changes in mathematics teaching self-efficacy. Specifically, where program elements among the mathematics teacher education programs in Thailand and the United States are similar, we hope to better understand how those program structures effect the efficacy of pre-service teachers and from there design investigations to determine why those effects occur and test possible changes that are culturally appropriate. Through these research endeavors I will be able to share new understandings about designing learning spaces for pre-service teachers that are authentic to their learning about teaching within the context of their culture. I also seek to find what elements of learning about teaching mathematics cross-cultures between Thailand and the United States. As culture itself is a complex human phenomenon it will require many such studies to triangulate when we have sufficient data for generalization and to necessarily determine the extent of outliers of such generalizations.

I began working with partners abroad in 2011 and by the time of this submission I have developed many research partnerships that have taken me to Australia, China, Germany, Japan, South Korea, and Thailand to do many things, including giving keynote speeches at international conferences, working on projects with educators from around the world through APEC (Asia-Pacific Economic Cooperation) programs, and teaching PhD students as a visiting professor in Thailand. I currently have two journal publications, five proceeding publications, and two manuscripts under review that are built upon the international work and I am conducting with partners. Additionally, there are three projects that I am working on with partners from China, Japan, and Thailand that we intend to submit for publication in the next two years.

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