

# *Evidence-Based Practices and Implementation Science in Special Education*

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**ABSTRACT:** *Establishing a process for identifying evidence-based practices (EBPs) in special education has been a significant advance for the field because it has the potential for generating more effective educational programs and producing more positive outcomes for students with disabilities. However, the potential benefit of EBPs is bounded by the quality, reach, and maintenance of implementation. The cross-disciplinary field of implementation science has great relevance for translating the promise of EBPs into positive outcomes for children and youth with disabilities. This article examines the history, extent, and limitations of EBPs and describes the emergence and current state of implementation science as applied in special education. Subsequent articles in this special issue of Exceptional Children address a range of issues related to implementation science in special education: the research-to-practice gap, dissemination and diffusion, adherence and sustainability, scaling up, a model for state-level implementation, and fostering implementation through professional development.*

**E**ducators generally agree that broad implementation of practices shown by scientific research to reliably cause increased student performance (i.e., evidence-based practices; EBPs) will result in increased student outcomes (Cook, Smith, & Tankersley, 2012; Slavin, 2008b). Despite special educators' general affinity for the concept of EBPs, as Odom and colleagues (2005) suggested, the devil of EBPs is in the details. Odom et al. were referring to the difficulties involved in identifying EBPs (e.g., How many studies must support an EBP? What research designs should be consid-

ered? What quality indicators are necessary for a trustworthy study? What effects must a practice have to be considered an EBP?). Although these issues continue to be debated (see Cook, Tankersley, & Landrum, 2009a; Slavin, 2008a), there has been considerable progress in generating and applying guidelines for identifying EBPs in general (e.g., What Works Clearinghouse, WWC, 2011) and special (e.g., National Professional Development Center on Autism Spectrum Disorders, n.d.; National Secondary Transition Technical Assistance Center, n.d.) education. However, the EBP movement may have leapt from the frying pan into the fire: The progress made in identifying

EBPs has highlighted the devilish details involved with implementation of EBPs, which now need to be addressed.

The gap—described by some as a chasm (e.g., Donovan & Cross, 2002)—between research and practice is a recurring theme in special education. Indeed, we suspect that the gap has been present in special education as long as research and practice have co-existed. Attempts to bridge the research-to-practice gap by identifying and implementing effective practices are a rich part of special education's history (Mostert & Crockett, 1999–2000). Despite considerable focus on the research-to-practice gap (e.g., Carnine, 1997; Greenwood & Abbott, 2001) and on identifying EBPs as means to bridge it (e.g., Cook et al., 2009b; Odom et al., 2005), there is little evidence suggesting that the gap has been meaningfully reduced. For example, a U.S. Department of Education report (Crosse et al., 2011) noted that only 7.8% of prevention programs related to substance abuse and school crime used in over 5,800 schools met their standards for an EBP. And, in special education, practitioners have reported using instructional practices shown by research to be ineffective (e.g., learning styles) with similar or greater frequency than some research-based practices (e.g., mnemonics; Burns & Ysseldyke, 2009).

This special issue of *Exceptional Children* focuses on addressing some of the devilish details related to bridging the research-to-practice gap by achieving broad, sustained, and high-quality implementation of EBPs. There is an emerging field of implementation science (Eccles & Mittman, 2006) that can be applied in special education to enhance the utilization of EBPs. To contextualize consideration of implementation science related to EBPs in special education, it's important to define what an EBP is, as well as to be aware of critical caveats and controversies related to EBPs in the field of special education.

## EVIDENCE-BASED PRACTICES

### WHAT ARE EBPs?

Emerging from the field of medicine in the early 1990s (Sackett, Rosenberg, Gray, Haynes, & Richardson 1996), EBPs are practices and programs shown by high-quality research to have

meaningful effects on student outcomes. The logic behind EBPs is simple: Identifying and using the most generally effective practices will increase consumer (e.g., student) outcomes. This logic rests on the assumptions that the most effective practices were not previously identified, implemented, or both; and that certain types of research (i.e., high-quality studies using designs from which causality can be inferred) are the best tools to determine effectiveness. Although not without detractors (e.g., Gallagher, 2004; Hammersley, 2005) this logic has been generally accepted (Slavin, 2008b) and even written into law (i.e., the No Child Left Behind Act of 2001's emphasis on "scientifically based research").

