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Implementation Science in Special Education: Foundations, Methods, and Directions for Research and Practice

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Jessica R. Toste [1, 2, 3]
James D. Lee [1, 3]

Abstract

Despite substantial advances in the development of evidence-based practices (EBPs) for students with disabilities, persistent challenges remain in translating these practices into routine, high-quality use in real-world special education settings. Implementation science provides a systematic approach for understanding and addressing the contextual, organizational, and system-level factors that influence the adoption, delivery, and sustainment of EBPs. This article positions implementation science as a critical lens for special education research and practice, emphasizing its relevance in light of legal mandates, equity considerations, and the complexity of service delivery across the lifespan. Key distinctions between intervention and implementation research are clarified, highlighting their complementary roles in improving student outcomes. Core components of implementation science, including frameworks, strategies, and implementation outcomes, are described and illustrated across early intervention, K-12, and transition contexts. The article concludes by outlining methodological, policy, and practice implications and presenting practical planning tools to support researchers and system leaders with the design of rigorous, contextually responsive implementation studies in special education.

Keywords: implementation science, evidence-based practices, research-to-practice gap

The past several decades have seen substantial growth in the development and testing of interventions designed to improve outcomes for students with disabilities. Across academic, behavioral, social-emotional, and self-determination domains, special education researchers have built a robust and increasingly nuanced evidence base identifying practices that can support student success. Yet the field continues to confront a familiar and persistent challenge: many evidence-based practices (EBPs) do not make their way into routine use in the classrooms and programs where students with disabilities receive services. Even when adoption occurs, implementation is often inconsistent, short-lived, or insufficient to produce meaningful change.

Implementation science offers a systematic way to understand and address this persistent disconnect between knowing and doing. Implementation science focuses on the methods, strategies, and contextual conditions that influence whether EBPs are adopted, integrated, and sustained in real-world service settings such as schools, early intervention (EI) programs, and community agencies. While intervention research focuses on the "what" of educational change, what practices lead to improved outcomes for students, implementation science focuses on the "how" of successful delivery and maintenance. This includes attention to contextual determinants, implementation strategies, and implementation outcomes that shape whether EBPs are used effectively, consistently, and equitably.

[1]The University of Texas at Austin, Department of Special Education; [2]Meadows Center for Preventing Educational Risk; [3]Center for Research to Community Impact. The preparation of this article was supported in part by the Research Institute for Implementation Research in Education (RIISE), funded by the U.S. Department of Education, Institute of Education Sciences (R305B210004). Dr. Toste was a RIISE Fellow from 2022-2024 and Dr. Lee was a RIISE Fellow from 2023-2025.

Correspondence concerning this article should be addressed to Dr. Jessica Toste, 1 University Station, D5300, Austin, TX 78712. Email: jrtoste@austin.utexas.edu

As intervention researchers, we are already deeply invested in implementation, often designing professional development, coaching models, manuals, or fidelity tools to support the use of the interventions we develop. Yet we often know more about whether an intervention works than how to support its use at scale in real-world settings. The purpose of this article is to bring implementation science into clearer focus for special education research and practice. We begin by outlining why studying implementation is especially critical in special education, given its legal mandates, equity commitments, and persistent challenges in scaling EBPs. We then clarify the distinction between intervention research and implementation research, emphasizing the complementary roles each plays in improving student outcomes. A subsequent section provides an overview of implementation science concepts, including frameworks, strategies, and outcomes, and illustrates how they apply to special education contexts across the lifespan. We conclude by discussing methodological implications and policy considerations and by calling for a more systematic integration of implementation science into special education research and improvement efforts.

This article is intended for special education researchers, implementation scientists, and system leaders (e.g., district administrators, instructional coaches, program developers) who are engaged in designing, studying, or scaling EBPs. We aim to provide both conceptual grounding and practical tools to support implementation-focused inquiry and decision-making.

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WHY STUDY IMPLEMENTATION IN SPECIAL EDUCATION?

Although a research-to-practice gap exists across many areas of education, its implications are particularly consequential for students with disabilities. Special education was designed to ensure access to individualized, evidence-informed instruction and services that general education alone may not provide. The Individuals with Disabilities Education Act (IDEA) requires the use of EBPs, ongoing data-based decision making, and sustained services that are responsive to individual needs. Yet despite these mandates, the implementation of EBPs in special education settings remains uneven. Students with disabilities may receive interventions that are mismatched to their needs, implemented with low fidelity, or discontinued prematurely. These implementation challenges limit the potential of EBPs to meaningfully improve academic and functional outcomes.

The barriers to high-quality implementation are not simply a matter of individuals' behavior. Special education operates within complex ecosystems that span federal and state policy, district structures, school leadership, staffing patterns, resource allocation, professional development systems, and variability in student needs. Intervention trials often include supports—such as intensive coaching, reduced caseloads, dedicated materials, or researcher oversight—that are not typically present in everyday school contexts. When these supports are removed or reduced, even the most effective interventions may be difficult to implement.

Students with disabilities are disproportionately affected by these implementation challenges. They often rely on specialized, intensive, and sustained interventions; they may require coordinated support across multiple providers; and they are more vulnerable to the consequences of inconsistent or low-quality instruction. Thus, studying implementation in special education is not ancillary—it is necessary to fulfill the promises of both the research evidence and the federal mandate to provide a free and appropriate public education.

Implementation research can help identify the multilevel factors that influence whether EBPs are delivered with fidelity and sustained over time. These factors include leadership engagement, implementation climate, provider knowledge and beliefs, logistical barriers (e.g., scheduling, staffing), and system-level policies. Studying implementation also helps illuminate what happens

after initial training—how educators interpret intervention materials, what adaptations they make, and what supports they need to deliver the intervention effectively. Importantly, implementation studies provide actionable insights for improving systems-level conditions that support durable, scalable use of EBPs.

