Using Research Findings and Practice-based Insights: Guidance for Policy, Practice, and Future Research

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Iris R. Weiss
Joan D. Pasley

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Abstract

The call for research-based findings to guide policy and practice is getting louder. At the same time, there is a great reliance (although often not acknowledged publicly) on practice-based insights to guide policy and practice. The KMD process was originally designed to identify what we know and how well we know it in relation to a small number of key topics, purposively working with both research-based findings and practice-based insights. Particular approaches, for example to deepen teachers' content knowledge, that were supported by knowledge from both research and practice as feasible and effective under a given set of conditions, would be prime candidates for dissemination and widespread implementation. Approaches recommended by expert practitioners that had not been systematically studied would be prime candidates for research, and further unpacking would be needed to explore areas where research and practice had divergent conclusions.

Although this original design for KMD work appeared conceptually sound, it didn't pan out as intended. We have found that much of the empirical literature in our focus topics is more appropriately characterized as program evaluation than research. For example, in many cases a study found that a multi-faceted program aimed at deepening teacher content knowledge was effective, but it was not possible to tell from the study the extent to which any design feature contributed to the outcome. Practitioner insights could be gathered at a much smaller grain size, but without the assurances of validity that systematic study would provide. A typical conclusion of our work is that a particular piece of practitioner advice is consistent with, rather than strongly supported by, the available empirical evidence. As a result, we have added a component to our work that goes beyond disseminating what is known and how well it is known to include ideas for enhancing the systematic accumulation of knowledge to address key problems of policy and practice.

Building on existing studies to move the field's understanding forward depends in part on attending to methodological issues. Substantively, many important questions remain open for the broader field to address, but first some decisions must be made on where best to focus investigations. Which features of interventions are most important to study? What aspects of the area should be measured and by what means? What background and experience characteristics of teachers might matter most and should therefore be accounted for in the study designs? What attributes of the context might influence generalizability of findings or replicability of programs?

Insights from experienced practitioners can inform decisions about priority hypotheses to be explored. Those strategies that experienced practitioners have found to be effective for particular purposes, often with some sense of why they are effective, offer strong candidates for study. Similarly, practitioners who have worked in a variety of programs often have a sense of the characteristics of participants that make a difference in what strategies do and do not work. These variables would be strong candidates for inclusion in research models. Finally, practitioners who have worked in multiple settings or have observed programs that have scaled up to new sites can offer suggestions about the features of the context in which interventions take place that might influence the success of a strategy (e.g., rural versus urban, extended summer experiences versus academic-year experiences).

Background

In recent years, there has been considerable emphasis on the need to base education policy and practice on research. The No Child Left Behind Act, for example, made repeated note of the need for schools to use programs and practices based on "scientifically-based research" (US Congress, 2001). Toward this end, the U.S. Department of Education has created mechanisms for reviewing research on interventions and assessing the quality of the evidence that they "work." Evidence generated from well-designed and well-implemented randomized field trials is considered the "gold standard" in evaluating the impact of interventions for these reviews. (What Works Clearinghouse, 2008.)

Of course, given the complexity and diversity of education systems, even if a program has evidence of impact based on several well-designed studies, it is highly unlikely that the treatment would be equally effective with all users. Briggs (2008) notes that decision-makers need confidence that a program will be effective in their particular settings; thus there is a need to focus research not only on being able to make causal claims but also on issues of generalizability. "What the superintendent of a school district wants to know is not so much what *has* worked but what *will* work. To be relevant, a good synthesis should give policy makers explicit guidance about program effectiveness that can be tailored to specific educational contexts: When and where will a given program work? For whom will it work? Under what conditions will it work the best?" (p. 20, emphasis in the original)