Unlike previous approaches for identifying effective practices in education (e.g., best practices, research-based practices), supporting research for EBPs must meet prescribed, rigorous standards (Cook & Cook, 2011). Although specific standards for EBPs vary between and within fields, research support for EBPs generally must meet standards along several dimensions, including research design, quality, and quantity. Typical guidelines require that for a practice to be considered evidence-based it must be supported by multiple, high-quality, experimental or quasi-experimental (often including single-case research) studies demonstrating that the practice has a meaningful impact on consumer (e.g., student) outcomes.

Discussion and promotion of EBPs have become seemingly ubiquitous in education in recent years (Detrich, 2008)—EBPs are promoted in national, state, and local educational policies; in professional conferences, university courses, and professional development; in professional standards; and in informal discussions among educators. The federally funded WWC (<http://ies.ed.gov/ncee/wwc/>), established in 2002, is perhaps the most comprehensive and well known source of EBPs for education. Until recently, however, the WWC did not identify EBPs for students with disabilities, and now does so only for certain disability groups. (The WWC has begun reviewing the evidence base of practices for students with learning disabilities, in early childhood special education, and with emotional and behavioral disorders.)

To address the need for standards for EBPs designed for and by special educators, Gersten et

al. (2005) and Horner et al. (2005) generated standards for identifying EBPs in special education using group experimental and single-subject research, respectively, in a special issue of *Exceptional Children* (Odom, 2005). Since that special issue, various organizations and teams of special education scholars have used the standards proposed by Gersten et al. and Horner et al. (2005; e.g., Cook et al., 2009a), used standards adapted from Gersten et al. and Horner et al. (Odom, Collet-Klingenberg, Rogers, & Hatton, 2010), and developed independent sets of standards (e.g., National Autism Center, 2009) to begin to identify a corpus of EBPs in special education. These and other ongoing efforts to establish EBPs in special education represent an important advance for the field. However, EBPs are not a panacea, and considerable and fundamental work remains to be done if they are to meaningfully improve outcomes for children and youth with disabilities.

#### CAVEATS AND CONTROVERSIES

The introduction of EBPs in any field seems to be inexorably followed by a period of questioning and resistance, which certainly has occurred in education (e.g., Hammersley, 2007; Thomas & Pring, 2004). Although a complete discussion of caveats and controversies regarding EBPs in (special) education are beyond the scope of this article (see Cook et al., 2012 for an extended discussion), we focus our attention here on a few prominent issues of which special educators should be aware: EBPs are not guaranteed to work for everyone, identification of EBPs is incomplete and variable, and EBPs will not be implemented automatically or easily in the “real world” of schools and classrooms.

*EBPs Are Not Guaranteed to Work for Everyone.* No practice will work for every single student; this is a reality of education (indeed, for all social sciences) of which special educators are keenly aware. As such, when educational researchers speak of causality, they do so in a probabilistic rather than absolute sense. That is, saying that an instructional practice causes improved educational outcomes means that the practice reliably results in improved outcomes for the vast majority, but not all, students who receive the intervention. For example, Torgesen (2000) esti-

ated that the most effective early reading interventions do not positively impact between 2% and 6% of children. Researchers typically refer to students for whom effective practices do not cause meaningfully improved outcomes as treatment resisters or nonresponders. Although EBPs have relatively low rates of nonresponders, it is important to recognize that even when implemented with fidelity and over time EBPs will not result in optimal outcomes for all students. Thus, when selecting practices to use in special education programs, EBPs are a good place to start; but the application of an EBP, like any other instructional practice, represents an experiment of sorts in which special educators must validate its effectiveness for each individual child.

