MSP Knowledge Management and Dissemination Project (MSP-KMD)

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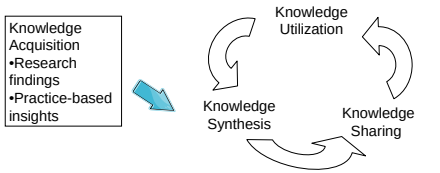
The MSP-KMD project examined the key question of how professional learning communities (PLCs) and other interventions affect instructional practices and student success. Currently, there is a wide variety of definitions of effective STEM teaching: use of inquiry-based practices, rigor of content addressed in instruction, cognitive expectations for student learning, student-centered instructional practices, use of formative assessment and feedback. MSP-KMD staff collected and analyzed MSP research and practice-based insights, including documenting how effective teaching in STEM is defined and measured.

The Math and Science Partnership Knowledge Management and Dissemination (MSP-KMD) was funded as a Research, Evaluation, and Technical Assistance project to support knowledge management within the MSP program and to disseminate information to the broader mathematics and science education community. The overall goal of MSP-KMD is to synthesize findings in the K–12 arena in a small number of important areas, articulating the contribution of the MSP program to the knowledge base and identifying "gaps" and promising practices/strategies for further investigation. In this way, MSPs and the field at large can benefit from MSPs' research and development efforts.

The MSP-KMD process involved the collection and synthesis of both research-based findings and practice-based insights. MSP-KMD focused its knowledge acquisition and knowledge sharing efforts in three primary areas: deepening teacher content knowledge, teachers as intellectual leaders, and STEM faculty involvement in the K-12 arena (www.mspkmd.net). In the last year, the MSP-KMD examined STEM PLCs as an approach for improving mathematics/science teaching and learning. Building on NCTAF's synthesis of research on PLCs, MSP-KMD staff collected and analyzed MSP research, including documenting how effective teaching is being defined and measured. The analysis was conducted using the Standards of Evidence process developed by MSP-KMD to operationalize best practices in empirical research involving various quantitative and qualitative methodologies (Heck & Minner, 2010). In addition, practice-based insights were collected from an on-line panel composed of representatives from MSP projects and other experienced practitioners.

Knowledge Management Framework



Adapted from Nevis, E.C., DiBella, A.J., & Gould, J.M. (1995). Understanding organizations as learning systems. *Sloan Management Review, 36*(2), 73–86.

Challenges

Research literature does not provide much guidance about how to design interventions in a given context in order to have a positive impact on classroom practice and student outcomes. The NCTAF synthesis project found that the research literature is very thin; only 33 research studies met their search criteria, and when standards of evidence were applied to the identified studies, the majority was judged to be of poor quality. In some cases, studies looked at a small number of teachers in depth, but did not explain how these teachers were selected, or the extent to which their prior backgrounds or experiences in the PLC were representative of the larger group of participants. In other cases, subjects were dropped from the studies with no explanation given or the impact of that attrition on the results. In addition, there were only five studies that explored the relationship between PLCs and student achievement. In both of these ways, the shortcomings of the knowledge base about PLCs is similar to those of the knowledge base regarding deepening teacher mathematics/science content knowledge and developing and utilizing teacher leaders (Heck, Markworth, & Weiss, 2010; Pasley, Smith, Taylor, & Heck, under review).

Overcoming Challenges

MSP researchers can help advance the state of knowledge about how to design and implement reform efforts by providing clear documentation, including descriptions of samples, interventions, contexts, and methods. This information provides a basis both for interpreting findings from individual studies and for combining findings across studies. In addition, the insights of experienced MSP practitioners, when systematically collected and analyzed, can provide valuable guidance to the education community. Because practice-based knowledge is culled from, and gives careful consideration to, specific contexts and conditions, we believe that it is both possible and informative to use insights from practice to understand and resolve problems of practice. There is value and need for practice-based knowledge to help address questions of importance in the education field, including how to design a PLC in a given context in order to have a positive impact on classroom practice and student outcomes. KMD applied a systematic methodology for collecting and analyzing practice-based knowledge so that it will be understood as credible and valid.

Intellectual Contributions

MSP-KMD has made a number of contributions to the field of mathematics and science education and education research:

- Developed an explicit and rigorous process for collecting and analyzing empirical research findings from published studies.
- Developed a process for collecting and analyzing practice-based insights from experienced practitioners.
- Synthesized research and practice-based insights, generating over 30 knowledge reviews.
- Developed 17 case studies of MSP practice.
- Developed a database of measures of teachers' mathematics/science content knowledge.

Papers and Presentations

All papers and presentations for MSP-KMD can be found at:

http://www.mspkmd.net/papers/index.php

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