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Abstract

At least some of the challenges faced in special education, such as the disproportionate representation of culturally and linguistically diverse students, the gap between research and practice, and inequitable educational opportunities, can be explained in part by a research gap, or, in other words, a failure to conduct the different types of research best suited for addressing the complicated issues faced in schools. In this article we discuss the benefits of being more open to and welcoming of mixed methods when conducting special education research. We provide an overview of mixed-methods research and explain different philosophical concepts associated with mixed methods. We emphasize why it is important to foreground culture when conducting educational research. We also compare educational research with research in the medical field and challenge the notion of randomized controlled trials as the “gold standard.” We finish by sharing an example of our own mixed-methods research.

Keywords

mixed methods research, research to practice, qualitative research

At least some of the challenges faced in education, such as the achievement gap between White students and students of color (Lee, 2002), the disproportionate representation of culturally and linguistically diverse students in special education (Donovan & Cross, 2002; Harry & Klingner, 2006), the gap between research and practice (Elmore, 1996; Schneider & McDonald, 2007; Vaughn, Klingner, & Hughes, 2000), and inequities in educational opportunities (Ball & Forzani, 2007; da Silva, Huguley, Kakli, & Rao, 2007), can be explained in part by a research gap, or, in other words, a failure to conduct the different types of research best suited for addressing the complicated issues faced in schools. A broader view of research that encompasses mixed methods would enable special education scholars to collect empirical data relevant to issues involving culture, language, social interaction, and cognition (Gee, 2001), thereby expanding the kinds of research problems that can be addressed and the applicability of findings. Our position is that the U.S. Department of Education overrelies on randomized control trials for determining what works (Chatterji, 2005; Eisenhart, 2006; Raudenbush, 2005). At the very least, the practicability of randomized control trials is limited when the data collected are insufficient for contextualizing the results or for supporting real world applications (Spillane et al., 2010). Researchers sometimes gather and analyze a wealth of qualitative data that are never reported or used to understand quantitative findings because of the

premium placed on significance values and effect sizes. We claim that mixed methods that combine quantitative and qualitative research tools can support stronger scientific inferences than when either is employed in isolation (Feuer, Towne, & Shavelson, 2002) and that mixed methods are better positioned to determine what works (Creswell & Plano Clark, 2011). On this point, Raudenbush (2005), a highly respected quantitative research methodologist, asserts,

The question before us now is not whether to employ mixed methods in education research generally; rather, the question is how to employ them in the service of a newly dominant research agenda that seeks to evaluate claims about the causal effects of interventions aimed to improve teaching and learning in the nation's classrooms. . . . Well-designed randomized experiments are, I believe, necessary but not sufficient for determining what works. (p. 25)

Mixed-methods designs are better suited to unraveling educational phenomena “of enormous complexity” (Berliner, 2002, p. 20). “Because the U.S. education system is so

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heterogeneous and the nature of teaching and learning so complex, attention to context is especially critical for understanding the extent to which theories and findings may generalize to other times, places, and populations” (Shavelson & Towne, 2002, p. 5). Educational programs are implemented in real world contexts, in authentic schools, with characteristics that are both unique to a particular context and shared across contexts. Mixed-methods research can help to establish cross-context patterns of regularity and determine unique within-site variables (Greene, 2005). Whereas quasi-experimental and experimental approaches provide information about which instructional methods are most effective in a general sense, qualitative research helps establish which contextual factors may influence the success of an approach. Mixed methods can lead to insights about possible challenges to implementation as well as the circumstances under which a practice is most likely to be successful, adding depth and breadth not available through quantitative designs alone. We propose that it is not enough to ask, “What works?” Researchers must also ask, “What works with whom, by whom, in what contexts, under what circumstances, and for what purposes?” (Klingner & Edwards, 2006). Mixed-methods research can answer questions about why a particular approach works for some children and not others (Raudenbush, 2005). For example, by observing teachers’ implementation of a practice and interviewing teachers and students, researchers can begin to produce plausible explanations for variations in quantitative student outcome data, new hypotheses, and ideas for fine-tuning the practice, as well as for refining data collection and analysis methods. Such an approach can lead to more nuanced understandings of how school and neighborhood contexts, as well as linguistic and cultural variables, influence teacher implementation and student outcomes.

In this article we discuss the benefits of being more open to and welcoming of mixed methods when conducting special education research. We provide an overview of mixed-methods research and explain different philosophical concepts associated with mixed methods. We emphasize why it is important to foreground culture when conducting educational research and compare educational research with research in the medical field. We also share an example of our own mixed-methods research.