This focus is further illustrated by evidence across special education contexts, including autism intervention, school mental health, intensive academic interventions, and data-based decision-making. In autism research, multiple reviews and longitudinal studies have shown that interventions with strong empirical support are inconsistently implemented or gradually discontinued in early intervention and school settings, often because of limited training opportunities, lack of ongoing coaching, and insufficient administrative or organizational support (e.g., Lee et al., 2025; Stahmer et al., 2021). Similar patterns have been documented in school mental health, where practices initially adopted with fidelity frequently decline once external supports are removed or competing initiatives are introduced (e.g., Lyon & Bruns, 2019). In reading research, well-validated instructional routines and intervention programs are often adapted, simplified, or abandoned in practice, particularly in the absence of structured implementation guidance and sustained professional development (e.g., Shapiro et al., 2024). Likewise, data-based decision-making frameworks—despite decades of evidence supporting their effectiveness—are frequently underused or misunderstood, limiting their potential to inform instruction and intensify intervention (e.g., Choi et al., 2024; Mandinach et al., 2015). Collectively, these examples underscore the need for research that moves beyond demonstrating whether an intervention works to understanding how to make it work for the educators and systems serving students with disabilities.

INTERVENTION AND IMPLEMENTATION RESEARCH

Intervention research in special education focuses on whether a practice, program, or approach improves targeted outcomes for students or, in some cases, changes in educator behavior. This includes efficacy studies that test interventions under controlled conditions and effectiveness studies that examine their use in more typical school environments. Intervention outcomes generally include student achievement, behavior, social-emotional competencies, or other educational or developmental indicators.

Implementation research shifts the focus to the processes and conditions that enable successful delivery of an intervention in the settings where it is intended to be used. In this context, the intervention refers to the educational or clinical innovation itself, while implementation refers to the strategies, activities, and system-level supports that promote adoption, integration, and sustainment. Implementation research examines determinants (e.g., organizational climate, provider attitudes, resource constraints), tests implementation strategies (e.g., coaching models, leadership training, audit and feedback), and evaluates implementation outcomes (e.g., fidelity, feasibility, acceptability, adoption, sustainability). These outcomes are distinct from intervention outcomes, though they ultimately influence the likelihood that an intervention will benefit students.

Without attention to implementation, the field often observes a pattern in which EBPs with strong efficacy evidence fail to achieve consistent or widespread use. For example, implementation-focused reviews in autism intervention have identified numerous EBPs that show promising effects but are inconsistently delivered across EI and school settings, often due to misalignment between intervention demands and system-level capacities. Similarly, reviews of data-based individualization and data-based decision-making practices suggest that educators may endorse these approaches but struggle to enact them with fidelity over time. These examples illustrate why implementation research is essential for understanding how interventions function in the complexity of real-world special education environments.

Intervention and implementation research are not competing paradigms; rather, they are mutually reinforcing. Intervention research identifies what works, while implementation research helps determine how to support its effective use in diverse contexts. Effectiveness-implementation hybrid designs and other integrated approaches explicitly combine these perspectives, generating both effectiveness and implementation evidence within a single study. Advancing outcomes for students with disabilities requires research that moves beyond the question of whether an intervention works to also address how, for whom, and under what conditions it can be successfully enacted and sustained. A central challenge in special education is that knowing that an intervention works does not guarantee that it will be used effectively, consistently, or equitably in the places where students receive services. Intervention research identifies the practices that improve outcomes, but implementation research illuminates the multilevel systems, contextual determinants, and practical supports necessary for those practices to take hold and endure. To advance both research and practice, the field must integrate these perspectives and intentionally study the processes that bridge intervention development

and real-world use. The following section provides an overview of implementation science—its frameworks, strategies, and outcomes—and illustrates how these tools can guide more effective and sustainable implementation of evidence-based practices across EI, K-12 schooling, and transition services.

WHAT IS IMPLEMENTATION SCIENCE?

In implementation science, the goal is to enhance the uptake of EBPs within routine care settings, such as schools, EI programs, or other community-based service environments. To do this, implementation science draws on a set of frameworks, strategies, and outcomes that structure the systematic process of supporting EBP use in real-world contexts. Before introducing these components, it is essential to clarify the context in which implementation is discussed. As noted above, implementation science distinguishes between the intervention itself (the "thing") and the strategies used to support its uptake, integration, and sustainment in practice (Curran, 2020). While an intervention focuses on what is being delivered, implementation focuses on how it is delivered effectively, consistently, and equitably within a specific service context, for example, providing coaching to teachers, establishing data systems, or allocating professional development time.

This distinction is especially important given the complexity of implementation efforts and the ease with which the two concepts can be conflated. For example, intervention outcomes typically reflect clinical or educational benefits experienced by end users, such as improved student achievement or engagement. In contrast, implementation outcomes capture indicators of how well the intervention is integrated into practice, such as implementation climate, fidelity, feasibility, or sustainment (Proctor et al., 2011). These implementation outcomes are essential for understanding not only whether an intervention works, but also how, for whom, and under what conditions it can be scaled and sustained in real-world settings.

Implementation science relies on a range of theories, models, and frameworks (TMF), strategies, and outcomes to guide the planning, execution, and evaluation of implementation efforts. These tools help researchers and practitioners structure implementation processes, identify contextual determinants, and select appropriate supports. The subsections that follow provide an overview of these core components.

IMPLEMENTATION THEORIES, MODELS, AND FRAMEWORKS

Although often interchangeably used, TMFs in implementation science offer conceptual guidance for the design, assessment, and interpretation of implementation efforts. They help identify relevant determinants, describe the phases of implementation, and clarify which outcomes should be assessed. Although the number of available TMFs is large, more than 140 according to Wang et al. (2023), they generally fall into three major categories: determinant frameworks, process models, and evaluation frameworks (Nilsen, 2015; Tabak et al., 2023).

These TMFs serve different but complementary purposes (see Table 1 for an overview). Many implementation studies use more than one type of TMF, for example, drawing on a determinant framework to identify barriers and a process model to organize implementation activities.

