Challenges and Opportunities for Design-based Research in Helping to Overcome the Research to Practice Gap in Special Education

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Abstract

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*Theme: Innovative approaches to DBR methods and analysis*

**Introduction**

In June of 2013, I was invited along with 17 other researchers to attend the 2013 Design-based Research at the Crossroads conference, an American Educational Research Association (AERA) research conference hosted at the University of Georgia. The goal of the conference was to establish a framework for guiding the implementation and presentation of design-based research (DBR). This conference was unique in that it implemented an innovative conference format called the “crossroads” model. The implementation of this innovative format promoted powerful academic discourse that advanced the overarching goal of the conference. This paper presents a case report that richly describes the research I presented, and how participation in this conference impacted my thinking regarding my current DBR project in particular as well as towards conducting DBR in general.

The Crossroads model was developed by John Settlage from Weber State University and Adam Jonhston from the University of Connecticut as a venue for intense educational conversations (Johnston, Moss, Settlage, & Carlone, 2008; Settlage & Johnston, 2008). They argue that such conversations can sometimes happen at larger conferences, but that it is uncommon for these types of conversations to be promoted or structured. The Crossroads model
focuses explicitly on promoting these conversations. The intended outcome of these scholarly discourses is to establish new actions for researchers. A key summary quotation from the Science Education at the Crossroads website ([http://www.sciedxroads.org/index.html#purpose](http://www.sciedxroads.org/index.html#purpose)):

“Crossroads is a place to begin and take responsibility for new pursuits, rather than find closure and completion to old ones.” This focus on pragmatism and establishing new knowledge and directions for future research distinguishes the Crossroads model from more traditional approaches.

Scholarly discourse using the Crossroads model is promoted using “incubator” forums, in which presenters and audience members are prompted by a facilitator to take turns asking questions, posing challenges, and generating ideas. In an incubator forum, the roles of presenter and audience members are blurred, which allows for a shift in focus from an individual reporting outcomes to a community discourse surrounding specific, challenging academic problems. To prepare for these incubator forums, invited scholars were asked to prepare a conference proposal with three elements: a vexation, a venture, and visuals. For the vexation we were to describe a frustration, challenge, or difficult question with details as to why it was troublesome. For the venture, we were to describe a proposed course of action to approach our identified vexation. Finally, for the visual, we were asked to attempt to translate our thoughts into a visual format to help enhance the clarity of our thinking. These three elements were then used as points of discussion in the incubator forums.

**Project Context**

Recent efforts towards special education reform seek to identify, validate, and implement instructional practices as efficacious (Cook, Smith, & Tankersley, 2012; Earles-Vollrath, 2011). Federal statutory mandates such as *The Education Sciences Reform Act of 2002*, (ESRA, 2002);
The No Child Left Behind Act of 2001 (NCLB, 2001) and The Individuals with Disabilities Education Act (IDEIA, 2004) insist that evidence-based practices (EBPs) be used to educate all children. According to What Works Clearinghouse (WWC), “It is critical that educators have access to the best evidence about the effectiveness of education programs, policies and practices in order to make sound decisions” (2010, p. 1). EBPs are derived from research studies that demonstrate high internal validity, such as methodologically rigorous randomized controlled trials. This would appear to be appropriate, as scientific research is generally recognized as the best tool for discerning practices that cause improved student outcomes (Earles-Vollrath, 2011; Odom et al., 2005). However, despite considerable resources devoted to conducting and synthesizing experimental research to identify what works, EBP research appears to have limited impact on practice (American Enterprise Institute for Public Policy Research, 2007; Cook & Smith, 2012; Shriver, 2007; Sindelar, Shearer, Yendol-Hoppey, & Liebert, 2006). Furthermore, long-term longitudinal studies corroborate the observation that most educators know little about the specific nature, definition, and application of EBPs (Cook et al., 2012). The result of this is that some effective practices are used infrequently, while some ineffective practices are used more frequently.