An Overview of Mixed-Methods Research

To generate a basic definition of mixed-methods research, Johnson, Onwuegbuzie, and Turner (2007) asked numerous leaders in mixed-methods research for their definitions of the approach and compiled their responses. They concluded that mixed-methods research is a combination of “elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative view points, data collection,

analysis, inference techniques) for the purposes of breadth and depth of understanding and corroboration” (p. 123). Mixed-methods research legitimizes the use of multiple approaches in answering research questions. It is inclusive, pluralistic, complementary, and eclectic.

Purposes of Mixed Methods

Mixed-methods research has several purposes and can address many types of research questions. The emphasis should always be on figuring out the most appropriate methods to address a specific purpose and answer particular questions. Mixed methods can illustrate and explain quantitative findings, describe both process and product, check reasons for unexpected effects, develop the basis for instruments, show the extent of generality, validate and triangulate other data, and fulfill social or political purposes (Krathwohl, 2009). There are several reasons for adding qualitative data before, during, and after intervention studies (adapted from Creswell & Plano Clark, 2011, p. 192):

Reasons for adding qualitative data before beginning the intervention:

- To develop an instrument for use in the study
- To understand the participants, context, and environment
- To document a need for the intervention
- To compile comprehensive baseline information

Reasons for adding qualitative data during the intervention:

- To validate quantitative outcomes with qualitative data representing participants’ perspectives
- To understand the impact of the intervention on participants
- To understand different characteristics of the participants that might affect outcomes
- To understand barriers and facilitators to the implementation of the intervention
- To understand participants’ experiences during the intervention
- To understand factors in the environment that might potentially affect the outcome of the intervention
- To check the fidelity of implementation procedures (and to understand why fidelity might be low)
- To identify potential mediating and moderating factors

Reasons for adding qualitative data after concluding the intervention:

- To understand participants’ perspectives on the results of the study

- To elicit participant feedback that can be used to revise the intervention
- To help explain quantitative outcomes
- To determine the long-term effects of the intervention
- To determine the extent to which teachers continue using an intervention
- To understand in more depth how the components of the intervention worked in a theoretical model
- To assess the context when comparing outcomes

Types of Mixed-Method Designs

Mixed-methods research can be designed in different configurations that vary depending on the order in which data are collected and which form of data collection is foregrounded. Creswell and Plano Clark (2011) described six possible designs. We list these designs here, along with sample research questions.

Convergent Design: Quantitative and qualitative data are collected concurrently, analyzed separately, and then merged.

To what extent do quantitative and qualitative findings converge?

Example: To what extent do self-esteem survey ratings agree with the views of middle school boys with learning disabilities (LD) about their self-esteem?

Explanatory Design: Quantitative data are collected and analyzed first; results are used to inform follow-up qualitative data collection.

In what ways do the qualitative data help to explain quantitative findings?

Example: In what ways do the views of middle school boys with LD about their self-esteem explain what they reported about their self-esteem on surveys?

Exploratory Design: Qualitative data are collected and analyzed first, results are used to inform follow-up quantitative data collection.

In what ways do the quantitative results generalize the qualitative findings?

Example: Are the views of middle school boys with LD about their self-esteem generalizable to many middle school boys with LD?

Embedded Design: Qualitative and quantitative data can be collected sequentially, concurrently, or both. One form of data is embedded within another.

How do the qualitative findings provide an enhanced understanding of the quantitative results?

Example: What are the characteristics of middle school boys with LD who scored very high or very low on self-esteem surveys?

Transformative Design: The researcher frames the study within a transformative theoretical perspective. Qualitative and quantitative data can be collected concurrently, sequentially, or both.

How do the qualitative findings provide an enhanced understanding of the quantitative results in order to explore inequalities?

Example: How do the views of middle school boys with LD help researchers to develop a treatment program?

Multiphase Design: Both sequential and concurrent strands are included in a study over a period of time (e.g., in a large-scale evaluation).

Include combinations of the previous questions at different phases in the project so that an overall research goal is addressed.

Underlying Philosophical Concepts

In this section we describe different philosophical concepts that are important for understanding and framing mixed-methods research: paradigms, pragmatism, ontologies, and epistemologies. These concepts lay the groundwork for how researchers view truth, knowledge, and their work and explain in part why different researchers value one approach to research over others. We include an illustration of how tensions between these concepts can play out while conducting special education research.