DETERMINANT FRAMEWORKS

Determinant frameworks identify multilevel factors, such as organizational conditions, leadership, provider attitudes, policies, and resource availability, that influence implementation outcomes. These frameworks help researchers and practitioners understand why implementation succeeds or encounters barriers and which contextual influences are most relevant in a given setting. The Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2022) is a widely used determinant framework that organizes determinants into five domains: intervention characteristics, outer setting, inner setting, characteristics of individuals, and implementation processes. CFIR is commonly used for conducting needs assessments, guiding formative evaluation, and selecting implementation strategies that respond to identified barriers and facilitators.

PROCESS MODELS

Process models describe the temporal and iterative nature of implementation. They outline the phases that implementation efforts typically progress through and provide structure for planning, sequencing, and monitoring activities. The Exploration, Preparation, Implementation, Sustainment (EPIS; Aarons et al., 2011) is one of the most widely used process models. Exploration involves assessing needs, considering the fit of an innovation, and

Table 1
Overview of Implementation Theories, Models, & Frameworks

Type	Purpose & Key Question Addressed	Representative Examples
Determinant Frameworks	• Identify factors (barriers and facilitators) that influence implementation • What contextual, organizational, and individual factors affect EBP adoption, fidelity, and sustainment?	*Consolidated Framework for Implementation Research (CFIR)* Damschroder et al. (2022)
Process Models	• Describe stages or phases of implementation and guide systematic planning • What steps occur from exploration to sustainment, and how should activities be sequenced?	*Exploration, Preparation, Implementation, Sustainment (EPIS)* Aarons et al. (2011)
Evaluation Frameworks	• Specify what should be measured when evaluating implementation and its outcomes • How do we assess reach, adoption, fidelity, sustainability, and overall implementation quality?	*Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM)* Glasgow et al. (1999)

engaging stakeholders. Preparation consists of planning for implementation by building capacity, establishing supports, and developing materials or procedures. Implementation refers to actively using the innovation, monitoring fidelity and feasibility, and providing ongoing support as needed. Sustainment focuses on institutionalizing the practice and maintaining its use over time, ensuring that the intervention remains viable once initial supports are removed. Process models such as EPIS help structure complex implementation efforts and encourage teams to anticipate the shifting requirements of each phase.

EVALUATION FRAMEWORKS

Evaluation frameworks provide structured guidance for assessing the quality and impact of implementation efforts. They clarify which aspects of implementation should be measured and ensure that evaluation extends traditional intervention outcomes to capture how an innovation functions in routine practice. A widely used example is the RE-AIM framework, which includes Reach, Effectiveness, Adoption, Implementation, and Maintenance (Glasgow et al., 1999). Reach reflects the proportion and characteristics of individuals who receive or benefit from the innovation. Effectiveness captures its impact under typical service conditions. Adoption concerns the extent to which providers or organizations decide to implement the practice. Implementation addresses the fidelity and consistency of delivery, including adaptations and resource use. Maintenance refers to the persistence of the practice over time at both the individual and organizational levels. Together, these dimensions highlight the importance of evaluating both the immediate use of an innovation and its longer-term integration.

Evaluation frameworks also help distinguish between outcomes associated with the intervention and those associated with the implementation process. They guide the selection of appropriate measures, such as fidelity assessments, feasibility or usability surveys, and organizational indicators, so that implementation quality is captured systematically. By specifying outcomes that reflect real-world use, evaluation frameworks support a more comprehensive understanding of whether an innovation is reaching intended users, being delivered as intended, and positioned for sustained use.

IMPLEMENTATION STRATEGIES

To advance EBPs from research and theory into routine practice, researchers have developed a range of

purposeful methods, commonly referred to as implementation strategies, to support the adoption, integration, and sustainment of innovations. Although implementation strategies are, in a sense, "interventions" designed to enhance implementation of a clinical or educational innovation (i.e., "the thing"), the field distinguishes them terminologically to avoid confusion. As with implementation TMFs, a wide array of implementation strategies exists, reflecting work across diverse populations and service systems. Powell et al.'s (2015) conducted an Expert Recommendations for Implementing Change (ERIC) review in which they identified 73 distinct strategies commonly used across healthcare, education, and related fields. These strategies vary considerably, from discrete actions such as training, coaching, reminders, or audit and feedback, to more complex organizational or systems-level approaches such as policy enactment or restructuring service delivery.

Building on this work, Waltz et al. (2015) utilized ERIC to further refine these categories into nine distinct clusters of implementation strategies based on stakeholder consensus. These ERIC clusters organize 73 discrete strategies into functional groups, such as (a) using evaluative and iterative strategies, (b) providing interactive assistance, (c) adapting and tailoring to context, (d) developing stakeholder interrelationships, and (e) training and educating stakeholders. The compilation also includes clusters focused on supporting clinicians, engaging consumers, utilizing financial strategies, and changing infrastructure. Some of these strategies involve a single, discrete action—for example, sending reminders to educators or conducting a fidelity check. Others are multifaceted, combining multiple discrete strategies into a coordinated approach, such as pairing a workshop with follow-up coaching, or embedding several strategies within an implementation model.

Selecting and deploying implementation strategies effectively requires careful attention to the organizational or community context. Because implementation barriers and facilitators vary across settings, strategies typically need to be adapted or combined to address local determinants of practice. Implementation packages (Powell et al., 2015) and implementation toolkits (e.g., Lee et al., 2024; Piat et al., 2025) are common approaches to coordinating multiple strategies into coherent, context-responsive supports. When selected and tailored systematically, strategies are more likely to improve implementation outcomes such as fidelity, feasibility, acceptability, and sustainability (Proctor et al., 2011).

Several tools exist to guide this process of identifying and adapting implementation strategies. One well-established method is implementation mapping (Fernandez et al., 2019), which provides a structured sequence of activities: conducting a needs assessment; identifying outcomes, performance objectives, determinants, and change objectives; selecting theoretical methods and designing strategies; developing protocols and materials; and evaluating implementation outcomes. Implementation mapping is intentionally flexible, allowing researchers and practitioners to tailor strategies to the needs of a particular innovation, organization, or population. For example, a district team might use implementation mapping to identify barriers to delivering a reading intervention, select coaching and data-use routines as strategies, and develop materials to support consistent implementation across schools.