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*Incomplete and Variable Identification of EBPs.* Although more and more EBPs are being identified in both general and special education, because of the considerable time and expertise it takes to complete an evidence-based review (i.e., apply standards for EBPs to the body of research literature examining the effectiveness of a practice) many practices have not yet been reviewed. And because of the relative scarcity of high-quality, experimental research in the educational literature (Berliner, 2002; Seethaler & Fuchs, 2005), many evidence-based reviews result in the conclusion that there is simply not enough high-quality research utilizing appropriate designs to meaningfully determine whether a practice is evidence-based. In other words, just because a practice is not considered an EBP does not necessarily mean that it is ineffective. It is then important to distinguish between practices that are not considered evidence-based because (a) they have been shown by multiple, high-quality research studies from which causality can be inferred to be ineffective and (b) an evidence-based review has not been conducted or there is insufficient research to conclusively determine whether the practice is effective (Cook & Smith, 2012). The former practices should rarely if ever be used, whereas the latter might be implemented when relevant EBPs have not been identified or a student has been shown to be a nonresponder to identified EBPs.

Special educators also should recognize that there are many different approaches for identifying and categorizing EBPs. For example, Horner et al. (2005) proposed dichotomously categorizing practices (i.e., evidence-based or not evidence-based), Gersten et al. (2005) proposed a three-tiered approach (i.e., evidence-based, promising, and not evidence-based), and the WWC (2011) uses six classifications (i.e., practices with positive, potentially positive, mixed, indeterminate, potentially negative, and negative effects) to categorize the evidence base of practices. Moreover, approaches for identifying EBPs in education vary on specific standards for research design, quality of research, quantity of research, and effect size (see Cook et al., 2012, for an extended discussion). Accordingly, the evidence-based status of some practices will likely vary across EBP sources (Cook & Cook, 2011). It is important, then, to consider EBPs within the context of the specific standards used to identify them.

*Implementation.* The research-to-practice gap underlies what is probably the most vexing caveat related to EBPs: the difficulty in translating research findings to the everyday practices of teachers in typical classrooms. As EBPs in education began to be identified, relatively little attention was given to how to implement them, perhaps under the assumption that school personnel would eagerly and readily apply identified EBPs. However, as Fixsen, Blase, Horner, and Sugai (2009) noted, “choosing an evidence-based practice is one thing, implementation of that practice is another thing altogether” (p. 5). The problem of implementation is not unique to EBPs and likely underlies the generally disappointing outcomes associated with most school reform efforts (e.g., Sarason, 1993). Implementing and sustaining new practices involves a host of complex and interrelated problems, including issues related to the practice being promoted (e.g., relevance and fit to target environment, efficiency and practicality), users (e.g., available time, mistrust of research, knowledge of EBPs, skills), and the institutional context (e.g., available resources, organizational structures and culture, staffing, coaching, training, administrative support; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Nelson, Leffler & Hansen, 2009; Tseng, 2012).

Implementation issues have been referred to as “wicked” problems (e.g., Fixsen, Blase, Duda, Naoom, & Van Dyke, 2009; Signal et al., 2012) because, among other characteristics, they are moving targets that fight back (Rittel & Webber, 1973). For example, Fixsen, Blase, Metz, and Van Dyke (this issue) noted that organizational systems work to sustain the status quo by “overwhelm[ing] virtually any attempt to use new evidence-based programs” (i.e., fight back). In contrast, tame issues may be complex but they tend not to change or actively resist being solved. As difficult as it may be to address the tame issue of how to identify EBPs, it is a fixed, circumscribed issue that once solved, stays solved. It is hardly surprising, then, that typical, passive approaches for promoting the implementation of EBPs (e.g., “train and hope”) that do not provide systematic and ongoing supports almost invariably fail to address the wicked problems of implementation and therefore seldom result in broad, sustained change (Fixsen et al., 2005).

Implementation is the critical link between research and practice. Fixsen et al. (this issue) proposed a simple formula to represent the critical interaction of research efficacy and practice (implementation) in generating outcomes:

$$\text{Effective interventions} \times \text{effective implementation} = \text{improved outcomes}$$

The implication of this formula is that in the absence of implementation, even the most effective intervention will not yield desired outcomes. Glasgow, Vogt, and Boles (1999) conceptualized the slightly more elaborate RE-AIM framework to represent the importance of multiple dimensions of implementation in determining a practice’s real-world impact. The RE-AIM model considers four aspects of implementation in addition to a practice’s efficacy in determining impact— $R \times E \times A \times I \times M = \text{impact}$ , where:

- Reach: the proportion of the target population reached by a practice.
- Efficacy: the success rate of a practice when implemented appropriately.
- Adoption: the proportion of targeted settings that adopt the practice.