Paradigms. In his influential book *The Structure of Scientific Revolutions* (1962), Thomas Kuhn introduced the idea of “paradigm” as a specialized research term to mean a worldview and the various philosophical assumptions associated with that point of view (Teddle & Tashakkori, 2009). Since then, a research paradigm has come to signify a research culture that includes a set of beliefs, values, and assumptions shared by a community of researchers (Johnson & Onwuegbuzie, 2004). These include ontological beliefs and epistemological beliefs, which we explain in a later section.

Researchers generally align with one of three research paradigms (Teddle & Tashakkori, 2009): (a) a positivist or post-positivist paradigm (quantitative researchers), (b) a constructivist paradigm (qualitative researchers), or (c) a pragmatist paradigm (mixed-methods researchers). Positivist and constructivist paradigms predate the pragmatist paradigm. Creswell and Plano Clark (2011) noted that it was not until the 1980s that several researchers first described their use of mixed methods. Thus, mixed-methods research is referred to as the third wave or third research movement (Johnson & Onwuegbuzie, 2004) and the “third research community” (Teddle & Tashakkori, 2009, p. 4).

Pragmatism is a paradigm that “rejects the either/or choices associated with the paradigm wars, advocates for the use of mixed methods in research, and acknowledges that the values of the researcher play a large role in interpretation of results” (Tashakkori & Teddle, 2003, p. 713). Pragmatism focuses on real life research problems and prioritizes the purpose of the study rather than the use of particular research designs. Researchers mix methods in ways that make the most sense given their research questions,

integrating qualitative and quantitative approaches and data analysis procedures and attempting “to open up inquiry to all possibilities while tying that search to practical ends” (Maxcy, 2003, p. 86).

In describing the roots of pragmatism, Maxcy (2003) noted that it is a “distinctly American philosophy” (p. 56). He explained that pragmatism began as a philosophical movement during the late 19th century, initiated by Charles Sanders Peirce and developed further by William James, John Dewey, George Herbert Mead, and Arthur Bentley, among others. These early pragmatists challenged the perspective that social science research could access the real world solely through a single scientific method. They redirected “the course of philosophy away from continental idealism and New World romantic transcendentalism and toward commonsense practical thinking” (Maxcy, 2003, p. 55).

We are pragmatists. We identify with the early pragmatists and their desire to address social problems and resolve conflicts. Maxcy (2003) explained that for them, “meaningful research began not with a single method or set of methods but rather with ordinary experience and the desire for a better world” (p. 53).

The parable of the elephant examined by several people in the dark (see Note 1) resonates with us and helps explain our preference for mixed-methods research. In this parable, each person feels a distinct, small part of the elephant, drawing a different conclusion about its nature. They then advocate for the veracity of their own conclusions, not realizing that the reality is actually more expansive than they were able to perceive individually. It was only possible to derive an accurate portrayal of the elephant by combining their diverse perspectives. As mixed-methods researchers, we are guided by constructivism, sociocultural perspectives, and cognitive psychology, to varying degrees. We think in terms of continua rather than dichotomies. We conduct randomized controlled trials, but believe that without the thoughtful integration of qualitative data, such quantitative studies can tell only part of the story (or help us feel part of the proverbial elephant).

Ontologies and epistemologies. *Ontology* refers to fundamental views about the nature of reality. Quantitative researchers are often characterized as thinking of reality as objective and singular. Qualitative researchers, on the other hand, think of reality as subjective and multiple. *Epistemology* is closely related to ontology and pertains to views of knowledge and where knowledge comes from, how knowledge is acquired, whether something can be known beyond the shadow of a doubt, and what counts as knowledge (Creswell, 2008). What individuals think they know and the kinds of knowledge they value are based on epistemological assumptions. As Krauss (2005) explains, in the positivist paradigm, the object of study is believed to be independent of researchers; researchers discover and verify knowledge through direct observations or measurements of phenomena, facts and establish by taking apart a phenomenon to examine

its component parts. Alternatively, the constructivist view represents the perspective that knowledge is established through the meanings attached to the phenomena studied, researchers interact with the participants in a study to obtain data, inquiry changes both researcher and participants, and knowledge is context and time dependent.