IMPLEMENTATION OUTCOMES

Implementation outcomes are key indicators used to assess how effectively implementation strategies increase the uptake and use of an EBP. Implementation outcomes differ from intervention outcomes and are used to assess how well strategies support EBP use. In a study designed to test implementation strategies, primary outcomes should reflect implementation constructs (e.g., fidelity, feasibility, adoption), not clinical or educational effects. Conversely, in a study designed to test the efficacy of an intervention, outcomes related to student or client change are the primary focus. Conflating these types of outcomes can obscure the mechanisms through which change occurs, leading to incorrect conclusions about whether an intervention itself was ineffective or whether implementation challenges limited its impact. This distinction is particularly important in effectiveness-implementation hybrd designs, which examine both types of outcomes simultaneously and are discussed in a later section.

Proctor et al. (2011; 2023) identified a widely used taxonomy of implementation outcomes, including acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration, and sustainability. Acceptability reflects how agreeable or satisfactory stakeholders find the intervention or the implementation process. Adoption refers to the decision or action to use the intervention in a particular setting. Appropriateness captures the perceived fit or compatibility of the intervention within the local context. Cost refers to financial resources required to implement the practice. Feasibility reflects whether an intervention can be used within existing resources and structures. Fidelity indicates the extent to which the intervention is delivered as intended. Penetration describes the spread or degree of integration of the intervention

within a service system. Sustainability concerns the continuation of implementation over time once initial supports diminish.

A recent scoping review by Lee et al. (2025) illustrates current trends in the field. In their analysis of 13 autism intervention studies using implementation science methods, fidelity was the most frequently evaluated outcome, reflecting the priority placed on determining whether EBPs are delivered as intended in real-world conditions. Outcomes such as acceptability, adoption, and feasibility appeared less consistently, and outcomes focused on longer-term sustainment—such as penetration or sustainability—were rarely assessed. This pattern suggests that many implementation efforts remain concentrated in early phases of rollout rather than long-term scale-up and maintenance.

Given the centrality of determinants, strategies, and outcomes in implementation science, it is essential that these elements be conceptually and taxonomically aligned. Strategies should be selected based on specific determinants identified within the local context (van der Laag et al., 2024), and implementation outcomes should provide evidence that the strategies are addressing those determinants effectively. For example, in a district aiming to strengthen their services for students with autism, consider a scenario in which multiple determinants have been identified: limited provider knowledge of autism EBPs (a provider-level barrier), strong organizational support for improving services (an organizational-level facilitator), and new legislation increasing funding for professional development (a system-level facilitator). A coherent implementation plan would align strategies to each determinant, such as offering online EBP modules for providers, creating recognition or incentive structures to support high-quality implementation, and leveraging state-level resources to sustain professional development.

Aligning strategies with determinants in this manner increases the likelihood of achieving successful adoption, integration, and sustainment of EBPs. Addressing provider-level barriers builds foundational knowledge; organizational incentives reinforce engagement and high-quality use; and system-level supports ensure the infrastructure needed for long-term maintenance. Continuous assessment of implementation outcomes then serves as a feedback loop, allowing teams to refine strategies in response to evolving needs and contextual changes. Through this iterative process, implementation efforts become more responsive, targeted, and capable of producing durable improvements in practice.

CONDUCTING IMPLEMENTATION SCIENCE RESEARCH IN SPECIAL EDUCATION

Special education across the lifespan—from EI for infants and toddlers through transition services for young adults—offers a rich and complex context for studying implementation. Given the legal mandates and accountability structures embedded in the IDEA (2004), special education is both highly in need of and uniquely suited for implementation research. The following sections describe the key research questions that guide implementation work in special education, the essential role of practitioner and stakeholder collaboration, and methodological considerations that support rigorous, contextually grounded implementation science.

KEY RESEARCH QUESTIONS IN SPECIAL EDUCATION IMPLEMENTATION RESEARCH

A central area of inquiry concerns the factors that facilitate or hinder the implementation of EBPs across EI, K-12, and transition settings. These determinants span multiple levels, including leadership support, implementation climate, organizational readiness, provider attitudes, and system-level policies. Given the layered nature of special education systems and the individualized needs of students with disabilities, these influences may differ substantially across service contexts and developmental stages.

A second guiding question concerns how contextual factors shape implementation fidelity and sustainability. Teacher training, administrative structures, staff turnover, caregiver engagement, school culture, and resource allocation can each influence whether EBPs are delivered as intended and sustained over time. These contextual considerations are especially salient in special education, where multidisciplinary teams, individualized plans, and diverse disability profiles interact with implementation processes.

A third question centers on adaptations. Implementation researchers increasingly study how EBPs are modified to enhance contextual fit, and how such adaptations can be distinguished from modifications that compromise core components. Recent work highlights the importance of understanding both intentional and naturalistic adaptations, particularly in classrooms where EBPs must integrate into existing routines. For example, Bearss et al. (2022) employed the Discover, Design/Build, Test (DDBT) framework to systematically adapt the Research Units in Behavioral Intervention (RUBI) parent training

program for use in educational settings. By integrating user-centered design, they were able to address contextual fit and ensure the intervention was effective and feasible for the time constraints of a real-world classroom.

Empirical studies illustrate these questions in action. Stahmer et al. (2023) examined readiness for autism EBPs across California schools and regional agencies, revealing significant variability in implementation climate, leadership, and provider attitudes. Findings indicate the need for differentiated supports across organizational layers. Similarly, the UNITED study protocol (Locke et al., 2022) demonstrates how a multisite, lifespan-oriented approach can illuminate implementation determinants and strategies across EI, elementary, and secondary settings. Together, these lines of inquiry position special education as a compelling area for studying implementation processes and generating practical knowledge for improving EBP delivery.