- **Implementation:** the proportion of interventionists who implement the practice with fidelity in real world settings.
- **Maintenance:** proportion of organizations (e.g., schools) and interventionists (e.g., teachers) who maintain implementation of the practice over time.

Imagine, for example, that a school district adopts an EBP for its students with learning disabilities in elementary schools. District personnel are understandably excited to begin the new year by rolling out a practice that has been shown by multiple, high-quality studies to meaningfully improve outcomes for, say, 95% of elementary children with learning disabilities. However, only 80% of elementary schools agree to participate in the project (reach). Further, given problems related to training, planning and instructional time, and reluctance to adopt new practices, only 70% of teachers within targeted schools end up using the practice at all (adoption). Due to sometimes ineffectual training and lack of ongoing support, perhaps only 60% of teachers who adopt the practice implement it with fidelity; and only 50% of those maintain their use of the practice over the entire school year. In this scenario, actual impact is calculated as

$$.95 \text{ (efficacy)} \times .80 \text{ (reach)} \times .70 \text{ (adoption)} \times .60 \text{ (implementation)} \times .50 \text{ (maintenance)} = .16$$

In other words, due to problems at various levels of implementation, the EBP actually had the desired impact on slightly less than 16% of elementary students with learning disabilities—a far cry from the rosy 95% efficacy that district administrators found so attractive.

After considering these numbers, it may seem that special educators would be better served by pursuing practices that appeal to teachers and are easily implemented, but which are less effective (i.e., typical practice), than by chasing the large effects of EBPs that may be difficult to realize. However, special educators sell themselves short—and, more important, do a disservice to the students they serve—by settling for practices with limited effects. Efficacy and implementation both set a ceiling for real-world impact. Just as a highly efficacious intervention that is not implemented will have no real effect, an ineffective

practice that is broadly implemented remains an ineffective practice that will, at best, have limited impact. When considering the importance of implementation, educators should not disregard the importance of efficacy, but rather realize the symbiotic relationship of efficacy and implementation in determining impact.

The recent emphasis on EBPs in special education is laudable, encouraging, and necessary, but identification of EBPs is insufficient without supporting their use in common practice (Odom, 2009). The challenge is how to achieve high levels of implementation of the most effective practices. Unfortunately, because sound research investigating implementation has been sparse, “we are faced with the paradox of non-evidence-based implementation of evidence-based programs” (Drake, Gorman, & Torrey; as cited in Fixsen et al., 2005, p. 35). Special educators do not yet have complete, empirically substantiated guidelines for supporting implementation of EBPs. The emerging field of implementation science has begun to address this issue by conducting research and generating theories regarding the implementation of EBPs.

## IMPLEMENTATION SCIENCE

In the inaugural issue of *Implementation Science*, Eccles and Mittman (2006) defined *implementation science* as “the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice” (p. 1). A number of related terms have been used to refer to this area of study (e.g., *knowledge utilization*, *knowledge transfer*, *knowledge translation*, *implementation research*, *translational research*, *diffusion*, *uptake*; Straus, Tetroe, & Graham, 2009). We use *implementation science* because, in our experience, it is the most frequently used term by contemporary education scholars. This is not meant to suggest that a definitive corpus of knowledge has been established in the area of implementation (i.e., a science of implementation); rather, it denotes a field of scientific inquiry in which issues related to implementation are investigated.