Researchers who adopt pragmatism are not necessarily interested in attempting to sort out epistemological/ontological issues. Rather, their interest lies in doing research that yields useful results (or results that work). They embrace various methodologies and perspectives. Greene (2005) focused on diversity and the melding of different epistemologies. She described mixed methods as “an approach . . . that actively includes, even welcomes, multiple methodological traditions, multiple ways of knowing and multiple value stances” (p. 208). She added,

Ways of knowing are understood as also ways of valuing. A mixed method way of thinking thereby actively engages with difference and diversity, again, of method and of values, as well as difference and diversity as manifest in the contexts in which we work. In short, a mixed method way of thinking is itself anchored in values of toleration, acceptance and respect—of multiplism and of difference. . . . Moreover, a mixed method way of thinking seeks better, more comprehensive understanding of educational phenomena, understanding that is woven from strands of particularity and generality, contextual complexity and patterned regularity, inside and outside perspectives, the whole and its constituent parts, change and stability, equity and excellence and so forth. That is, a mixed method way of thinking seeks not so much convergence as insight; the point is not a well-fitting model or curve but rather the generation of important understandings and discernments through the juxtaposition of different lenses, perspectives, and stances; in a good mixed methods study, difference is constitutive and fundamentally generative. (p. 208)

Spillane et al. (2010) cautioned mixed-methods researchers not to lose touch with the particular ontological or epistemological fundamentals of either qualitative or quantitative research. They also noted that although quantitative and qualitative forms of research can be compatible, the challenges of mixing these approaches should not be understated. Similarly, Johnson and Onwuegbuzie (2004) wrote that “philosophical debates will not end as a result of pragmatism” (p. 17).

An example of converging epistemologies from special education research: During a presentation at the 2010 Pacific Coast Research Conference, Doug Fuchs summarized contrasting ontologies and epistemologies for the audience. He explained that some scholars believe that the truth about “what works” can be determined through hard work and rigorous, carefully planned and executed research studies. He then noted that other scholars believe that truth is relative

and varies depending on circumstances and on the perspectives of those involved. He was contrasting two prevalent research paradigms considered by many researchers to be opposing: a positivist (or post-positivist) paradigm and a constructivist paradigm. Positivists are aligned with the scientific method and believe that “there’s a reality out there to be discovered” (Krathwohl, 2009, p. 620). Constructivists believe that knowledge is subjective, shaped by one’s experiences and background (Creswell, 2008).

Doug went on to tell about his Peer Assisted Learning Strategies (PALS) Scaling Up project, explaining that they had three sites, one in Nashville, another in Minnesota, and a third in South Texas. The scale-up study began as a randomized controlled trial with Grade 2–5 teachers assigned randomly to PALS and control groups. PALS teachers learned PALS and were provided with support to help them implement the program correctly. Findings across sites were mixed. Also, it appeared that adding “helpers” to boost implementation fidelity did not lead to greater outcomes (McMaster et al., 2010). McMaster et al. wrote, “The impact of an ‘evidence-based’ intervention may vary with changes in educational contexts” (p. 2).

Doug explained that they changed their design in the next year of the study to provide teachers with the option of making adjustments to PALS (but keeping certain critical components intact). Controls continued as controls; however, PALS teachers were able to choose whether they wanted to continue as “top-down” teachers conducting PALS “by the book” or make changes and be “bottom-up” teachers. Thus, in Year 2, the study became quasi-experimental because teachers were not assigned randomly to the two PALS conditions. McMaster et al. (2010) compared the achievement of students taught by top-down PALS teachers with the achievement of students taught by bottom-up PALS teachers and found that students who used modified versions of PALS outperformed their peers. McMaster et al. concluded, “It seems that teachers’ customizations increased PALS ‘fit’ with their specific classroom needs.” It appeared that context mattered. When we wrote to Doug about this, he explained that they looked hard for alternative ways of explaining their findings, such as possible differences between top-down and bottom-up teachers and their students, but could not find any. He cautioned, “But that doesn’t mean they don’t exist . . . So, ‘context matters’ is a logical conclusion to draw from our findings, but it is not the only possible conclusion” (D. Fuchs, personal communication, October 29, 2010). We also asked Kristen McMaster about this research (K. McMaster, personal communication, October 29, 2010), and she shared the following:

Evidence suggests that a balance of fidelity to core components of PALS and flexibility to customize PALS to fit particular classroom and student needs may enhance student achievement outcomes. In future research, it will be important to carefully consider what types of data and methodologies will shed light on relations among fidelity, flexibility, and student outcomes. Additional data could include class-

room observations and teacher and student interviews to elucidate the extent to which teacher buy-in, student motivation and engagement, and how other contextual variables influence teachers’ implementation of evidence-based practices and student gains that result.

After the PCRC presentation, we asked Doug which approach he now believes is best, and he responded that he thinks the answer is “somewhere in the middle.” We believe that “somewhere in the middle” is a good way to describe mixed-methods research. In addition, we think that this illustration shows why it is so valuable to include qualitative data when conducting intervention studies. Given the cultural and linguistic diversity of their sample, it also demonstrates the need for more research that focuses on language and culture.