Unfortunately, issues of generalizability of research findings are often overlooked; eagerness for research-based evidence of program effectiveness sometimes leads to misplaced confidence in the applicability of particular findings. As an example, Amaral, Garrison, and Klentschy (2002) found that a professional development program focused on inquiry-based science instruction led to increased achievement among English language learners. At a meeting of district-based professional development teams, someone who was familiar with that study cited it as "proof" of the effectiveness of inquiry-based instruction in narrowing achievement gaps. However, the situation that was the basis of the Amaral and colleagues study was very unusual: the intervention was led by the district superintendent, teachers were required to participate in the professional development, and principals were asked to bring examples of student work to monthly meetings with the superintendent, all of which may have resulted in more attention being paid to the interventions than would otherwise have been the case. It is not at all clear whether a professional development program that was similar in design to that one would have similar impacts on English language learners (or other groups) in different situations.

Of course, issues of overgeneralization and inadequate consideration of context are not restricted to empirical research; they are also evident when "best practices" or "lessons learned" are recommended as the basis decision-making:

> The assumptions undergirding the phrase "best practices" (e.g., that there must be a single best way to do something) are highly suspect. … From a systems point of view, a major problem with many "best practices" is the way they are offered without attention to context. Suppose automobile engineers identified the best

> fuel injection system, the best transmission, the best engine cooling system, the best suspension system, and so forth….Let us further suppose, as is likely, that these best subsystems (fuel injection, etc.) come from different car models (Lexus, Infiniti, Audi, Mercedes, etc.). When one had assembled all the "best" systems from all the best cars, they would not constitute a working car. Each best part (subsystem) would have been designed to go together with other specifically designed parts for a specific model of car. They're not interchangeable. Yet, a lot of "best practices" rhetoric presumes context-free adoption. (Patton, 2001, p. 331)

If a common goal of syntheses of empirical literature and compilations of best practices is to inform policy, practice, and future research, then there may well be utility in looking across these types of knowledge to see where they are in agreement, and where they differ, as well as the nature of the contexts in which both types of knowledge were generated. One suggestion is to base confidence in a particular recommendation on the extent to which it is supported not only by multiple sources, but by different types of knowledge:

> High-quality lessons learned, then, represent principles extrapolated from multiple sources and independently *triangulated* to increase transferability as cumulative knowledge or working hypotheses that can be adapted and applied to new situations, a form of pragmatic utilitarian generalizability, if you will. The internal validity of any single source of knowledge would need to judged in terms of the criteria appropriate for that type of knowledge. Thus, practitioner wisdom and evaluation studies may be internally validated in different ways. However, when these various types and sources of knowledge cohere, triangulate, and reinforce each other, that very coalescence increases the likelihood of external validity, perhaps sufficient to justify designation as a *triangulated better practice*, or a *high-quality lesson learned*. (Patton, 2001, p 334, emphasis in the original)

Complicating the matter even more is that often recommendations are made without a clear indication of the extent to which they are based on empirical evidence and/or the intuitions and insights of experienced practitioners. For example, descriptions of the principles of effective professional development in the past decade or so have been remarkably similar (Corcoran, 2005), giving the impression of robust empirical support for these ideas. In their review of the literature on professional development, however, Wilson and Berne (1999) note that there is in fact very little empirical evidence in support of the consensus beliefs about the effectiveness of lesson study and other recommended alternatives to traditional workshops.

> We know as little about what teachers learn in these kinds of forums as we do about what teachers learn in traditional staff development and in-service. Our readiness to embrace these new principles may, in fact, be rooted in a desire to escape collective bad memories of drab professional development workshops rather than in sound empirical work. But replacing our old conceptions of professional development with new makes sense only if the new ideas are held up for rigorous discussion and evaluation. New is not always right. (p. 176)

Similarly, Elmore (2002) notes that "educators' professional literature and academic research reflect a broad consensus on the main features of effective professional development." Judging this literature "quite sensible and useful in thinking about how to design and operate professional development activities that have some likelihood of improving teaching and learning" he notes that there is in fact very little "hard evidence about its effects on practice or on student learning" (p 6). Like Wilson and Berne, Elmore suggests that activities designed on the basis of these "sensible propositions" be subjected to empirical testing.