Implementation science, which draws on a rich history of foundational research investigating

implementation in various fields (e.g., Rogers, 1962; see Weatherly & Lipsky, 1977, for an example in special education), is associated most closely with the second of two phases of translation research. The first phase of translating research into practice involves the relatively neat, orderly, and relatively well funded, endeavors of conducting and synthesizing applied research to determine what works in real-world settings (i.e., establishing EBPs; Hiss, 2004). Hiss suggested that Phase 2 translation research, which investigates adopting and sustaining the EBPs identified in Phase 1 translation research, tends to be messy and poorly funded. However, with the recent increase in attention being paid to implementation (or lack thereof), funding appears to be increasing. For example, the W. T. Grant foundation recently funded 15 research projects in general education designed to examine how research is used to inform policy and practice in local schools (Tseng, 2012).

Essentially, the goal of inquiry in implementation science is to research and understand how innovations are adopted and maintained, so that implementation moves from “letting it happen” to “making it happen” (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004). As has been the case with the vast majority of previous education reforms, letting EBPs happen (i.e., assuming that they will be implemented by virtue of their identification) has proven largely unsuccessful (Tseng, 2012). To bring about the broad and sustained implementation of EBPs, special educators need to (a) look to the lessons learned thus far from implementation science and (b) identify what is not known about making EBP implementation happen and conduct research to systematically fill those gaps in our knowledge base.

Based on their comprehensive review of the literature in implementation science, Fixsen et al. (2005) concluded that the relatively sparse experimental research in implementation science indicates that providing guidelines, policies, information, and training are not enough to “make it happen.” In contrast, long-term, multi-level strategies tend to result in successful implementation. The authors gleaned seven core implementation components (or implementation drivers) that, when in place and functioning at a high level, can routinely change and improve

practitioner behavior related to the implementation of EBPs: staff selection, preservice and inservice training, ongoing consultation and coaching, staff evaluation, program evaluation, facilitative administrative support, and systems interventions (i.e., “strategies to work with external systems to ensure the availability of the financial, organizational, and human resources required to support the work of the practitioners,” p. 29). They suggested that purveyors—change agents who are experts at identifying and addressing obstacles to implementation—are critical for utilizing core implementation components to achieve broad and sustained implementation of EBPs.

Schoolwide positive behavior support (SWPBS) is a good example of a program used in special education that incorporates lessons from implementation science into its design (see McIntosh, Filter, Bennett, Ryan, & Sugai, 2010). Indeed, SWPBS implementation is guided by a model incorporating five principles drawn from implementation science: contextual fit, priority, effectiveness, efficiency, and using data for continuous regeneration (McIntosh, Hornèr, & Sugai, 2009). For example, SWPBS practices are modified to maximize fit with the environment in which they will be implemented, although modifications are made with a strong understanding of SWPBS such that they do not violate the integrity of core components of the intervention (i.e., fidelity with flexibility; see Harn, Parisi, & Stoolmiller, this issue). Moreover, SWPBS frequently utilizes structures such as state leadership teams that lead and coordinate training, coaching, and evaluation to systematically support and scale up SWPBS (see Fixsen et al., this issue; Sugai & Horner, 2006). Such attention to the principles of implementation science has, no doubt, contributed to SWPBS’s extensive, sustained, and effective application (e.g., Horner, Sugai, & Anderson, 2010).

Fixsen et al. (2005) defined *implementation* broadly: “activities designed to put into practice an activity or program” (p. 5). Thus, virtually any activity involved in the implementation process might be considered under the purview of implementation science. The topics addressed in this special issue of *Exceptional Children* (i.e., a theoretical framework for linking research to practice, dissemination, balancing fidelity with flexibility

and fit, scaling-up implementation efforts, statewide implementation efforts, and professional development) are by no means exhaustive of the many and varied elements of implementation science that have application for special education. We have included topics that represent what we believe to be among the most critical areas for improving the implementation of EBPs in special education.

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#### **ARTICLES IN THIS SPECIAL ISSUE**

The purpose of this special issue, and each of the articles in it, is two-fold: (a) review emerging evidence in the area of implementation science that special education scholars, policy makers, administrators, and other stakeholders can apply to advance the implementation of EBPs and (b) provide a framework for identifying unanswered questions for future research to explore related to implementation of EBPs in special education. In the first article, Smith, Schmidt, Edelen-Smith, and Cook propose a conceptual framework for understanding and bridging the research-to-practice gap. Drawing from Stoke's (1997) Pasteur's quadrant model, they posit that rather than dichotomizing research as either rigorous or relevant, research must be both rigorous and relevant to be translated into practice and positively impact student outcomes. Smith et al. propose that educational design research conducted within communities of practices is a promising approach for conducting relevant and rigorous inquiry that will facilitate implementation of EBPs.