COLLABORATION WITH PRACTITIONERS AND COMMUNITY STAKEHOLDERS

Implementation research in special education requires intentional, sustained collaboration with practitioners and other community stakeholders. Teachers, paraprofessionals, related service providers, administrators, and caregivers possess critical contextual knowledge about the feasibility, usability, and fit of EBPs in daily practice. Their insights help identify local barriers, refine implementation strategies, and shape adaptations that maintain core components while improving contextual alignment.

Such collaboration varies across service settings. In EI settings, implementation often centers on caregiver coaching and interdisciplinary teaming. In K-12 environments, collaboration may involve general and special educators, paraprofessionals, and specialists working within complex organizational structures. Transition settings may require coordination with vocational services, community agencies, and families. Across each context, practitioner involvement enhances both implementation quality and social validity.

Community-Based Participatory Research (CBPR) provides a structured model for equitable collaboration among researchers, practitioners, families, and communities. In CBPR, community members participate as co-designers and co-investigators, shaping research questions, refining implementation strategies, interpreting findings, and determining next steps. For example, a school-based team might partner with researchers to adapt an intervention by modifying lesson pacing, aligning materials with district curricula, and identifying feasible coaching routines, while preserving core instructional components. Within special education, research-practice partnerships have been used to enhance cultural responsiveness, reduce implementation burden, and ensure that EBPs align with local priorities and constraints (e.g., Terry & Bingham, 2023). CBPR emphasizes relational collaboration, but participatory principles also influence methodological choices, particularly mixed methods approaches and iterative refinement processes, discussed in the following section.

METHODOLOGICAL CONSIDERATIONS IN SPECIAL EDUCATION IMPLEMENTATION RESEARCH

As implementation questions become more nuanced, methodological approaches must be capable of capturing both the complexity of educational systems and the mechanisms through which implementation processes unfold. Special education, with its diverse service models and highly contextualized practices, requires methodological approaches that balance rigor with relevance.

To orient readers to the methodological decisions described in this section, Figure 1 provides a process flowchart that integrates key elements of implementation science. To further ground these considerations in practice, we include three applied examples (vignettes) that illustrate how implementation science is operationalized across different research and practice contexts. Together, these examples demonstrate how implementation science can be integrated within real-world contexts to address critical special education questions.

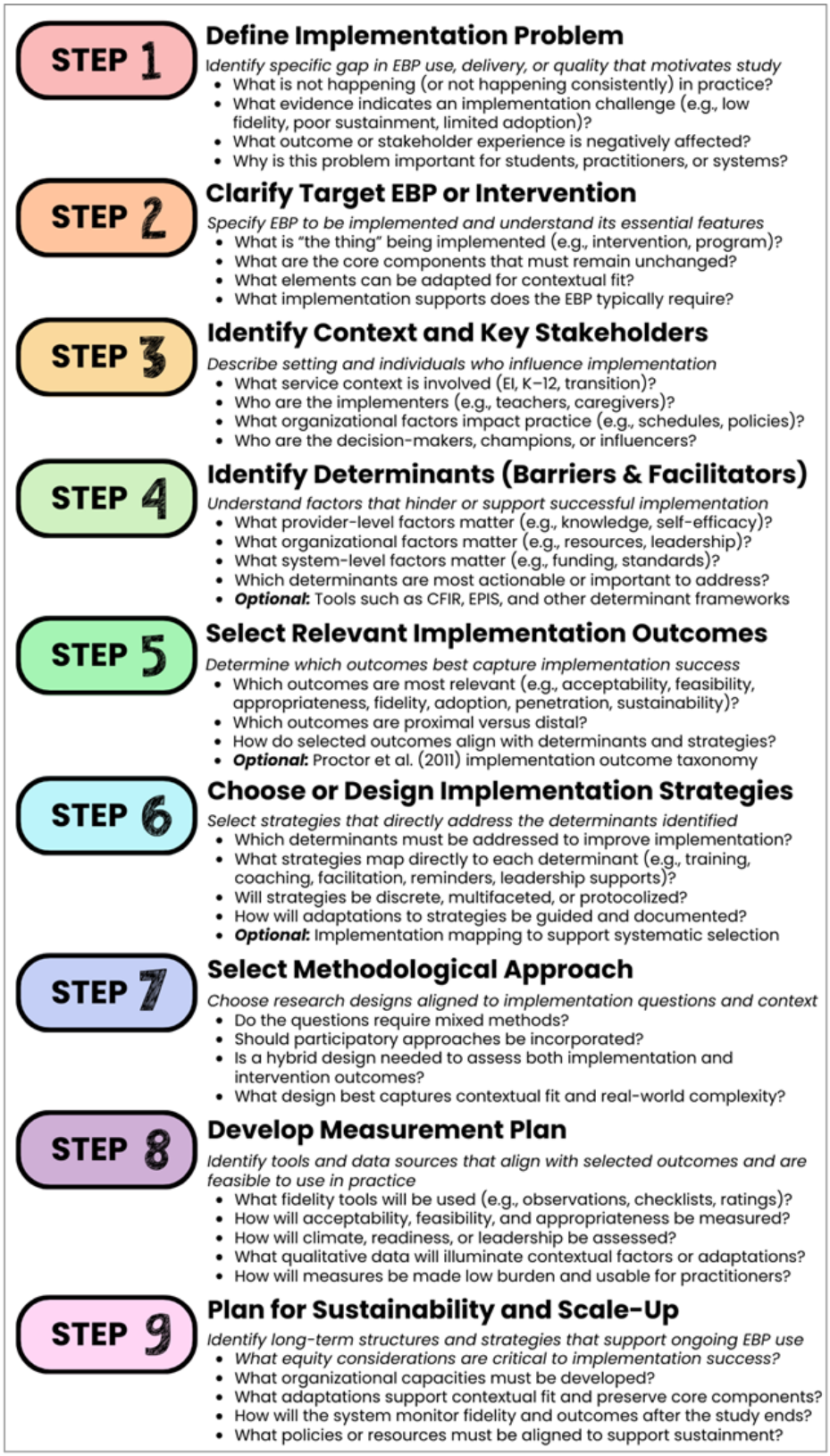
IMPLEMENTATION MEASURES

Rigorous implementation research depends on high-quality measurement. Fidelity tools—such as structured observations, checklists, and session-level scoring—assess whether EBPs are delivered as intended. Tools such as those developed by Ruble et al. (2020), which integrate fidelity and teaching quality for autistic students, exemplify attention to both instructional precision and contextual complexity.