Culture and Mixed Methods in Special Education Research

To make progress toward closing the research gap we described at the beginning of this article, we believe that special education researchers must broaden their perspectives by first understanding research as situated cultural practice and then conducting more mixed-methods research that explicitly addresses the needs of culturally and linguistically diverse students (Arzubiaga, Artiles, King, & Harris-Murri, 2008).

Research on culturally and linguistically diverse populations. Researchers have not done enough to focus on culturally and linguistically diverse students. The assumption by many seems to be that “one size fits all,” or, in other words, that the lessons learned from research with mostly White, middle class students can be applied to other students. For example, the National Reading Panel report “did not address issues relevant to second language learning” (National Institute of Child Health and Human Development, 2000, p. 3). Yet the recommendations from the report were widely touted as applying to all students (i.e., through Reading First). On the other hand, the National Early Literacy Panel (2008) did look for studies conducted with English language learners, as well as other culturally diverse children, but noted that there were “not yet studies focusing on these specific subpopulations or that allow examination of these subpopulations” (p. 120). Despite a lack of research, the authors recommended that it would be “prudent” to make a practice found to be effective with monolingual English-speaking children, code-focused instruction, “available to all populations of young children, at least until research more directly addresses this question” (p. 120). However, the extent to which code-based instruction helps young English language learners is an empirical question and one that we suggest would best be answered through mixed-methods research. Other research suggests that a more prudent approach with English language learners would actually be to focus on oral language skills, vocabulary, and background knowledge

(Dickinson, Hirsh-Pasek, Neuman, Burchinal, & Golinkoff, 2009; Gutierrez, Zepeda, & Castro, 2010).

Prichard and Klingner (2010) examined reading intervention studies published between 2001 and 2009 and found that in several research studies, the authors did not give adequate consideration to student variation (e.g., regarding ethnicity and language proficiency) and overgeneralized their findings as applying to students not part of their research populations. Similarly, Artiles, Trent, and Kuan (1997) conducted a review of 22 years of empirical research published in special education journals and found that diversity was rarely addressed. They noted that the number of articles published with a focus on diversity was “alarmingly low” and concluded that many educational researchers form generalizations about culturally and linguistically diverse students without attending to population validity and ecological validity or designing research that is sensitive to cultural differences. Lindo (2006) analyzed interventions for African American student populations and found few studies that specifically examined and reported demographic results. In analyzing research conducted with English language learners, Bos and Fletcher (1997) and Artiles et al. (2005) found a scarcity of research on within-group diversity among English language learners. Researchers rarely described in sufficient detail the demographics, language proficiency, and other characteristics of English language learners. Without this information it is difficult to determine the validity of an intervention for different subpopulations of students. We recommend much greater attention to understanding the characteristics of participants in research studies.

A related problem is that English language learners are often omitted from research samples precisely because of their less-than-fluent language. Yet language dominance and proficiency are important research variables and can and do affect treatment outcomes. Leaving students out of studies further limits the external validity and applicability of such studies, especially for teachers who have English language learners in their classes.

Research as situated cultural practice. One reason that more researchers do not focus on cultural and linguistic diversity may be that they operate within a post-positivist paradigm and a belief that research and practice can be acultural. By disregarding the influence of culture, they view research, as well as teaching and learning, as technical enterprises (Arzubiaga et al., 2008). They do not understand the cultural nature of research or adequately account for culture when conceptualizing, designing, and carrying out their investigations. In emphasizing the importance and centrality of culture when conducting research in the social sciences, Demerath (2006), citing Stearns (2003), noted that “culture influences, indeed, powerfully shape the human condition.” More systemic inquiry on cultural processes “could elevate the place of cultural findings in an intellectual community that, particularly in the United States, has become excessively devoted to a scientism that tends to ignore culture” (p. 101).

Thus, we argue for a paradigm shift so that research will be seen as situated cultural practice. Arzubiaga et al. (2008) challenged special education researchers to view themselves as cultural beings and members of a scientific field, and to recognize the cultural presuppositions in that field’s habitual practices. What problems to study, which theoretical perspectives to adopt, where to conduct research and with whom, which measures to use, how to analyze data, which findings to highlight, and how to interpret results are all informed by cultural presuppositions. Acknowledging this is perhaps the first step toward becoming more culturally aware. As Arzubiaga et al. noted, “Special education and psychology research must be based on a view of ‘human nature that places culture at the center of its concerns’ (Cole, 1998, p. 291)” (p. 312).

