



The Mathematics Teacher Education Partnership: The Power of a Networked Improvement Community to Transform Secondary Mathematics Teacher Preparation: A Review

Rugaya Tuanaya¹ 

Accepted: 21 April 2024 / Published online: 7 June 2024
© Ontario Institute for Studies in Education (OISE) 2024

Abstract A review of Martin, W. G., Lawler, B. R., Lischka, A. E., & Smith, W. M. (2020). *The Mathematics Teacher Education Partnership: The Power of a Networked Improvement Community to Transform Secondary Mathematics Teacher Preparation*. Charlotte, North Carolina: Information Age Publishing, xix + 412 pp., \$62.04 (paperback), ISBN 978-1-64,113-931-1, \$89.24 (hardcover), ISBN 978-1-64,113-932-8.

This book offers a thorough overview of a 7-year initiative by the Mathematics Teacher Education Partnership (MTE-Partnership), a national consortium uniting over 90 universities and 100 school systems. Focused on preparing secondary mathematics teachers, the MTE-Partnership operates as a Networked Improvement Community (NIC), merging improvement science with networking for accelerated progress. Addressing key challenges in teacher preparation, such as content knowledge development, impactful clinical experiences, recruitment, and equity considerations, the book explores existing knowledge and initiatives by Research Action Clusters (RACs). These collaborative clusters iteratively refine processes and products to enhance secondary mathematics teacher preparation. The book outlines successful RAC approaches and specific products, offering insights for educators and policymakers. Reflecting on the NIC model, it provides valuable considerations for research design, with explicit references to the Standards for Preparing Teachers of Mathematics (Association of Mathematics Teacher Educators, 2017), enhancing practical applicability. This resource is essential for advancing the field of secondary mathematics teacher preparation.

Résumé Le compte rendu du livre de Martin, W. G., Lawler, B. R., Lischka, A. E., et Smith, W. M. (2020). «The Mathematics Teacher Education Partnership: The Power of a Networked Improvement Community to Transform Secondary Mathematics Teacher Preparation». Charlotte, Caroline du Nord: Information Age Publishing, xix + 412 p., 62,04 \$ (livre de poche), ISBN 978-1-64,113-931-1, 89,24 \$ (livre relié), ISBN 978-1-64,113-932-8. Cet ouvrage offre une vue d'ensemble approfondie d'une initiative vieille de sept ans, menée par le «Mathematics Teacher Education Partnership (MTE-

✉ Rugaya Tuanaya
rugayatuanaya.2021@student.uny.ac.id

¹ Educational Research and Evaluation, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Partnership)» (partenariat pour la formation des enseignants de mathématiques), un consortium national réunissant plus de 90 universités et 100 systèmes scolaires. Axé sur la préparation des enseignants de mathématiques du secondaire, le partenariat fonctionne en tant que communauté d'amélioration réseautée (CAR), fusionnant la science relative à l'amélioration et la mise en réseau pour accélérer les progrès. Abordant les principaux défis associés à la formation des enseignants, tels que le développement des connaissances liées au contenu, les expériences cliniques marquantes, le recrutement et les considérations en matière d'équité, l'ouvrage explore les connaissances existantes et les initiatives des groupes d'action de recherche (GAR). Ces groupes collaboratifs raffinent de manière itérative les processus et les produits afin d'améliorer la formation des enseignants de mathématiques du secondaire. Le livre couvre les approches fructueuses des GAR et leurs produits spécifiques, offrant ainsi des perspectives aux éducateurs et aux décideurs politiques. Tenant compte du modèle CAR, il offre des considérations pertinentes en ce qui a trait à la conception de la recherche, avec des références explicites à l'ouvrage intitulé «Standards for Preparing Teachers of Mathematics» publié par «[the] Association of Mathematics Teacher Educators» en 2017, et améliore ainsi l'applicabilité pratique. Cette ressource est essentielle pour faire progresser le domaine de la préparation des enseignants de mathématiques au niveau secondaire.