Additional measures assess perceptions of acceptability, feasibility, and appropriateness (Weiner et al., 2017), while organizational-level instruments such as the School Implementation Climate Scale (Thayer et al., 2022) and the Implementation Climate Scale for Early Intervention (Lee et al., 2026) capture broader system influences. Practitioners frequently assist in reviewing

Figure 1

Process Flowchart for Designing an Implementation Science Study in Special Education



and refining these tools to ensure feasibility, low burden, and alignment with daily workflows.

Applied Example #1:
Considering Implementation Measures to Strengthen Fidelity of Reading Intervention Delivery

In a school implementing a supplemental reading intervention for students with dyslexia (word-level reading disability), instructional leaders observed variability in how the intervention was delivered across classrooms, raising an **implementation problem** related to inconsistent fidelity. A team of teachers, instructional coaches, and administrators worked together to examine how **context** influenced intervention delivery, including scheduling constraints, competing instructional priorities, and differences in teacher experience.

Through this process, the team identified key **determinants**, including unclear expectations for implementation, limited opportunities for feedback, and variability in teachers' understanding of core instructional components. To address these challenges, the team determined that instructional coaching would make sense as an **implementation strategy** focused on strengthening fidelity. They developed of a brief observation checklist aligned with the intervention's core components, along with procedures for regular observation by the coaches and feedback cycles. Teachers were actively involved in refining the checklist to ensure it was feasible, low burden, and aligned with typical instructional routines.

The **evidence-based practice** consisted of a validated reading intervention program, with fidelity defined in terms of adherence to core instructional routines and quality of delivery. The **measurement** plan included structured observations by coaches using the fidelity checklist, supplemented by teacher self-report measures of feasibility and acceptability. In addition, the team incorporated an organizational measure of implementation climate to better understand system-level supports for consistent delivery.

Data from these measures were used to guide ongoing coaching and instructional adjustments, creating a feedback loop between measurement and practice. To support long-term use, fidelity tools and observation routines were embedded into existing coaching structures and data team meetings, with continued attention to feasibility and alignment identified as critical for **sustainment and scale-up**.

MIXED METHODS APPROACHES

Mixed methods research designs are well aligned with implementation research in special education. Quantitative methods, such as randomized controlled trials, observational fidelity assessments, and surveys, provide evidence about intervention effects, implementation outcomes, and system-level determinants. Qualitative approaches—such as interviews, focus groups, document review, and classroom observations—reveal contextual nuances, adaptations, and practitioner perspectives that often shape real-world feasibility. Integrating these data sources allows researchers to understand not only *whether* an implementation strategy works but *how, why,* and *for whom* it works (Leko et al., 2022; Palinkas et al., 2019). Common mixed methods designs include convergent, explanatory sequential, and exploratory sequential structures, each suited to the iterative and context-sensitive nature of implementation research.

Mixed methods CBPR (MM-CBPR; DeJonckheere et al., 2019) extends participatory approaches by explicitly integrating qualitative and quantitative methods within a power-sharing framework. Community partners participate across all phases of the research cycle, from defining questions to interpreting data and deciding next steps. In addition to this integration, MM-CBPR emphasizes iterative refinement of data sources. Techniques such as merging datasets, connecting phases, or constructing joint displays support continuous reflection and adaptation. In special education, MM-CBPR is especially valuable for identifying context-specific barriers (e.g., schedules, staffing, policy constraints), triangulating fidelity and mechanism data, and producing actionable adaptations that enhance fit.

Applied Example #2:
Mixed Methods to Inform Transition Planning Practices

Researchers focused on transition outcomes for students with intellectual and developmental disabilities (IDD) recognized an ongoing **implementation problem** related to schools developing inconsistent and often compliance-driven transition plans that did not meaningfully support students' postsecondary goals. A research-practice team, including special educators, transition specialists, school leaders, and family members, worked collaboratively to examine how **context and stakeholders** influenced transition planning, particularly given differences in team

coordination, available resources, and expectations for student outcomes.

Through this collaboration, the team identified key **determinants**, including limited time for interdisciplinary planning, unclear roles and responsibilities across team members, and variability in educator knowledge of evidence-based transition practices. To address these challenges, the team designed a mixed methods study integrating both quantitative and qualitative data sources to inform improvement efforts. Quantitative data included structured reviews of transition plans, indicators of goal quality and alignment, and educator surveys assessing feasibility and acceptability. Qualitative data were collected through interviews with educators and families, focus groups, and document review to better understand how transition planning processes were enacted and experienced in practice.

Consistent with a **mixed methods approach**, data were analyzed using a convergent design in which quantitative and qualitative findings were examined together to identify actionable insights. For example, patterns in goal quality and alignment were interpreted alongside qualitative data to better understand how team collaboration, family engagement, and competing demands shaped planning practices. Elements of **community-based participatory research** were incorporated, with educators and families contributing to interpretation of findings and co-developing adaptations to improve relevance and feasibility.

Findings from integrated data sources informed refinement of **implementation strategies**, including clearer protocols for transition planning, targeted professional learning, and structures to support family engagement and interdisciplinary collaboration. Ongoing use of both quantitative indicators and qualitative feedback created a continuous improvement cycle, supporting more responsive and contextually grounded implementation and contributing to the **sustainment and scale-up** of effective transition planning practices.