The second step is to move beyond a view of culture as a static, unitary construct that is “neatly bound across groups” (Arzubiaga et al., 2008, p. 312) or that stereotypes individuals and boxes them into categorical identities (e.g., poor, Latino, low-achieving student). Rather, culture is complex and dynamic (Gutierrez & Rogoff, 2003; Rogoff, 2003). Culture reflects one’s beliefs, how one learns, what one values, and how one interacts with others (Klingner & Soltero-González, 2009). Within any cultural group is much variability. Individuals belong to multiple cultures into and out of which they move fluidly. Cole and Engeström (1993) explained that although cultures demonstrate patterns, “there is also no doubt that [they are] far from uniform, because [they are] experienced in local, face-to-face interactions that are locally constrained and heterogeneous with respect to both ‘culture as a whole’ and the parts of the entire toolkit experienced by a given individual” (p. 15). It is important to consider the cultural practices an individual brings to a situation, as well as the institutional cultures that provide the context within which interactions take place (McDermott, Goldman, & Varenne, 2006). Arzubiaga et al. (2008) noted that adopting this view of culture as cultural practices allows researchers to pose more complex questions about learning and instruction than otherwise would be possible. It is through these complex questions, addressed with mixed methods, that researchers can begin to close the research gap.

An example of the power of qualitative research to explain quantitative findings: Success for All (SFA) has been a highly touted instructional program. For example, it was one of three school reform programs found to be strongly associated with improvement in student achievement by the American Institutes for Research (Herman et al., 2000). Yet, studies of the effects of a 3-year implementation of SFA in Miami-Dade County, Florida, showed that achievement did not improve in the highest-need schools (Levitt, 2000) and that English language learners in SFA schools made smaller gains in English proficiency than students in comparison schools (Urdegar, 2000). The creators of SFA warned that their program is effective only when “fully implemented” (Slavin & Madden, 2001, p. 34), and observers commented that SFA

must not have worked in Miami-Dade County because it was not implemented with fidelity.

As part of a larger study in South Florida, schools focused on understanding the reasons for the disproportionate representation of culturally and linguistically diverse students in special education (Harry & Klingner, 2006). Klingner, Cramer, and Harry (2006) examined the challenges faced by four high-need urban schools when trying to implement SFA. The students in these schools were predominantly African American or Caribbean Black (mostly from Haiti), with almost 100% of the students receiving free or reduced-price lunches. Klingner and colleagues wanted to understand the reading instruction students were receiving as well as how SFA fit into the larger school context. Over a span of almost 2 years, the researchers observed 45 SFA lessons (21 complete and 24 partial) across the four schools, implemented by 30 different teachers. Klingner et al. found that several issues affected the fidelity with which teachers implemented SFA. One of the greatest challenges was that students were not able to pass the tests that would allow them to move to higher levels of the program. Thus, they recycled through material they had already covered, sometimes many times. This added to students' boredom and frustration and created behavioral challenges. Teachers faced numerous grouping and scheduling difficulties, resulting in students of different reading levels and widely varying grade levels being placed in the same class. It appeared that teachers tried in good faith to implement SFA as it was designed but faced very real challenges that made it difficult to do so. Perhaps most importantly, it was the teachers who made adaptations so that SFA could work in their classrooms, with their students, who seemed to be most effective. By observing in classrooms and interviewing teachers, Klingner et al. learned a great deal that could inform future efforts to implement SFA in high-need urban schools. These rich qualitative findings are important when viewed in light of the quantitative outcomes, namely, low fidelity and low student scores. It is qualitative methods that are most responsive to the local context. This example shows why a combination of qualitative and quantitative methods is best able to answer questions about complex phenomena. It also illustrates the importance of understanding the context within which interventions are carried out, as well as cultural practices at play. Additionally, it demonstrates what Ball and Forzani (2007) described when they noted, "Often lacking is research that explains causes or examines the interplay at the heart of educational practice and policy." As do we, they argued for research that focuses on the "instructional dynamic" (p. 529).

Debunking Medical Science as the Gold Standard in Research

We contend that the research gap in special education is due in part to a narrow view of what counts as research. Several

years ago, the first author sat in the audience at an Office of Special Education Programs Project Directors conference as Russ Whitehurst (then the Director) explained that the field of education has much to learn from the field of medicine. He held up randomized controlled trials as the gold standard for research. However, medicine is not the exact science it is sometimes thought to be. When the first author was treated for a relatively rare form of cancer a few years ago and read every article she could find on her condition in medical journals and talked with doctors about a treatment plan, it became very clear to her that randomized controlled trials could provide little guidance. Not enough research had been conducted on her disease because there were too few patients with her particular form of cancer. No treatment had been found to have a statistically significant positive effect, in part because sample sizes were too small. When she asked about effect sizes, her doctors had no idea what she meant. Trying to follow recommendations from research conducted with patients with related conditions seemed of little help because each doctor with whom she spoke had a different opinion of what the best course of action might be. Ultimately, the treatment plan they came up with seemed to have as much to do with what they determined about her, her life style, and unique aspects of her condition as it did with guidance from the results of clinical trials. In other words, her doctors used mixed-methods research to formulate a plan, and her role was an active rather than passive participant.