Keywords Mathematics education · Teacher preparation · Networked community

This book is an essential resource for educators and policymakers focused on improving the preparation of secondary school math teachers. The book offers a multifaceted approach to enhancing the clinical experience, emphasising the importance of strong partnerships with schools, clear goals for prospective teachers, and support and guidance for teachers. The book also addresses the challenges of recruiting and retaining diverse teacher candidates, proposing improvement theories supported by data-driven strategies. The book introduces innovative modules to bridge the gap between methods courses and field experience, align teaching practices with state standards, and promote equitable education. In addition, the book confronts the deficit view of students from non-dominant populations, advocating for equality and social justice in education policy. The book underscores the need for knowledge creation and management systems for program improvement and highlights the success of collaborative partnerships in driving transformation efforts. A comprehensive literature review, practical recommendations, and focus on continuous improvement make this book an indispensable guide for those committed to advancing the education of secondary school math teachers.

The first section provides a complete overview of the Mathematics Teacher Education Partnership's (MTE-Partnership's) efforts to improve math teacher preparation in secondary schools. The MTE Partnership, organised by the Networked Improvement Community (NIC), aims to address challenges associated with teacher preparation through collaborative and systematic improvement efforts. This section begins by establishing the context for forming the MTE partnership and emphasising the importance of program transformation with a focus on social justice and equity. It introduced Research Action Clusters (RACs) to address specific practice issues in areas such as mathematical preparation, clinical experience, and recruitment and retention of prospective teachers. The AMTE Standard combines these efforts and emphasises the importance of adhering to established professional standards.

Recruitment and retention of prospective secondary mathematics teachers was one of the main issues discussed. The literature review in this section underscores the need to retain candidates in educational programs and increase the diversity of the teacher candidate pool. Addressing diversity, equity, and social justice issues; raising program awareness; advocating for policymakers; and improving perceptions of teaching are strategies to achieve these goals. Furthermore, the review emphasises the need to apply and evaluate intervention concepts and systematic change to achieve improvement goals. In addition, this

section discusses the development and implementation of modules aimed at enhancing the relationship between methods, courses, and field experience. For example, the first module focuses on Standards for Math Practice (SMP) and engages mentor and prospective teachers to discuss effective math teaching. This section aims to align the mentor teacher with state standards and practices in mathematics teaching. MATH RAC's marketing focus and recruitment efforts include using the Plan-Do-Study-Act (PDSA) cycle to improve the recruitment process. The trajectory of the MATH RAC and the establishment of the RAC Recruitment and Retention Programme (PR2) are ongoing efforts to address the shortage of qualified secondary mathematics teachers.

Clinical experience is an essential component of coaching teacher candidates. This section discusses research and advice regarding mentoring teachers, internships, student teaching, and institutional partnerships. This section shows how important it is for mentor teachers to adjust to the changes in teaching required by standards such as the Head of State Standard for Mathematics. It also shows how difficult it is to prepare a high-quality mentor teacher. The book discusses factors such as graduation rates, state licensures, and recruitment data to retain employees in the teaching profession. This book emphasises how important it is to track the progress of prospective teachers and the challenges graduates may face in teacher employment.

Another topic covered in the first section is Community of Active Learning in Mathematics Reform Action (ALM RAC). ALM RAC's efforts are to improve mathematics learning in higher education, especially in entry-level mathematics courses such as calculus. ALM RAC defines active learning as engaging students in complex problems, encouraging conversations between friends, and allowing instructors to deepen student understanding through interaction with students. Mathematics education organisations that promote active learning strategies emphasise this approach. With its growing emphasis on equity, the program meets the Common Core State Standards. The mission of ALM RAC is to change the paradigm of mathematics teaching in universities by engaging students through sociocultural practice. They use design principles to encourage tasks that enhance reasoning and problem-solving, encourage students to speak, and create a classroom environment that respects diverse perspectives. The initiative supports a broader movement in mathematics education that aims to ensure that students understand procedures and can also use their abilities in mathematics to solve real-world problems. Research supports ALM RAC's efforts to equip future math teachers with the skills to instill a deep understanding of math in their students.

