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Supporting middle school teachers' implementation of STEM design challenges.

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Summary: We describe and analyze a professional development (PD) model that involved a partnership among science, mathematics and education university faculty, science and mathematics coordinators, and middle school administrators, teachers, and students. The overarching project goal involved the implementation of interdisciplinary STEM Design Challenges (DCs). The PD model targeted: (a) increasing teachers' content and pedagogical content knowledge in mathematics and science; (b) helping teachers integrate STEM practices into their lessons; and (c) addressing teachers' beliefs about engaging underperforming students in challenging problems. A unique aspect involved low-achieving students and their teachers learning alongside each other as they co-participated in STEM design challenges for one week in the summer. Our analysis focused on what teachers came to value about STEM DCs, and the challenges in and affordances for implementing DCs. Two significant areas of value for the teachers were students' use of scientific, mathematical, and engineering practices and motivation, engagement, and empowerment by all learners. Challenges associated with pedagogy, curriculum, and the traditional structures of the schools were identified. Finally, there were four key affordances: (a) opportunities to construct a vision of STEM education; (b) motivation to implement DCs; (c) ambitious pedagogical tools; and, (d) ongoing support for planning and implementation.

Classification: B50

Keywords: teacher education; STEM

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