A general argument for the use of EBPs is that by using the most effective practices, student achievement will increase. There is little question that this is particularly important for at-risk learners who require the most effective instruction to succeed. This leads to a vexation. Given that EBPs have been empirically vetted as effective begs the question of why we are not seeing wide practitioner adoption and subsequent impact on student outcomes. Schmidt and colleagues (2013) argue that the number of high quality experimental studies in special education is limited; hence, not all aspects of practice can be guided by practices that are considered to be
evidence-based. At the same time, just because a practice has not been deemed “evidence-based” does not mean that it is ineffective. Further, the ways that EBPs have been disseminated traditionally, for example, through research reports and websites such as What Works Clearinghouse, are overwhelming and confusing. In addition, if a practitioner does identify an EBP, little guidance exists for how to implement it with fidelity. However, practitioners need to adapt EBPs to fit their strengths, their contexts, and their students' needs. Without guidance on how to implement, practitioners might inadvertently alter key components of the intervention. Compounding these factors, practitioners might consult different sources to identify EBPs, each of which might use different criteria for what constitutes an effective practice. This results in practices being classified differently by different sources.

Another factor as to EBPs are not being widely adopted might be attributed to dichotomous and oftentimes polarizing professional ideologies between researchers and practitioners (Smith, Schmidt, Edelen-Smith, & Cook, 2013). While researchers emphasize evidence-based practices supported by research that is rigorous and internally valid to determine what works in education, practitioners tend to rely on their own personal beliefs and experience, that of their colleagues, and that of their institutions. Yet another factor is a widely held perception that EBP studies habitually highlight only highly prescribed practices shown to work in “laboratory or other impoverished contexts of participation” (Barab & Squire, 2004, p. 1), rather than useful practices that confront the richness and contradictions of typical school environments (Burkhardt & Schoenfeld, 2003; Dijkers, 2011; Newkirk, 2009). The real-world outcome of these issues is a research to practice gap (Klingner, Boardman, & Mcmaster, 2013).

With so much focus on evidence-based reform in schools, issues like those outlined here are certainly not making it easy for practitioners to enact such reform. Ultimately, practitioners
need clarity as to what works; however, what works seems to be anything but clear. Given these challenges, it would appear that practitioners would benefit from accessible means to locate and consider information related to those practices deemed effective. At the same time, this information should be specific to their particular needs and should provide guidance on how identified practices might be implemented in real-world classroom contexts. Finally, guidance on how practices might be altered so as to be effective in real-world contexts without changing critical components of interventions would allow practitioners to focus on making practices work for them in their specific contexts.

**Electronic performance support systems to promote access to EBPs.**

The origin of evidence-based practices can be traced to the medical field in the 1990s as a reaction to the “bench-to-bedside” gap (Sackett & Rosenberg, 1995). Evidence-based medicine has similar problems to EBPs in special education, particularly related to dissemination, implementation, fidelity, and conflicting recommendations (Straus & McAlister, 2000). To help approach these issues DiCenso and colleagues (2009) proposed the “6S pyramid” to guide prioritization and decision-making with different types of research information. The model behind the 6S pyramid is based on progress in the medical field at “filtering” academic knowledge through an appraisal process, and the model is ultimately a representation of this filtering process. The model begins with original single studies, with the next layer being succinct descriptions of individual studies as synopses of studies, then systematic reviews of these studies as syntheses, followed by succinct descriptions of these syntheses as synopses of syntheses, then practice guidelines derived from lower level elements of the model as summaries, and finally systems at the peak of the pyramid, such as computer-based decision support systems (CDSS). Clinicians looking to implement evidence-based medicine in their practice would start
at the peak of the pyramid and consult a CDSS. Such a system would allow the clinician to enter
detailed patient attributes that the system would use to identify specific recommendations for that
patient. If a CDSS does not exist, the clinician would start at the next level down in the pyramid
and search for summaries. In this manner, the clinician would continue down the pyramid until
resources are found, and in the case that resources are not found, would then search for evidence
that has not yet been vetted through any filtering process.

The medical field and the field of special education are greatly different, yet both face
similar challenges in terms of identification and implementation of EBPs. Drawing from the 6S
pyramid's model, if computer-based decision support systems are seen as an ideal means to
mediate access to EBPs for medicine, then it seems plausible that a similar approach could work
for special education. Hence, the proposed venture is to create a CDSS to help guide
practitioners' identification and implementation of EBPs in special education. CDSS are
computer systems designed to improve user performance and have have shown promise as a
means to reduce cost, optimize decision-making, prevent errors, and improve processes. CDSS in
the field of special education could provide a straightforward means to allow practitioners to
discover EBPs that apply to specific practice scenarios. Practitioners could use such a system to
determine which EBP should be selected and which EBP will work for a given student.