This book discusses mathematics preparation for prospective secondary school mathematics teachers by discussing basic research and current standards, including the development of mathematical knowledge for teaching (MKT). Section II of the book presents the results of two Research Action Clusters (RACs): Mathematics Conducting, Comprehensive Learning, and Educating for Secondary Schools, and Mathematics Active Learning. Each RAC focuses on tackling problems in mathematics subjects. The RAC MODULE aims to enhance MKT teacher candidates' skills by creating mathematics, statistics, geometry, and algebra curriculum materials. The future of RAC may include considering other areas of mathematics that are becoming more important in the secondary school curriculum and expanding the impact on content and instruction in upper-level mathematics courses. The main objective of Section II is to provide teacher candidates with a better learning experience and opportunity to learn mathematics to ensure that they are prepared to teach math in high school.

The clinical experience of aspiring high school math teachers, critical to their advancement as effective educators, is discussed in Section III. This section includes chapters that discuss how important it is to have good clinical experience and offer recommendations on improving this experience to prepare future educators for the challenges of teaching math. Prospective teachers should be involved in real-life teaching situations to apply their knowledge and skills in the classroom. Section IV of this book addresses issues and approaches related to recruiting and retaining prospective high school math teachers, both in credentialing programs and teacher employment. This section provides a complete literature review on those topics. It provides an understanding of the efforts made by the Mathematics Teacher

Education Partnership (MTE-Partnership) community to improve those areas. This section shows practice at MTE Partnership institutions. It explains how MTE Partnership uses the Networked Improvement Community research model to improve teacher appointment and retention strategies in its member institutions. In addition, early partnership efforts to create resources that guide the design of marketing strategies aimed at attracting prospective teachers to this work were also discussed. After achieving this goal, the research team concentrated on broader retention and hiring issues in the credential program. The final section presents preliminary research findings from a team of researchers investigating the retention of math teachers early in their careers. Collaboration from multiple stakeholders, including school districts, schools, state agencies, and teacher preparation programs, is necessary for successful teacher recruitment and retention.

The book's final section effectively communicates the NIC's power in accelerating education reform. This section highlights the MTE Partnership as a successful model of how a networked community can coordinate efforts across organisations to achieve large-scale instructional-focused improvement goals. The NIC is designed to support and accelerate reform efforts by leveraging collective expertise and using remedial science methods. The Mathematics Teacher Education Partnership (MTE-Partnership) is a prime example of NIC in action, focusing on improving secondary school math teacher preparation programs. This section outlines the essential elements that contribute to the effectiveness of the NIC, such as the development of sound design principles and driver diagrams. These tools are essential to clearly focusing on key challenges while enabling coverage expansion. MTE-Partnership's success in mathematical preparation, clinical experience, and teacher recruitment and retention is due to adherence to its guiding principles and structured approach.

A vital aspect of the Networked Improvement Community (NIC) model, as demonstrated by the MTE partnership, is the use of the Plan-Do-Study-Act (PDSA) cycle. This iterative process is critical to designing, testing, and refining interventions, ensuring that improvements made are evidence-based and data-driven. A grant from the National Science Foundation supported the collaboration, highlighting the significance of research and resources in teacher education and mathematics teaching. In addition, it also discussed the challenges faced by the NIC-Transform project, such as limited time and support from teachers. Despite these hurdles, the authors explained that it secured additional funding, developed a shared vision, and increased collective expertise, especially with the support of CSU's team network of 22 campuses across the state.

Overall, the strength of this book is that it is thoroughly organised and well structured, providing a clear picture of the challenges and strategies involved in preparing secondary school math teachers. This book demonstrates the use of evidence-based interventions and the importance of data-driven decision-making. In addition, the book highlights the collaborative nature of the MTE and RAC Partnership, demonstrating the power of collective efforts in education reform. Improvements to this comprehensive book include providing deeper strategies to combat deficit discourse, enhancing engagement from part-time teachers, exploring alternative models to traditional internships, and optimising pair placements. The book must offer substantial support for non-traditional teaching experiences, more detailed strategies for addressing opportunity gaps, and concrete examples of successful continuous improvement systems. Expanding these areas will increase its perspective on challenges and solutions in preparing secondary school math teachers, making it a more well-rounded resource for educators and policymakers.

Declarations

Conflict of Interest The author declares no competing interests.

Reference

- Martin, W. G., Lawler, B. R., Lischka, A. E., & Smith, W. M. (2020). *The Mathematics Teacher Education Partnership: The Power of a Networked Improvement Community to Transform Secondary Mathematics Teacher Preparation*. Information Age Publishing Inc.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.