HYBRID EFFECTIVENESS-IMPLEMENTATION DESIGNS

Hybrid designs provide an additional methodological tool for studying EBPs within real educational systems. Unlike traditional linear models in which efficacy, effectiveness, and implementation studies occur sequentially, hybrid designs allow researchers to examine intervention effects and implementation processes simultaneously—accelerating the translation of EBPs into practice. Curran et al. (2012) describe three types of hybrid designs along a continuum. In a Type 1 design, researchers prioritize evaluating intervention effectiveness while collecting preliminary data on implementation determinants or feasibility. Wainer et al. (2025) offer an example through their evaluation of Caregiver Implemented Reciprocal Imitation Teaching (CI-RIT) in EI settings, where child and caregiver outcomes were primary but implementation outcomes such as acceptability and coaching fidelity were also assessed.

Type 2 designs give equal attention to intervention outcomes and implementation strategies. Lyon et al. (2021) exemplify this approach in school mental health through simultaneous testing of trauma-focused cognitive behavior therapy (TF-CBT) outcomes and Beliefs and Attitudes for Successful Implementations in Schools (BASIS), a motivational implementation strategy designed to shift clinician readiness. Finally, Type 3 designs primarily test the implementation strategy while still monitoring key intervention outcomes. Locke et al. (2025) illustrate this approach in the Helping Educational Leaders Mobilize Evidence (HELM) study, which targets leadership and organizational determinants of Positive Behavioral Interventions and Supports (PBIS) implementation while tracking student indicators to ensure no loss of benefit. Across types, hybrid designs support concurrent examination of effectiveness, feasibility, fidelity, and contextual fit—an approach particularly well suited to special education systems where EBPs must function within varied and complex service contexts.

Applied Example 3:
Conducting Hybrid Design Study to Optimize Autism Early Intervention Services

Families of young children referred for autism evaluations often experience extended delays before receiving a diagnosis and accessing formal services, leaving caregivers with limited guidance during a critical developmental window. In partnership with EI providers, administrators, and families within the IDEA Part C system, a research-practice team sought to address this **implementation problem** to provide structured, preemptive support during the waitlist period. Through this collaboration, **stakeholders and context** were used to identify key **determinants** (barriers and facilitators). Barriers included limited provider capacity, lack of formalized supports during the waitlist period, and variability in caregiver access to resources.

Facilitators included strong organizational commitment and existing EI infrastructure.

To address these factors, the team used implementation mapping to identify performance objectives and link them to specific determinants, guiding the selection of **implementation strategies**. A modular approach was adopted, drawing from multiple **evidence-based practices** that could be flexibly combined and tailored to meet diverse family needs. Strategies included targeted provider training, development of structured navigation protocols, and ongoing support to promote consistent and feasible delivery within existing service systems.

A **hybrid effectiveness-implementation design** was selected to allow for simultaneous examination of caregiver outcomes and **implementation outcomes**, including feasibility, acceptability, and fidelity. **Measurement** procedures were designed to balance rigor with feasibility, incorporating fidelity observations, caregiver-reported measures, and indicators of engagement. To support long-term use, the model was intentionally aligned with existing EI workflows and staffing structures, with ongoing coaching and integration into routine service delivery identified as key mechanisms for **sustainment and scale-up**.

To synthesize the core components of implementation planning described above, Figure 1 presents a process flowchart outlining key decision points for designing an implementation science study in special education. This visual guide integrates conceptual elements—determinants, outcomes, strategies, methodological choices, and measurement planning—into a structured sequence that supports systematic study development. Rather than functioning as a rigid linear model, the flowchart reflects the iterative nature of implementation work, in which decisions are revisited and refined in response to emerging data and contextual constraints.

To complement the flowchart, Table 2 provides a structured worksheet that researchers can use to plan a study or improvement initiative. Each section corresponds to a step in Figure 1 and includes prompts to document the implementation problem, identify determinants, select strategies, justify methodological decisions, and articulate sustainability plans. Used together, the figure and table support coherence across planning decisions, facilitate communication among stakeholders, and promote alignment between identified barriers, selected strategies, and intended implementation outcomes.

Although the steps in Figure 1 are presented sequentially, implementation planning typically involves revisiting earlier decisions as new information emerges. By making these decision points explicit, the flowchart can support coordinated planning, transparency for research-practice partnerships, and active stakeholder engagement in shaping contextually responsive and feasible implementation approaches.

IMPLICATIONS FOR SPECIAL EDUCATION POLICY AND PRACTICE

Implementation research has important implications for special education policy and practice, particularly as districts, states, and federal agencies aim to strengthen the quality, consistency, and equity of services for students with disabilities. Because IDEA requires schools to provide evidence-based instruction and justify instructional decisions, implementation science offers a lens for improving not only which practices are selected but also how they are enacted and sustained across diverse contexts. The following subsections highlight how implementation research can inform policy decisions, support systems-level improvement, and strengthen research-practice partnerships.

INFORMING SPECIAL EDUCATION POLICY AND FUNDING DECISIONS

Implementation research generates evidence that policymakers can use to guide decisions about resource allocation, professional development, accountability structures, and statewide priorities. By identifying determinants that support or hinder implementation, research highlights where investments are most needed—such as coaching, leadership development, implementation teams, or data systems. State and district leaders increasingly rely on this type of evidence to understand why EBPs fail to scale. For example, studies assessing implementation climate or leadership readiness can reveal system-level vulnerabilities that limit adoption. Such findings can inform policies that embed implementation expectations into guidance documents, target supports toward schools with low readiness, or fund infrastructure that improves feasibility.

Implementation research also clarifies the return on investment for implementation supports. Cost-effectiveness analyses within hybrid studies help leaders determine which strategies yield measurable improvements in fidelity and sustainment. Rather than investing solely in EBPs, policymakers can prioritize the supports most likely to result in high-quality and lasting implementation.

