

THE DESIGN AND IMPLEMENTATION OF AN INTERVENTION TO SUPPORT AND RETAIN EARLY CAREER MATHEMATICS TEACHERS

EL DISEÑO E IMPLEMENTACIÓN DE UNA INTERVENCIÓN PARA APOYAR Y RETENER PROFESORES DE MATEMÁTICAS RECIÉN EGRESADOS

Lisa Amick
University of Kentucky
lisa.amick@uky.edu

Maria Campitelli
Florida International
University
mcampite@fiu.edu

Paula Jakopovic
University of Nebraska Omaha
paulajakopovic@unomaha.edu

Judy Kysh
San Francisco State
University
jkysh@sfsu.edu

Dawn Parker
Texas A&M University
dparker@tamu.edu

April Pforts
Iowa Department of Education
april.pforts@iowa.gov

Travis Weiland
University of Houston
tweiland@central.uh.edu

Laura J Wilding
Texas A&M University
ljwilding@science.tamu.edu

This study reports on efforts over several years to design and implement a yearlong intervention intended to support secondary mathematics teachers in their early years of teaching. The intervention is designed to support these teachers' development of meaningful professional relationships with a school-based mentor and to create an online community of practice for support with other professionals. The intervention itself consists of early career teachers and their mentors participating in monthly professional development sessions such as online meetings, Zoom panels with experts, and collaboratively reading and discussing timely, purposeful, and relevant content. The intervention is designed to not over burden the participants and to be feasible for national implementation with little funding. The goal of the intervention is to try to retain secondary mathematics teachers in the profession by providing them with meaningful and targeted support.

Keywords: Teacher Education - Inservice / Professional Development, Teaching Tools and Resources

Purpose of Study

Half of all teachers leave the profession within the first five years, and this rate is highest for mathematics positions in high poverty schools (Fantilli & McDougall, 2009; Goldring et al., 2014). Furthermore, half of all current teachers in the U.S. retiring in the next five years (Foster, 2010), enrollment in teacher preparation programs declining, and teacher turnover is costing America \$7.3 billion annually (National Math + Science Initiative, 2013), which represents a crisis for public education in the U.S. These conditions lead to classrooms staffed with underprepared/unqualified teachers, which profoundly affects the mathematical preparation of students in high school, college, and beyond. Experts agree that addressing the mathematics-teaching crisis meaningfully will require building a more cohesive system of teacher preparation, support, and development (Mehta, Theisen-Homer, Braslow, & Lopatin 2015). The purpose of this study is to report on the design and implementation of a cost effective, easily replicable intervention for early career secondary mathematics teachers with the goal of positively impacting teacher retention. We also present lessons learned over two years of implementing the intervention and provide suggestions for future research.

Background

Transforming the preparation of secondary mathematics teachers across the U.S. is at the core of the Mathematics Teacher Education Partnership (MTE-P). Since its inception, this initiative has continued to improve mathematics teacher education across the nation (for more information about the partnership see (Martin et al., 2020). MTE-P has established guiding principles and five Research Action Clusters (RACs) to carry out these principles. The authors of this paper are members of the RAC guided by a focus on teacher retention and induction in line with standard P.5-Recruitment and Retention of Teacher candidates, which is included in the Standards for Preparing Teachers of Mathematics (AMTE, 2017).

Novice teachers often feel isolated and those feelings of isolation are often associated with teachers leaving the field (Carroll & Fulton, 2004; Schlichte, Yssel, & Merbler, 2005). This RAC is grounded in the perspective that teacher retention would improve with the development of communities of practice to provide a support network to draw upon, including online communities (Wenger, 2011). Communities of practice are “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger, 2011, p.1). Wenger further shared three features that characterize communities of practice: a domain of interest, a community (members who participate in joint activities and discussions), and shared practice. For our work, our domain of interest is teaching high school mathematics during the early years of a teacher’s career. The community consists of early career teachers, mid-career mentoring teachers, curriculum specialists, and university program coordinators and mathematics teacher education faculty. The practice of focus is teaching mathematics. We recognize that the work of retaining teachers requires, in part, a focus on developing relationships within the educational community and promoting connectedness within the larger community (Minarik, Thornton, & Perreault, 2003).

Past Work: Driving the Design

To respond to the teacher retention crisis, the RAC created a survey as an initial step to study the current support systems of early career secondary mathematics teachers. One research question guiding this work was: *What is the perceived scope, nature, and impact of professional support for early career mathematics teachers?* This survey was created through an iterative design and vetting process that extended from the fall of 2014 to early 2016. The main goal of the survey was to better understand the degree to which early career mathematics teachers perceived various learning opportunities as influential to their interest in teaching mathematics. By better understanding current support systems, the RAC could develop interventions that would strengthen and replicate systems that were working and attempt to improve broken ones. The survey consisted of 25 questions asking respondents to report on their current support systems, job satisfaction, projected longevity in the field, and other related topics. The survey was given in November of 2016 and gleaned 141 responses from teachers across the nation. Results from this study are presented in Amick et al. (2020).