What are policy makers and practitioners to do in the meantime? States, districts, and schools need to make decisions about the design of professional development programs, teacher recertification, whether/how to use teacher leaders, etc., and it would be better to help them use the evidence we have available, rather than expecting them to wait until the research evidence is clear and compelling.

This point was driven home to me a while back, when I attended a meeting of policy makers and mathematics and science education researchers that focused on forging links between research and policy. The researchers in the group were discussing how little we knew about a particular topic, citing threats to validity in many studies, e.g., problematic instruments, the wrong unit of analysis, as well as the uncertainties about the generalizability of the results from existing studies. Nothing noteworthy here; anyone who has taken a careful look at the research literature in almost any aspect of mathematics or science education can attest to the spottiness of the research base. What *was* noteworthy was the frustrated reaction of one State Commissioner of Education. His comment, as best I can reconstruct it:

> *When I get back home on Monday, I am going to have to decide what our policy will be. I understand all of the caveats you are sharing, but we can't wait for you folks to do all of the research that would satisfy you about the best course of action. You know more than I do about science education, so I'd rather use your judgment than mine. But let me be clear: with or without your advice, we are going to make a decision.*

The Commissioner's comment has stayed with me. At the risk of stating the obvious, the fact that there is a great deal we don't know about how to improve education does not mean that we know nothing. Using what we know from research to-date, augmenting that knowledge with "sensible propositions" on important problems of practice and policy, provides the best guidance we can for both practice and policy.

The MSP KMD Project: Assessing What We Know and How Well We Know It

The Knowledge Management and Dissemination project is designed to compare and contrast what has been learned from different sources as part of identifying what we know, how well we know it, and the implications for policy, practice, and future research. With support from the National Science Foundation's Math Science Partnership Program, Horizon Research, Inc., the Center for Leadership and Learning Communities at the Education Development Center, and WestEd are focusing on synthesizing both research findings and practice-based insights in a

number of key areas of mathematics and science education: deepening teacher content knowledge for teaching; preparing and deploying teachers as intellectual leaders in their schools/districts; and providing induction support for new teachers. The purpose of this paper is to describe the differences between what we learned from these two types of sources, and make a case for the importance of collecting and analyzing both kinds of data to inform policy and practice, as well as future research, not only in these specific areas, in education more generally.

The MSP KMD project uses a three-stage knowledge management model developed by Nevis, DiBella, and Gould (1995) for workplace settings. The model posits that learning occurs in three identifiable stages: knowledge acquisition, knowledge sharing, and knowledge utilization. As initially envisioned, the knowledge acquisition process in MSP KMD would identify areas where the experiences of expert practitioners reinforce the results of research; approaches that had empirical support based on sound research and that practitioners agreed were effective in diverse contexts and under a variety of conditions would be prime candidates for dissemination. In cases where important practice-based insights had not been investigated empirically, those insights would be considered priorities for future research. Similarly, when there was considerable disagreement among practitioners, research could be designed to sort out the target audiences and conditions under which a particular intervention is effective. The following sections give a brief overview of how we went about collecting both research findings and practice-based insights; describe the difficulties in combining the two types of data to identify what is known and how well we know it; and make a case for the importance of developing a system where research and practice can more readily build upon each other.

What do we know from research on deepening teacher content knowledge and developing teacher leaders?

The empirical literature on deepening teacher mathematics/science content knowledge and developing/deploying teacher leaders turned out to be even thinner than we had anticipated. (The review for teacher induction is still in process, but that literature too appears to be lacking in many important ways.)