Mixed methods are more prevalent in medicine than one might realize. Patients respond differently to the same treatment for many reasons, some of which medical experts indicate seem to be related to race (Bloche, 2004; Committee on Pharmacokinetics and Drug Interaction in the Elderly, Institute of Medicine, 1997; Harder, 2005). Yet, these differences very well could be due to social inequities and disparities in the health care provided across ethnic groups (Smedley, Stith, & Nelson, 2003).

Regardless of race, the effectiveness of medical treatments varies depending on multiple factors. Just as all students do not learn in the same way, not all patients respond in the same way to medical treatments. Consider medications for depression (Klingner, Sorrells, & Barrera, 2007). For example, although Paxil has been found to be effective for reducing depression through clinical trials with adults, among adolescents Paxil actually increases incidences of suicide and was banned in Great Britain (Alliance for Human Research Protection, 2003). Even with adults, Paxil, like other medications for depression, seems to work well for some patients but not others. The process of identifying the most effective drug for a given individual seems to be one of trial and error and collecting multiple sources of data, including interviews with the patient. Decisions about the most effective treatment are based on a variety of influences, forces, and decisions. Even in the field of medicine, it is not enough

to ask “What works?” Rather, physicians must ask, “What works with whom, under what circumstances, and with what effects?”

Erickson (2005) also challenged the idea of randomized field trials as the gold standard for educational research by drawing from the field of medicine. He relayed how a physician, upon hearing this idea during a discussion about the National Research Council’s (Shavelson & Towne, 2002) report on educational research, commented that “if knowledge development in polio research had had to depend only on conclusive findings from experiments, research on polio would today consist mainly of studies of the treatment effects of the iron lung” (p. 9). Just as in medicine, in education there is a place for large-scale clinical trials. But, as Erickson, noted, “the questions such approaches know how to answer are not the only ones worth asking” (p. 9). The potential power of qualitative data to enhance and explain quantitative findings should not be undervalued. We argue that the new gold standard in special education should be mixed-methods research that combines the best of multiple approaches in order to answer the “questions worth asking.”

A Mixed Methods Example From Our Research: Collaborative Strategic Reading

In this section, we highlight an example of mixed methods from our current research on Collaborative Strategic Reading (CSR) with struggling readers. The quantitative findings from this randomized control trial research are reported in Vaughn et al. (in press; see Note 2). CSR is an instructional approach designed to enhance the reading comprehension and content learning of students in diverse, heterogeneous classrooms. Students learn reading comprehension strategies and apply them while working with their peers in small, student-led collaborative groups (Klingner, Vaughn, Dimino, Schumm, & Bryant, 2001). To investigate the complex relationships between teaching reading strategies and student learning outcomes, we chose a sequential mixed-methods explanatory design (Creswell & Plano Clark, 2011; Onwuegbuzie & Teddlie, 2003; Tashakkori & Teddlie, 1998) to formulate our research questions and to guide our data collection and analysis. We focus here on the process of creating research questions and the progression of data collection related to student outcomes.

In our sequential mixed-methods research, we used research questions as a guide in an iterative process in which we analyzed data while we continued to collect additional data. Initial findings informed subsequent questioning, data collection, and analysis. For example, in our first overarching question, we asked: “Does Collaborative Strategic Reading improve reading outcomes for struggling readers in general education language arts and reading classrooms?”

We chose initial data-collection procedures by establishing the kinds of data needed to answer this research question. This included providing pre- and postassessments to all students in intervention and comparison classes. With this initial quantitative data analysis we could determine if CSR was working and for whom. We assessed the significance of the effect (p value) and the magnitude (effect size) and correlated these results with student demographic information. With results from these quantitative analyses, we were able to ask a second research question: “What components of CSR contribute to student learning?”