The vast majority of novice teachers had received mentoring or coaching from someone at their school site, and almost (89%) found that experience to be moderately or very influential to their enthusiasm for teaching mathematics. This finding is consistent with other research on induction programs (Ingersoll & Strong, 2011; Youngs et al., 2019). In their review, Ingersoll and Strong (2011) found that induction programs and *especially teacher mentoring programs* positively influenced novice teachers’ satisfaction, commitment, and/or retention. Further, Ingersoll (2012) found that retention was significantly impacted when a mentor and novice teacher taught in the same subject area and had a common planning time, as well. He also found that having multiple induction supports had a strong positive effect on retention. Thus, the work of this RAC, to develop systems

that can effectively support early career teachers with the overarching goal to increase their job satisfaction and longevity in the field, was built upon past research, as well as the survey results.

Methods

Our overall methodology for this work has been a design experiment approach (Cobb et al., 2003), focusing on a problem in practice and pragmatically designing an intervention to impact that problem with multiple iterations of implementation and (re)design. We used constant comparative analysis to modify the intervention and methods as the investigation evolves based on new findings from analyzing the data collected.

Design

Due to both current research in the field and the RAC's survey results pointing towards mentoring as an extremely impactful induction experience, our group focused on the mentoring relationship as the basis for the first year of implementation of our intervention. The first year intervention was implemented throughout the 2018-2019 academic year. The intervention was designed to provide targeted support to first-year teachers by: (1) strengthening the mentor/mentee relationship through monthly communications; (2) suggesting targeted discussion topics between the mentor/mentee teachers; (3) and providing synchronous online meetings to build a professional community. In keeping with a design experiment approach, the intervention was modified over the course of the year, based on continuous analyses, in an effort to improve the intervention. After the first year of implementation the team went through a (re)design process during the summer of 2019 to prepare for the second year of implementation.

In order to avoid overburdening early career teachers, the intervention was designed to include only one hour of active participation each month. Furthermore, the intervention was designed to engage the early career teachers with their mentors to allow them to take part in an online community such that each pair had opportunities to engage in learning about research-based teaching practices together. Including mentor teachers in the study, was meant to provide a supported space for mentor teachers and first-year teachers to build positive relationships.

The monthly engagement activities were selected/designed by the research team to be timely, and several of the selected topics are also aligned to the Common Core Standards of Mathematical Practice and NCTM's Effective Mathematics Teaching Practices. For example, in September an email was sent with several self-care resources and asked the participants to peruse and discuss with their mentor teachers. In October, a Zoom panel was put together where participants have a sounding board to vent frustrations, ask questions, and seek advice. The panelists included teachers who are past their first few years of teaching, but who are still in their early years of their careers as to be relatable to the participants. We ended each year with an anonymous feedback form for the early career teachers to complete. One addition we made during the second intervention year was the creation of a Facebook group for participants to engage. We posted resources frequently (at least once a week) on the group feed to attempt to create an online space for dialogue and further support online community development.

Participants

To recruit early career teachers, the researchers on this project extended email invitations to recent graduates of their teacher preparation programs. For our first year of implementation, we only invited teachers in their first year of teaching. Participants were asked to commit one hour a month to the study, and to recruit a mentor teacher if they did not have one assigned to them. We strongly suggested that mentor teachers also teach math. The participants for both years of implementation included a diverse group that taught a variety of courses and grade levels (6-12), and have settings that range from large urban districts to small rural schools. During year 1, we had seven teachers

volunteer to participate and during year 2 we improved our recruitment of early career teachers and had 15 teachers register.

Data Sources

The main data sources of this study consist of feedback from the participants over the course of the year via email, and a mid-year and end-of-year survey for each intervention year. The end-of-year survey is used to collect information on how useful the new teachers found each of the monthly interventions to be in supporting them and what supports they still wish they had. There are also questions for the new teachers asking specifically if the support received had an impact on whether or not they intend to continue in the profession in the future.