In preparation for reviewing the research literature, we specified a set of standards of evidence to be used in identifying the contributions of individual studies to the knowledge base in each of our designated topics. (See Heck, 2008 for a description of the standards of evidence, the process used to develop them, and the parameters that guided our initial searches.) In the case of deepening teacher content knowledge, our initial search located nearly 2000 articles. However, many articles were excluded from further analysis either because they were advocacy pieces rather than studies, or because they lacked measures of teacher content knowledge. Fewer than 150 studies were retained for the next step in the synthesis, which was the application of standards of evidence to the findings. Similarly, while the initial teacher leadership search yielded nearly 800 articles, more than 90 percent of these were eliminated in an initial screening; typically either because they were not empirical in nature or did not address an explicit question about teacher leadership.

When standards of evidence were applied to the findings of the articles that passed the initial screening for each knowledge review, it became clear that many of the studies had serious problems in their research designs. While we did not use the very high (and in our opinion overly-restrictive) standard of randomized field trials, the fact that many of the studies did not make a convincing case for the initial equivalence of the treatment and comparison groups, or lacked comparison groups entirely, limited what could be learned from the set of studies. In the case of the deepening teacher content knowledge review, the fact that studies often used investigator-developed measures, and the articles rarely included information about the validity or reliability of these measures, limited our confidence in the findings.

Even when the studies were well-designed and the findings credible, the results did not provide very much guidance for policy or practice. Treatments tended to be described in very general terms, perhaps in the expectation that journals value detail about data collection, analysis, and results, more than detail about the interventions. Whatever the reason, someone who wanted to replicate the treatment would have a difficult time doing so. In addition, studies tended to be more "program evaluation" than research; a multi-faceted program for deepening teacher content knowledge or preparing/deploying teacher leaders may have been shown to be effective, but it would not be possible to tell from the studies which component(s) of the intervention were responsible for the gains.

How does what we know from practice compare to what we know from research in these areas?

In addition to the research-based findings, knowledge acquisition for the MSP KMD project involved collecting and synthesizing insights through interviews and online panel discussions with experienced practitioners, including those involved in Math and Science Partnerships. Through these data collection efforts, experienced practitioners shared their insights and provide information on the necessary conditions for implementing approaches effectively. The online panel discussion turned out to be a particularly efficient and effective mechanism for collecting practice-based insights. (See Miller, 2008 for a description of that process.) Like the descriptions of principles of effective professional development that were mentioned earlier, the insights we identified in the panel process are not based on modal practice, but rather on "expert" practice, drawing on the insights of expert practitioners and people who have observed multiple instances of practice, both expert and novice.

It is important to note that the panel process enabled us to go beyond having people cite each other's opinions as support for their insights/recommendations. By pointing out discrepancies and differences of opinion, and asking for evidence/justifications, we were able to surface "conditions" that may affect outcomes, conditions that are often not addressed in either the research or the best practices literature.

For example, in the case of having teacher leaders work with teachers in the classroom to help improve instruction, the research indicates that:

- Teacher leader work with teachers in classrooms to improve instruction is important and that there is evidence that it impacts what teachers do in classrooms.

- Teacher leader work with teachers in classrooms includes a number of different strategies: demonstration lessons or modeling; lesson planning, review or analysis; co-teaching.

However, there is very limited research on specific strategies, e.g., demonstration lessons or modeling. Nine of the studies analyzed as part of the MSP KMD knowledge review included demonstration lessons as one of a number of strategies, and the fact that the studies that included this strategy identified positive impacts on teacher practice suggests that it is effective. However, the research did not focus on the contribution or impact of demonstration lessons (or any other strategy.) Thus, we don't know much about the impact of demonstration lessons relative to other strategies teacher leaders may use, nor how or why demonstration lessons help improve teacher practice.