Table 2
Planning Guide for Designing an Implementation Science Study in Special Education

Planning Component	Guiding Questions Refer to Figure 1 (Process Flowchart)	Proposed Study
1. Implementation Problem	What is the specific implementation challenge? What evidence supports this?	
2. Target EBP or Intervention	What practice or model is being implemented? What are core components versus adaptable elements?	
3. Context and Stakeholders	What is the setting? Who delivers the EBP? Who influences implementation?	
4. Determinants	What factors influence implementation across various levels of the system (i.e., barriers and facilitators)? How will they be assessed?	
5. Implementation Outcomes	Which outcomes are most relevant? Which outcomes are proximal versus distal?	
6. Implementation Strategies	Which strategies address the determinants identified? How will adaptations be guided and documented?	
7. Methodological Design	What research design is most appropriate? What justifies this choice?	
8. Measurement Plan	What fidelity tools will be used? What climate or cost measures will be used? How will burden and usability be addressed?	
9. Sustainability and Scale-Up Plan	What structures will support long-term use? How will capacity be built and assessed?	

SYSTEMS-LEVEL CHANGES TO SUPPORT SUSTAINED USE OF EBPS

Sustaining EBPs in special education requires organizational and system-level structures that promote long-term use. Implementation research helps identify these structures and provides actionable guidance for strengthening them. One critical area is building implementation capacity. Many systems lack core infrastructure—such as implementation teams, coaching models, and data routines—that supports consistent delivery. Research clarifies which components are most influential for main-

taining fidelity and sustainment, helping districts design capacity-building efforts that extend beyond individual training.

Implementation leadership is another essential system-level condition. Studies such as HELM (Locke et al., 2025) demonstrate how leadership behaviors shape implementation climate, set expectations, and influence provider engagement. Policies that fund leadership development or integrate implementation competencies into administrator preparation can strengthen local capacity to support EBPs.

Systems also benefit from embedding implementation supports into routine service delivery, rather than treating them as optional add-ons. Protected planning time, coaching cycles, performance feedback, and structured collaboration routines are examples of supports that enhance fidelity and feasibility. Finally, implementation research helps identify misalignments between mandates, resources, and accountability systems. When states require EBP use but provide insufficient training or infrastructure, implementation is compromised. Research can guide policy adjustments that align expectations with the supports needed to meet them.

BRIDGING RESEARCH AND PRACTICE THROUGH ONGOING COLLABORATION

A central implication of implementation science is the need for sustained, bi-directional collaboration between researchers and practitioners. Because EBPs must function in real classrooms and service settings, implementation efforts benefit from practitioner insight at every stage—from initial problem definition to adaptation, evaluation, and sustainment. Researchers can strengthen relevance and feasibility by co-designing implementation strategies and adaptations with teachers, administrators, related service providers, and caregivers. Practitioner expertise helps identify local barriers, refine procedures, and shape adaptations that preserve core components while improving contextual fit.

Participatory approaches offer structured ways to share power, integrate community perspectives, and ensure cultural and linguistic responsiveness. Through joint interpretation of findings, co-development of measures, and joint decision-making, these approaches enhance both rigor and ecological validity. Collaboration is further supported by continuous data use and feedback loops, which allow teams to monitor fidelity, outcomes, and contextual conditions and adjust implementation strategies in real time rather than waiting for end-of-study results. These ongoing cycles of learning help organizations maintain EBPs even as staffing, resources, or student needs shift.

Finally, long-term research-practice partnerships help ensure that EBPs continue beyond initial trials and become embedded into organizational routines. Sustained collaboration promotes alignment between research goals and district priorities, supports professional learning, and enhances the likelihood that successful practices will be adopted and maintained across settings.

KEY TAKEAWAYS AND FUTURE DIRECTIONS

Implementation science offers an essential lens for understanding how EBPs are adopted, adapted, and sustained within the complex service systems that support children and youth with disabilities. Although special education has long recognized a persistent research-to-practice gap, this gap reflects not a lack of effective interventions but a lack of systematic attention to the conditions under which those interventions can thrive. As intervention researchers, we are fundamentally interested in implementation, yet we have historically approached implementation primarily as a *practice*, a set of activities necessary to deliver an intervention, rather than as a *science* that warrants its own constructs, methods, and empirical study. Elevating implementation as a scientific pursuit allows the field to investigate not only whether an intervention works, but how, under what conditions, and for whom it can be used effectively and equitably.

The need for greater emphasis on implementation science extends across research, funding, and practice. Funding agencies, such as the National Institutes of Health and the Institute for Education Sciences, help accelerate progress by supporting hybrid trials, implementation strategy testing, and measurement development that grapple directly with real-world constraints. Research institutions and journals can foreground rigorous implementation-focused scholarship and studies that examine contextual determinants, practical adaptations, and scale-up processes. State and local education agencies can embed implementation capacity-building—from leadership development to professional learning systems—into ongoing improvement efforts. Together, these shifts can help ensure that implementation is not treated as an afterthought but as a central component of evidence-based reform in special education.

The planning tools presented in this paper, specifically the process flowchart (Figure 1) and the structured

worksheet (Table 2), underscore the practical steps involved in designing an implementation-focused study in special education. By making explicit the sequential and iterative decisions required to identify determinants, select strategies, plan measurement, and anticipate sustainment, these tools illustrate how implementation science can guide systematic, transparent study design. They also serve as resources for research-practice partnerships, enabling practitioner involvement in shaping contextually responsive and feasible implementation approaches.

Moving forward, researchers can deepen the field's capacity by designing studies that integrate stakeholder perspectives, use mixed methods to capture mechanisms and contextual nuance, and test implementation strategies that address multilevel determinants. Educators and school leaders can strengthen implementation by cultivating supportive climates, participating in ongoing data use, and engaging in collaborative problem-solving that aligns EBPs with local needs. Policymakers can enhance the reach and longevity of EBPs by establishing structures that support coaching, technical assistance, sustained professional learning, and alignment of mandates and funding with the realities of school systems.

Advancing implementation science in special education ultimately requires coordinated efforts across research, practice, and policy. By systematically attending to how EBPs are introduced, supported, and sustained, and by centering the contexts and communities in which they operate, the field can make meaningful progress toward improving educational experiences and outcomes for students with disabilities.

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