To answer this research question, we began with our quantitative results and then determined how we could probe more deeply into students’ learning. We collected additional data for analysis. We selected a representative sample of students for each teacher in the study (i.e., one class of students for each teacher). These students were provided with qualitative measures that included the analysis of student learning logs (student work products) and a discourse analysis of audio-recorded group discussions during class to determine how the strategies were enacted in the classrooms. This pronged approach provided a rich description of how the strategies were used by students and allowed us to correlate and triangulate findings across multiple data sources. In some cases, such as with student work products, qualitative data were “quantitized” (converted into quantitative representations; Tashakkori & Teddlie, 1998) in order to interpret results. The quantitative and qualitative data revealed themes about how strategies were used as well as the variability in the ways that students seemed to take up the use of new strategies. From these combined results, we see that additional data are needed to probe the use of reading strategies with struggling readers. Thus, we are now asking a third question: “How do struggling readers who made reading gains differ from struggling readers who did not learn reading strategies?”

To answer this question, we plan to formulate groups of students, on the basis of results from quantitative and qualitative findings, who either improve in strategy use or do not improve in strategy use during the study. A sample of these students will participate in an additional layer of data collection. These students will be given a think-aloud task to assess strategy use and will also be interviewed to determine their perceptions of the new reading strategies. Additional students will be interviewed and provided the think-aloud task until saturation is achieved (i.e., no new information emerges during coding; Strauss & Corbin, 1998). The integration of quantitative data from assessment scores with qualitative data from interviews, think-alouds, and learning logs should allow for an in-depth understanding of how struggling readers use reading strategies and why some struggling readers improve more than others.

Answering the question “What works?” is only one component of our CSR research. Through mixed methods, we

are able to probe more deeply into the complexities of how and why CSR might be associated with improved learning outcomes for struggling readers. We can better understand the circumstances under which CSR seems to be most effective, and with whom.

Conclusion

We have argued that there is a research gap in special education at least in part because the field has not embraced multiple research methodologies better suited to answering a range of important questions than quantitative-only designs. While experimental research provides a powerful and rigorous tool for answering questions about the efficacy of instructional methods, it does not readily address questions related to how and why these methods work or under what circumstances (Collins, Onwuegbuzie, & Sutton, 2006). In particular, it is not well-suited for addressing the complex issues found in today's culturally, linguistically, and socio-economically diverse classrooms.

Mixed-methods research has the potential to address real world issues and to provide the "optimal combination required for the powerful development of evidence and an explanation that will gain a consensus around the interpretation of the data" (Krathwohl, 2009, p. 620). Mixed-methods research has evolved to the point that it is a separate methodological orientation with its own worldview, vocabulary, and techniques (Tashakkori & Teddlie, 2003). It draws from quantitative and qualitative research traditions and combines them in unique ways to answer questions that cannot be answered through other means.

Yet mixed-methods research alone cannot solve every problem in education. Different approaches are needed. All research methods have strengths and weaknesses, and it is important to understand what each research methodology can and cannot do. Johnson and Onwuegbuzie's (2004) position reflects our thinking:

We do not believe that mixed-methods research is currently in a position to provide perfect solutions. Mixed-methods research should, instead (at this time), use a method and philosophy that attempt to fit together the insights provided by qualitative and quantitative research into a workable solution. (p. 16)

A possible weakness with mixed-methods research is that it does not automatically position research as situated cultural practice or account for the cultural practices inherent in schooling (Arzubiaga et al., 2008). Thus, we believe that researchers must go beyond mixed methods and a pragmatist stance to embrace a sociocultural perspective. A mixed-methods paradigm allows the space and flexibility to do this.

One criticism of some mixed-methods studies is that the researchers do not sufficiently integrate their qualitative and quantitative data. Spillane et al. (2009) lamented that

mixed-methods researchers "often use the two approaches in parallel, rather than in tandem. As a result, the potential of mixing methods is not maximized" (p. 7). Onwuegbuzie, Slate, Leech, and Collins (2009) asserted that the data analysis step can make or break a mixed-research study. They claimed that the more interactive and embedded the quantitative and qualitative analyses in a mixed methods study are, the more integrated and coherent the inferences from the study will be.

Mixed-methods research is a relatively new paradigm, with untapped potential. We hope that our colleagues in special education will embrace it as a way to make progress toward solving some of the field's most intractable problems.

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Notes

1. There are various versions of this parable. In some versions, the individuals are blind rather than in the dark. For one source for this parable, see Saxe, J. G. (1963). *The blind men and the elephant: John Godfrey Saxe's version of the famous Indian legend. Pictures by Paul Galdone*. New York: Whittlesey House.
2. We included findings from qualitative data in an earlier draft of this manuscript, but a reviewer and the journal editor asked us to delete them.

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