Practice-based insights we collected about teacher leadership are of a finer grain size than the research findings. For example, in the case of demonstration lessons/modeling, the online panel discussions addressed the essential conditions for demonstration lessons or modeling to be effective in work with classroom teachers. These include:

- Teacher leaders need sufficient preparation and knowledge to expertly teach the demonstration lesson.
- Demonstration lessons or modeling experiences need to occur in a classroom setting that is realistic and similar to the teacher's classroom.
- A demonstration lesson or modeling experience needs to be purposeful and relevant to the teacher, in some way connected to the teacher's practice.
- A teacher's observation of a demonstration lesson or modeling experience, by a teacher leader, needs to be framed by a specific question or issue.
- The teacher and teacher leader need time to debrief and discuss what the teacher understood from his/her observation.

As another example, the research literature suggests that engaging students in the analysis of student work is effective in deepening teacher content knowledge, but has little to say about implementation. In contrast, over several rounds of online panel "discussions" moderated by the MSP KMD staff, in contrast, expert practitioners with very diverse experiences in professional development honed in on a series of insights that they all agreed with, including the need to use student work samples that were rich enough to show evidence of student thinking; the importance of showing teachers the full range of common responses; the utility of starting with prepared samples of student work in order to assure both richness and range in the set; and the utility of having teachers subsequently analyze samples of their own students' work to facilitate transfer of teacher learning to their classroom practice.

Given the calls for basing education practice on the results of scientifically-based research, it is ironic that based on the work we have done in the MSP KMD project, practice-based knowledge actually provides more detailed and helpful guidance to practitioners, including more information about "conditions" under which particular programs are likely to be effective. At the same time, practice-based insights have serious limitations of their own. For example, in the case of deepening teacher content knowledge, the expert practitioners formed their impressions

of effectiveness based on their interactions with teachers participating in professional development; rarely did they have information about effectiveness in terms of impact on classroom practice or student achievement. And in any event, practice-based insights lack the credibility that comes with systematic collection and analysis of evidence of effectiveness.

The utility of a system where research and practice build upon each other

The preceding sections gave examples of the kinds of knowledge generated from research and the kinds of knowledge generated from practice. When people point out a need to bridge the gap between research and practice, they often talk about ways of translating research into practice. We want to argue not only that bridging the gap between research and practice can be approached from the other direction, but that both research and practice would benefit from systematic and explicit attention to treating them as cyclical.

Translating research to practice

One approach for translating research to practice that doesn't seem very realistic is the expectation that practitioners will read research and implement it on their own. As Burkhardt and Schoenfeld (2003) note in relation to classroom teachers, and would likely be true of other practitioners as well:

> Most teachers do not have time to read much research, make sense of it, and employ their understandings productively in the classroom. Doing so is a very challenging task. Given the many detailed studies of each topic and their sometimes conflicting results, how would teachers decide what changes to make? Translating research into practice is a decidedly nontrivial task. (1-2)

Professional organizations and other intermediaries can increase the likelihood of the application of research by summarizing findings, and helping practitioners/policymakers understand how they can be used. At the core, however, the effectiveness of strategies for translating research to practice and policy is dependent both on the skills of the translators/technical assistance providers, and at least as importantly, on how well the available research addresses key problems of practice/policy.

Unfortunately there are few incentives in the research "system" for investigators to focus on problems of practice or policy in a coherent way. While solicitations from funders may specify areas of interest for research proposals, they tend to be broad, e.g., elementary science, or student assessment (National Science Foundation, 2006). Investigators are free to choose the questions they wish to address, the contexts in which to do the explorations, etc., so there is little likelihood of a coherent, systematic program of research to investigate particular problems of practice.

In addition, the incentives in the research enterprise encourage individual investigators to develop their own lines of inquiry, as noted in the following comments. (The first example describes some of the reasons for lack of cumulation of knowledge in the context of scientific research generally, and the second in the specific context of education research.)