**Challenges and opportunities of a design-based research approach.**

While the prospect of a CDSS for EBPs is compelling, it also raises many challenges.
Given the vast literature base on EBPs, the question becomes where to begin reviewing the
literature. Identifying sources of high quality experimental research is also a challenge, as well as
determining inclusion and exclusion criteria. A way to measure and quantify impact is also
needed. These issues are compounded by the need to pull the information together in such a way
as to be appealing to the target demographic. A filtering approach such as that illustrated in the 6S pyramid could be a starting point, but would require a significant effort in the field of special education that, while not insurmountable, is quite daunting. The research-to-practice gap in special education is itself a challenging issue. Designing a CDSS to approach this issue is likewise fraught with challenges and not yet well understood. An approach to designing a CDSS is needed that allows for flexibility and continual improvement.

Design-based research is one approach that could provide sufficient flexibility and continual improvement in designing and implementing a practitioner-focused CDSS for EBPs. DBR is an appropriate approach for big, real-world problems that may be poorly understood (Amiel & Reeves, 2008; Reeves, McKenney, & Herrington, 2011). Further, due to its cyclical nature, DBR allows for ongoing revisions to how interventions are executed, research design, and other factors related to the impact of an intervention within the given context, thus allowing for continual improvements over time (McKenney & Reeves, 2011).

While DBR could be an appropriate approach to the problem, the approach is poorly understood in the field of special education. Anecdotally speaking, some special education researchers have had tepid responses to DBR, balking at a perceived lack of rigor and few guidelines relating to fixed or established methods. Others have dismissed DBR outright, claiming that it is not research. Still others claim that they are already doing DBR, but they call it something else. Such perspectives might be born of a relative lack of knowledge about or understanding of the approach. Indeed, a search for terms related to DBR in *Exceptional Children*, arguably the most respected journal in the field of special education, from 2001 to 2013 yields zero hits. More common research approaches for special education naturally yield more hits, such as “single-subject” (45), “qualitative” (92), and “experimental” (111). Juxtapose
this with a search for DBR-related terms in *Educational Researcher* from 2003 to 2011, which results in 27 hits. These metrics are not intended to establish a basis of comparison, but instead to show that while DBR has gained a foothold in some areas of education, it is by no means ubiquitous.

That DBR is relatively unknown in the field of special education does not necessarily mean that such an approach does not have a place in this field. Indeed, it would seem that the field of special education could benefit greatly from DBR. Smith and colleagues (2013) support this view and argue that DBR coupled with communities of practice (CoP) could potentially shift the “either/or” perspective of the field of research being either basic or applied to a perspective of “and,” with research being mutually basic and applied. That is, DBR coupled with CoP may provide a framework for realizing Stokes’ (1997) notion of use-inspired basic research. This perspective is mirrored by Klingner and colleagues (2013) article that deals with the problem of scaling up instructional interventions in special education and the challenges presented when interventions move from the lab to real world settings, such as local contextual variables, the need to focus on establishing and maintaining relationships between researchers and teachers, and the need to provide more meaningful professional development. Kligner acknowledges that special education researchers will not be able to solve these issues alone and points to “design-based implementation research principles” (p. 207) as promising. From this perspective, using DBR as a general framework for the design and development of a CDSS for EBPs could result in meaningful, synergistic collaborations between researchers and practitioners that are mirrored in the resulting system. These synergies are illustrated conceptually in Figure 1.
Figure 1. Conceptual illustration of DBR-promoted synergies between research and practice in development of an CDSS for EBPs.

New Directions Suggested by Incubator Forum

The project context described in the prior sections was presented in an incubator forum on the second day of the Design-based Research at the Crossroads conference, with the identified vexation and venture provided, along with the rationale for using DBR. A brief summary of what was presented in the incubator forum is provided here. Audience participants were apprised of the pervasive research-to-practice gap in special education and the push to promote further use of EBPs in this field. Participants were introduced to the vexation of promising EBPs being largely ignored by practitioners, who tend to rely on intuition, information from other teachers, and
information from the institution to inform their teaching practice. Parallels in terms of challenges from the medical field were shared, along with the 6S pyramid model's approach of pointing practitioners to systems, such as computer-based decision support systems, as a first step in identifying EBPs. Following this, the venture of designing and implementing an CDSS for EBPs was shared, along with graphical mock-ups of what such a system might look like (Figure 2) and how it might perform (Figure 3). The rationale for using a DBR approach to designing the CDSS was provided, as well as an explanation of the challenges and opportunities for DBR in the field of special education. After this, feedback was solicited from audience participants following the incubator forum's unique format. The incubator forum resembles a semi-structured focus group. The format first allows time for the audience participants to ask clarifying questions. After this, participants discuss the vexation and venture from their own perspectives, without input from the presenter. Finally, the participants and the presenter are allowed time for back-and-forth discussion.
Method of identifying new directions.

