Review of *Promising Practices for Engaging Families in STEM Learning*

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The prominence of "21st century skills" and "college and career ready skills" in K–12 curricula has increased the need for science, technology, engineering, and mathematics (STEM) programming in schools and communities. National nonprofit organizations, statewide education networks, corporations, and family foundations have attempted to address a lack of STEM-related skills by offering programs and services in relation to STEM in out-of-school contexts. This book, *Promising Practices for Engaging Families in STEM Learning*, edited by Margaret Caspe, Taniesha A. Woods, and Joy Kennedy, attempts to fill a gap in the literature by highlighting STEM programs and frameworks that empower families to connect and engage in their children's education.

This volume seeks to reimagine "how and where we learn, through inquiry, experimentation, and discovery across both school and nonschool settings" (p. ix). Penned by authors ranging from higher education faculty to policy specialists and program officers, the book is divided into three sections about: (a) theories and frameworks; (b) STEM program models; and (c) local, state, and national policies. The 11 chapters are woven together by a focus on the role family plays in promoting STEM engagement in the early and elementary years. Each chapter promotes tools and resources that support positive attitudes and inquiry-learning approaches to programming.

Section I (Chapters 1–4) concentrates on the theories and frameworks used by researchers to understand family engagement in STEM. Chapter 1 by Caspe and Lopez proposes a "5R model" to engage schools, community educators, and families in STEM. The Rs stand for: reach out, raise up, reinforce, relate, and reimagine. The 5R framework situates STEM learning as flowing

from each facet of life—home, school, and community—and suggests that this learning can begin long before children enter school. Chapter 2, by Berkowitz, Schaeffer, Rozek, Beilock, and Levine, describes the impact of parental mathematics anxiety on parent–child math interactions. The authors recommend ways to minimize the occurrences when parents' anxiety about math transfers to their children, such as encouraging parents to engage in "number talk" (p. 26) or providing a script for parents to follow during math interactions with their child (so as to ease parental math anxiety).

In Chapter 3, Solis and Callanan challenge stereotypes and deficit assumptions of Mexican-heritage children and families in science classrooms. The authors call for educators and policymakers to examine their own biases and resist deficit thinking when working with children of different backgrounds from their own. As well, they recommend English language learners remain in science classrooms. The authors observe that parents' backgrounds are not predictors of their skills in engaging their child in inquiry-based learning. Similarly, Chapter 4, by Brown, Schreiber, and Barbarin, examines the unique challenges and discrimination African American children face in mathematics education and their resultant failure in the subject area. The authors present the "3Xs" best practices model: eXpose, eXplain, and eXpand. They recommend specific practices for schools, teachers, and parents for promoting mathematical development in African American children. The first X, eXpose, encourages parents to engage children in enrichment activities that supplement their school-based learning (e.g., connecting measurement to laundry). The second X, eXplain, focuses on families' conversations and how parents can reinforce children's understandings of "how things work" (p. 55), such as asking children to describe their mathematical thinking. The final X, eXpand, encourages parents to elaborate on children's knowledge to advance more complex thinking (e.g., helping child count blocks; library programs).

Section II (Chapters 4–8) extends the research-based theories described in Section I and presents four different STEM program models that engage families in learning. In Chapter 5, Duch and Gennetian apply the theory of behavioral economics to program recruitment as a means of boosting family engagement in mathematics school readiness programs. They argue that by considering the contextual factors (e.g., multiple jobs, financial stress) that impact families' "mental bandwidth" (p. 78), educators can make sure parents who need programming the most can access it. In Chapter 6, McWayne, Mistry, Brenneman, Zan, and Greenfield describe a STE (science, technology, and engineering) program that incorporates immigrant families' cultural resources or "funds of knowledge" (Moll, Amanti, & Gonzalez, 1992) in the development of curricula. In Chapter 7, Chklovski and Jaris argue that the STEM

ecosystem of organizations must come together to improve students' achievement. They highlight the Iridescent program as a model which brings students, families, educators, and engineers together to complete "design challenges" (p. 101) and increase students' and families' knowledge, confidence, and attitudes about STEM. In Chapter 8, Uscianowski, Almeda, and Ginsburg extend dialogic reading approaches to digital media, in particular how certain features of interactive storybooks can lend themselves to mathematics development.

The final section of the book focuses on policy and how policies at the local, state, and federal level can promote children's and families' engagement in STEM. In Chapter 9, Henríquez describes the New York Hall of Science Neighbors initiative. This initiative created an ecosystem for creative STEM learning for immigrant communities in Queens, New York by providing supports for multiple locally developed programs. A central tenet of this initiative was the emphasis placed on families' feedback in developing authentic opportunities for learning. Chapter 10 by Weyer explores how state level and federal level policies can promote family engagement in STEM learning during the early years. In the final chapter, Walker describes how the National Science Foundation supports family engagement in STEM learning through research initiatives and grant applications for family engagement projects.

The book is helpful for practitioners, teachers, and administrators eager to improve STEM learning in their school districts. With American schools lagging internationally in math and science education (DeSilver, 2017), it is imperative that schools look for ways to encourage inquiry, curiosity, innovation, and problem-solving within budgetary means. This volume provides a number of frameworks and program models that stakeholders could use as templates to build programs and/or initiatives in their school districts. By engaging families and tapping into the inquiry-learning supports families naturally engage in (such as those presented in Chapters 3, 6, and 9), educators can work within a third space theory (Moje et al., 2004) of STEM learning. Third space theory conceptualizes a space between home and school contexts that allows children to make sense of the knowledges and discourses of both worlds. Although the chapters do not specifically address third space theory, the volume provides evidence of all three ways Moje et al. (2004) conceptualized the theory: first, as a method in "building bridges from knowledges and discourses" (p. 45), as exemplified in all chapters across the volume as the authors argue for the inclusion of families' knowledge in school classrooms; second, as a "navigational space" that allows students to cross and succeed in "different discourse communities" (p. 44), best shown in Chapters 1, 6, 7, and 9; and finally, as a space of "cultural, social, and epistemological change" where different discourses are brought "into conversation with each other" (p. 44), as described in Chapters 3, 4, 6, and 9.

One difficulty with the volume is the lack of attention paid to all four aspects of STEM. Although the editors acknowledge that "the research throughout this monograph attends to only parts of the STEM equation" (p. x), it would help the text's flow and consistency to have all four disciplines equally represented. For example, it would be helpful to have chapters that examine biases and/or discrimination in technology and engineering, in a similar way Chapter 3 described science and Chapter 4 described mathematics.

Despite this, the volume is valuable for the significance it places on families and the positive role they play in supporting their children's STEM learning. As the title suggests, these are promising practices. The editors' call for increased attention to STEM family programming alerts researchers and practitioners to value family contribution as a means of increasing American STEM abilities.

References

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