> Scientists tend not to follow in the trails of others if blazing their own trail leads to ownership of part of the landscape. Further this tendency not to follow the trail of others is exacerbated when lack of agreement on definitions and measures makes the identity of the right trail problematic. Finally, initial success tends to lead to specialization and, while specialization leads to competence and therefore more success, specialization also leads to niches and regions uninhabited by competitors, and so ignorance of the work of others persists. (Huber, 1991, p.108)
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> The individualistic value system underlying academic credit allocation tends to limit the scope of investigations, not only in scale but also in how far they can combine generality and trustworthiness. Tacitly, there are pressures against standardization of treatments or probe-instruments, with a premium in prestige and satisfaction for inventing your own rather than using, perhaps with fine-tuning, treatments and research tools that already exist and are nearly as good. Apart from limiting the scope and reliability of research, this hinders comparability. (Burkhardt and Schoenfeld, 2003, p. 9)

Using Practice to Drive Research

Recall Elmore's (2002) notion that in addition to guiding practice in the absence of compelling research findings, the "sensible propositions" advanced by professional consensus can serve as hypotheses for empirical research. Based on our work to-date, we believe the online panel methodology employed to collect practice-based insights from expert practitioners can both operationalize and extend Elmore's idea in service of the systematic accumulation of empirical knowledge to address important problems of practice and policy. Not only can practice-based knowledge be used to generate a set of hypotheses of what might work, for whom, it can also help identify the conditions that need to be explored. In fact, even if not directly investigated in a particular study, variables of target population and context that might matter based on expert practitioner input should be documented in research studies to assist in future knowledge syntheses.

For example, in the case of teacher leaders using demonstration lessons, the practice-based insights described earlier would suggest that research questions be framed around such issues as:

- Examining the sequencing of demonstration lessons or modeling with regard to lesson planning/review/analysis or co-teaching. With whom and for what purposes are particular sequences of teacher leader strategies used?
- Assessing the extent to which the conditions for demonstration lessons or modeling (as indicated from practice-based insights) are present in situations where demonstration lesson or modeling occurs. This is a kind of fidelity of implementation approach (practitioners say that certain conditions are essential: are they present in teacher leaders' demonstration lesson or modeling with teachers?)

Similarly, for deepening content knowledge for teaching among mathematics and science teachers, results from the online panel suggest a need to explore the contributions of particular professional development approaches, perhaps through a planned variations approach. These practice-based insights also suggest the importance of documenting in future research: (1) the

experience levels of teachers participating in professional development; (2) the extent to which the focus of the treatment is on disciplinary content knowledge, mathematics/science as ways of knowing, and pedagogical content knowledge; (3) the particular strategies used, e.g., engaging teachers in challenging mathematics/science problems, having them work through the activities in student instructional materials, or analysis of student work; and (4) how/the extent to which the facilitation kept the focus on the key mathematics/science content and the applications of that content in teaching practice.

Using practice-based insights as the basis of research provides a promising alternative for bridging the gap between research and practice. Rather than trying to get practitioners' attention on using what researchers have learned, we can begin a more systematic investigation of the problems practitioners face, making the results of research more directly applicable to practice. As hypotheses are identified and conditions of context and implementation that may influence effectiveness are documented, the field can build theory to guide both practice and research. Weiss (1995) outlined a process for building and testing theory in program evaluation that provides a compelling case and practical suggestions for using program theory to improve evaluation design, and to make the results of evaluation studies more likely to contribute to broader theory and build a knowledge base for guiding practice. Weiss recommends that the assumptions and logic of social programs (that is, the program theory) be specified and used to identify relationships and intermediate effects that can be studied to not just assess if a program is effective, but to understand why or why not. Additionally, the specification and evaluative investigation of the presumed relationship and effects can then facilitate comparisons across programs and accumulation of evidence to support and refine theory, and to guide future practice. Thinking broadly about key areas of investigation in education research, a similar approach might be crafted. Including the insights of experienced practitioners along with findings from empirical research to build initial theories, the field can provide stronger guidance for current practice based on insights and evidence, generate and frame research and collection of insights to inform areas in need of deeper or more nuanced evidence, and, based on accumulation of evidence over time, lead in turn to more robust theories to move research and practice forward.

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