Results

We recently completed our second year of implementation and thus far, the results have been mixed as to the usefulness of the intervention. For those participants who remain engaged with the group we have received overwhelmingly good feedback as to the usefulness of the Zoom teacher panels. The participants report it being helpful to connect and talk to others that are and have been in similar situations. They also greatly appreciated the very practical advice. Unfortunately, the attendance for the Zoom teacher panels has been low with only 2-5 early career teachers participating. In addition, though we have encouraged the engagement of mentor teachers we have so far not had any join our conversations. Many of our participating teachers also reported that they had very little interaction with their mentor teachers. The teachers we have received feedback from often report feeling overwhelmed, primarily with issues of student engagement and planning. We have had little success with engaging early career teachers with Facebook in spite of many attempts to try to draw them into the conversation. Overall, we have struggled to keep teachers involved and engaged in the intervention beyond the first few months, which has led us to begin to rethink our approach.

Discussion/Summary

Similar to the results that we have seen, Youngs et al. (2019) in their synthesis of research on teacher induction programs that lead to retention of STEM teachers found that interventions with first year teachers seem to have little effect, which they attribute to teachers likely being overwhelmed. We are now considering focusing on teachers in their second and third years of teaching and would recommend that focus for future research. Another consideration is to focus on mentors or teacher leaders for the intervention and how to help them support groups of mentees. This would be a significant shift in focus for our interventions and recruitment of participants but might help to develop strong mentorship teams focused on a mentor. We have also considered taking a school team approach and involving an administrator as past research has shown the value of perceived administrator support (Youngs et al., 2019). We propose one approach could be to have school-based teams including all early career teachers, 1-2 mentor teachers, and an administrator and focusing on how to develop relationships and build community in the teams. We continue to look for impactful ways of supporting and retaining early career teachers and we believe the lessons we have learned will be useful to others in mathematics teacher education.

References

- Amick, L., Martinez, J., Taylor, M. W., & Uy, F. (2020). Retaining beginning secondary mathematics teachers through induction and leadership support. In W. G. Martin, B. R. Lawler, A. E. Lischka, & W. Smith (Eds.), *The Mathematics Teacher Education Partnership: The power of a Networked Improvement Community to transform secondary mathematics teacher preparation*. Information Age Publishing.
- Association of Mathematics Teacher Educators. (2017). Standards for Preparing Teachers of Mathematics. Available online at amte.net/standards.
- Carroll, T., & Fulton, K. (2004). The true cost of teacher turnover. *Threshold*, 8(14), 16-17.

- Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher*, 32(1), 9–13.
- Fantilli, R.D., & McDougall, D. E. (2009). A study of novice teacher challenges and supports in the first years. *Teaching and Teacher Education*, 25, 814-825.
- Foster, E. (2010). How Boomers Can Contribute to Student Success: Emerging Encore Career Opportunities In K-12 Education. Washington, DC: National Commission on Teaching and America's Future.
- Goldring, R., Taie, S., & Riddles, M. (2014). *Teacher attrition and mobility: Results from the 2012-13 teacher follow-up survey (NCES 2014-077)*. U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch>
- Ingersoll, R. M., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Educational Research*, 81(2), 201-233.
- Ingersoll, R. M. (2012). Beginning teacher induction what the data tell us. *Phi Delta Kappan*, 93(8), 47-51.
- Martin, W. G., Lawler, B. R., Lischka, A. E., & Smith (Eds.). (2020). *The Mathematics Teacher Education Partnership: The Power of a Networked Improvement Community to Transform Secondary Mathematics Teacher Preparation*. Information Age Publishing.
- Mehta, J., Theisen-Homer, V., Braslow, D., and Lopatin, A. (2015). From Quicksand to Solid Ground: Building a Foundation to Support Quality Teaching. Retrieved from <http://www.totransformteaching.org/wp-content/uploads/2015/10/From-Quicksand-to-Solid-Ground-Building-a-Foundation-to-Support-Quality-Teaching.pdf>.
- Minarik, M. M., Thornton, B., & Perreault, G. (2003). Systems thinking can improve teacher retention. *The Clearing House*, 76(5), 230-234.
- National Math + Science Initiative (2013). Stem Education Statistics. Retrieved January 20th, 2016 from <https://www.nms.org/AboutNMSI/TheSTEMCrisis/STEMEducationStatistics.aspx>.
- Schlichte, J., Yssel, N., & Merbler, J. (2005). Pathways to burnout: Case studies in teacher isolation and alienation. *Preventing School Failure: Alternative Education for Children and Youth*, 50(1), 35-40.
- Wenger, E. (2011). Communities of practice: A brief introduction. STEP Leadership Workshop, University of Oregon, Downloaded from <http://hdl.handle.net/1794/11736>
- Youngs, P., Bieda, K., & Kim, J. (2019). *Teacher induction programs that lead to retention in the STEM teaching workforce* (2019 AAAS ARISE Commissioned Paper Series). American Association for the Advancement of Science.