One of the critical stages of translating research to practice is disseminating and diffusing EBPs. Unfortunately, EBPs are primarily disseminated in traditional and passive ways (e.g., journal articles, research briefs) that hold little sway with the practitioners who actually implement the practices. In the second article, Cook, Cook, and

Landrum explore a variety of approaches for actively and effectively disseminating research-validated practices. They utilize Heath and Heath's (2008) SUCCESS model, which posits that dissemination efforts that "stick" are simple, unexpected, concrete, credible, emotional, and conveyed as stories. They provide theoretically and empirically validated dissemination approaches that might be utilized and researched further by special educators in each of these areas.

If practitioners do not implement EBPs with fidelity or as designed, the practices may not have the same positive effect demonstrated in research studies. However, in the third article, Harn, Parisi, and Stoolmiller note that demanding rigid adherence to predetermined procedures will decrease the likelihood that practitioners will adopt and sustain a practice. Moreover, practitioners being more concerned with adherence than meeting the needs of their students may actually decrease EBP effectiveness. Harn et al. discuss different aspects of the multifaceted construct of implementation fidelity and how programs and practices can be designed flexibly so that they can be implemented with fidelity but still meet the needs of different students in varying educational contexts.

In the fourth article, Klingner, Boardman, and McMaster discuss issues related to scaling up EBPs. The issue of scale is of critical importance in implementation science. Although implementing an EBP in a single school will positively impact the outcomes of a limited number of students with disabilities, if implementation of EBPs is addressed one school at a time, the research-to-practice gap is likely to remain wide. Klingner et al. propose a model of scaling up at the district level that involves district-researcher partnerships, integrating new practices with other district initiatives, tailoring the EBP to the districts' needs, enlightened professional development that includes team building and coaching, and district leadership that ensures communication with school personnel. They also provide an example of the model in practice.

In the fifth article, Fixsen and colleagues from the National Implementation Research Network (NIRN) apply a model of implementation science to address the problem of promoting programs that utilize EBPs for students with disabilities. They emphasize the importance of building

an infrastructure at the state level, and propose a framework that involves external systems change support, the creation of an executive management team, a process for training and support that flows from policy to practice levels, and, of particular importance, a feedback loop that incorporates information from the practice level into ongoing planning to support implementation.

The sixth article relates Odom, Cox, Brock and the NPDC Research Group's design of a professional development program supporting improvement in program quality and practitioners' use of EBPs for students with autism spectrum disorders, which followed an implementation science process based on the work of Fixsen, NIRN, and others. The process begins with developing a planning team at the state policy level, selecting a team or teams for providing technical assistance and coaching, providing training to practitioners and technical assistance providers together, and transferring control from professional development projects (i.e., Fixsen et al.'s, this issue, external systems change support) to state providers.

## CONCLUSION

We have been involved with two previous special issues of *Exceptional Children* that, respectively, set forth guidelines for identifying EBPs in special education (Odom, 2005) and applied those guidelines to a variety of research bases in special education to identify EBPs in our field (Cook et al., 2009b). We believe that this work has helped to advance the potential role of research in practice, although the actual impact of EBPs on the outcomes of children and youth with disabilities is unavoidably bounded by implementation. EBPs cannot have an impact unless they are implemented. Difficulties with implementation are not unique to education, and they have spawned an emerging multidisciplinary field of implementation science, dedicated to better understanding how to translate research knowledge into practice. It will be important for special education scholars to understand and apply relevant lessons from the implementation science literature, some of which are included in this special issue, to realize the fruits of their labor related to EBPs; that is, to translate research findings into improved practice

and student outcomes. This special issue is, we believe, a fitting conclusion to what is now a trilogy of *Exceptional Children* special issues on EBPs. Implementation is the next, and arguably most critical, stage of evidence-based reforms.

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