Two scribes kept detailed minutes during the incubator forum. These minutes were reviewed, summarized, condensed, and organized by the author using a method similar to a card sort. First, the minutes were reviewed for converging and diverging themes. As discussion progressed, the flow of ideas would sometimes converge around a single topic or idea, while at
other times the conversation would be colored by divergent perspectives. Both discourse trajectories provided valuable insights and critiques. Themes were identified and then placed into groupings of related themes. These related themes were then reviewed and sorted into different categorizations depending on how similar or different they were. The categories were then given descriptive titles, and the themes were again reviewed to determine how well they fit a given category. If themes did not fit, they were added to a different category where they fit better, or a new category was created. The ideas and thematic categorizations were then crafted into narrative form. The following sections present and discuss the categorized themes, as well as how the knowledge generated during the incubator forum has impacted the conceptualization of approaching the research-to-practice gap problem in special education in general and the design of a CDSS specifically. The themes are presented descending order of potential impact. Potential impact is defined as the implied or perceived impact of those new directions that are suggested by a given theme might have on this DBR project as a whole. Those themes that might have a greater impact are presented first, while themes that might have a lesser impact are presented later.

**Theme 1: Researcher bias in identified solution**

A critique that quickly came to the fore was that the proposed CDSS was oriented to an academic predisposition for rigor and internal validity, with all knowledge represented by the CDSS being academic and based on the notion that the randomized control trials that comprise the core of EBPs are the “gold standard” of academic research. The presented argument was that the CDSS would be a tool that was developed by researchers for practitioners, with practitioner input being limited to evaluating the tool. While this is one approach to collaboration that DBR can take, participants were in agreement that it could result in a lack of buy-in from practitioners
and a perception that the CDSS is “just another tool” that lacks real-world credibility. This argument led to a series of questions being raised by the participants. Of these, three were central to the issue of researcher bias in the proposed solution:

1. How will a CDSS alone help practitioners to distinguish between what works and what does not?
2. Do practitioners have input on what and how knowledge is represented in the CDSS?
3. Could the problem be more about culture change than about a tool, and, if so, what kinds of processes and teams are needed?

Question one is particularly compelling because it seems to be the kind of question that would be of interest to practitioners. This question suggests an incomplete solution in which the benefits of the CDSS are not readily apparent, and in which the knowledge presented is one-sided. That is, the CDSS as originally conceived would only provide information on what works—not on what does not work. The question also suggests that something more than a CDSS “alone” is needed. In addition, the question of how points to a need for further explication of problems, and how a CDSS could help practitioners approach those problems. Question two suggests a need for practitioners to have input on the knowledge represented within the CDSS, as well as how that knowledge is represented. The current state of the design is such that researchers filter academic knowledge into a format that can be matched to specific student criteria; however, there are currently no mechanisms for practitioners to share their own knowledge and experiences in the system. Finally, question three points to a larger issue which might well be central to the issue of relative lack of adoption of EBPs in practice—that of culture change. The dichotomy of the academy and the practice has been well documented, and some point to DBR as a potential method for bridging the polarizing “either/or” thinking that pervades
towards a more inclusive “with/and” model (Smith et al., 2013).

Question three points to a larger issue

Conversely, an EPSS can be useful, but needs to have the ability for teachers to share their own information. A knowledge management system that allows them to keep track of their own students and then make it a true community of practice among teachers, rather than “a tool”

Could be part of a larger solution – it's a tool “we” (academics) develop, and people then come to us to get information. This differs from a knowledge base in which practitioners can add their own knowledge.

The EPSS is like telling them “this works so do it”, but do they have input? Allowing practitioners to contribute would allow them to find contexts or situations that most closely resemble their own.

Practitioner knowledge should not be ignored

But, as others maintain McKenney and Reeves (2011) maintain, knowing what works is not sufficient. Practitioners need to know the how, when and why, for instance, the likelihood of successful implementation based on realities of a local school or classroom context.

Given that the EPSS will be used by practitioners, there is a clear need for establishing and leveraging collaborations between researchers and practitioners. From a research perspective, DBR allows us to determine the impact of the system on student outcomes using reliable and valid measures and research designs from which causality can be reasonably inferred. From the practitioner perspective, DBR also embraces the importance of specific, contextual variables and focuses on the impact of an intervention in educational settings rather than general efficacy.
• Gaining credibility for a system would require that practice based evidence be collected and practitioners treated as key stakeholders
• PBE as tacit knowledge of professionals
• Do we really know what their problems are? They are being told “what works,” but research shows they are not using it for a number of reasons.
  ○ Kligner's paper shows that teachers rely on intuition more than anything else, or ask another teacher or principal
• Give practitioners voice
  ○ What do they think the actual problem is?
• Practice-based evidence is a powerful concept and fits with thinking regarding DBR
• Reversing the roles of the researcher and practitioner could be informative – starting with the practitioners in order to gain their experience and add that to the EPSS/knowledge base and then searching for “what works”
• Collaboration between practitioners and researchers is important in order for EBP and PBE to work in conjunction with one another.
• Designing the process by which practitioners reflect on the solutions that have worked and then figuring out how to interpret it – this is needed as it is hard for practitioners to put this into words

New directions suggested by Theme 2.

Theme 2: Articulation of theoretical framework through identified solution

What is my theoretical frame? What are the 4-5 major problems? I need to explicate these in order to better lay out my theoretical foundation.

Talk focused on the design of a system, but not necessarily on the solution to a problem.

What are the big problems?

New directions suggested by Theme 3.

Theme 3: Premature identification of a solution

Is this running to the solution first?

New directions suggested by Theme 1.
**A few ways to conceptualize this project**

- 3 “models”
  - Start with EBPs to build an EPSS (researcher focus)
    - This seems like the model that was used to create the WWC
  - Start with PBEs to build a knowledge base (practitioner focus)
  - Work together to build an EPSS/knowledge base (integrated focus)

1. **Practice-based evidence**

**Conclusion**

**What I have learned about DBR (drawn from experience at conference and videos)**

1. There is some question as to whether DBR is accepted
2. All agree DBR is in its infancy
3. DBR isn't new – scholars have been doing it for a while, just with different names (see the citations in the videos)
4. Is DBR in the same place as qualitative research in the 1980s? Rick West
   1. Are there parallels between DBR as an emerging research approach and qual?
5. DBR is not seen as a method or a field – but what is it?
Research in general

- Many critiques of the “gold standard” approach espoused by the what works clearinghouse
  - referred to as the “what doesn't work clearinghouse”
- Medical research looked to as a model, but is that a reasonable model given the issues they are having (Ionnidas' work and Bryan's work “are research findings false”)
  - Does social science really have the evidence that if we do something it makes people's lives better?
- Knowing what works isn't enough (Cobb 2004) – how, when, and why equally important

Design-based research

1. DBR – where are we now?
   1. The process of iteration and moving towards educational impact seems to be well articulated in the literature; however, more clarity as to how the theoretical outcomes of DBR can be realized is needed.
   1. Look into videos I took for suggested directions
2. The DBR collective in 2004 set the framework for the following 10 years of DBR, but where do we go from here?
   1. Look into videos I took for suggested directions
3. Explicate relationship between and practice so that we may challenge the of hegemony of RCTs as the single spice / gold standard for educational research. If that connection were clearer then DBR may find greater acceptance / better understood or just understand the role It plays in educational research .... Better position to determine if, when, and how it serves a role in educational research. Elevate above evaluation...toms not just what but what how and why.

Conclusion

The field of special education is beginning to look at DBR as a potential conduit for approaching problems like scaling up and the research to practice gap, and it has been argued here that the use of DBR in special education could result in meaningful synergies between researchers and practitioners in this field. The question becomes, how might the DBR approach be forwarded in special education? Three questions seem key to making the DBR approach more accessible and understandable in special education researcher and practitioner discourse communities:

1. How might general guidelines of rigor and relevance for DBR be applied specifically in this field?
2. How might frameworks for establishing cooperative relationships between researchers and practitioners be effectively established?

3. How might the unique research methods used in special education be incorporated into a broader DBR research methodology?

In addition to this, clear examples from the field of special education that illustrate implementation of DBR and subsequent outcomes are needed. Few exist (for exemplary work, see (Palincsar, Magnusson, Collins, & Cutter, 2001), and more are needed. It could be the case that the current base of examples in the literature is insufficient, and hypothetical use cases or case studies will need to be developed.

References


