

Implementation Science 101: A Brief Overview

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What Is Implementation Science?

A common language is essential for a common understanding of what is expected. This is true in education, where groups as diverse as parents, educators, researchers, and policy makers may be striving to achieve a common goal of literacy for all children, including those with reading difficulties. Without clarity, it is difficult to develop meaningful strategies designed to improve and increase our reach to all students. Implementation science, which has emerged over the past 15 years as a prominent discipline within the social sciences, can serve as a bridge between research and practice, helping to fulfill that common goal.

It is, therefore, important to precisely define the term “implementation science” in the context of education. Implementation science can be defined as “the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice” (Eccles & Mittman, 2006, p.1). In other words, implementation science identifies the changes that must occur within the *systems* of an organization (e.g. building/school, district/division, state) so that implementers can successfully use a selected program or apply an innovation as intended (with fidelity). See the glossary at the end of this article for key implementation science terms.

Why Should We Pay Attention to Implementation Science?

Despite the well-meaning intentions of educators and stakeholders, literacy scores across the United States have been flat and mediocre, at best, over four decades (U.S. Department of Education & National Center for Education Statistics, 2016). Simply selecting literacy initiatives, programs, or practices that are evidence based or evidence informed will not lead to implementation. Creating new policies and initiatives to achieve an intended outcome is only one piece of a larger puzzle. Whether it be a state law to improve literacy outcomes for individuals with dyslexia or the requirement for differentiating instruction through a tiered system of supports such as Response to Intervention (RTI), a policy or initiative does not cause change simply by being a mandate.

In addition, research has suggested that without implementation teams using clearly defined implementation methods, it takes 17 years (Balas & Boren, 2000; Morris, Wooding & Grant, 2011) to move approximately half of an intended new initiative into routine practice (Bauer, Damschroder, Hagedorn, Smith, & Kilbourne, 2015). Many decisions, actions, resources, and reorganizations need to be put in place to create the conditions that allow educators to effectively apply new policies and initiatives. The application of evidence-based implementation strategies offers a structure for planning, instituting, and sustaining practical strategies. By closing the gap between

policies and intended outcomes and offering a roadmap for the next generation, new team members are able to pick up where the leaders left off and continue on the right path.

A Formula for Success

Conceptually, implementation science follows a “Formula for Success” (National Implementation Research Network, 2013). This is depicted as an equation describing three broad variables leading to achieve one’s intended outcome: *Effective Interventions*, *Effective Implementation Methods*, and *Enabling Contexts*. (See Figure 1).



(Fixsen, Blase, Duda, Naoom, & Van Dyke, 2010)

Figure 1. Formula for Success

The first variable, *Effective Interventions*, highlights the importance of selecting evidence-based or promising practices (including large-scale frameworks such as RTI) that are expected to produce desired outcomes (e.g. improved literacy scores, improved social skills, etc.). However, selecting the “right” intervention does not ensure all implementers will use the intervention with fidelity or that the intervention will be sustained over time.

The second variable, *Effective Implementation Methods*, highlights the important role of a system in providing direct supports to implementers (administrators, teachers, and coaches) of the selected interventions. Implementers need to have the training, coaching, and time to learn the new skills and the opportunities to use them. Systems also need to be in place to evaluate the intervention and make adjustments to sustain the intervention and related processes.

Finally, in order to achieve the intended outcomes for current students and generations of students to come, the building/school, district/division, or state must leverage or create *Enabling Contexts*. Enabling contexts, which may include policies, procedures, or practices, provide the opportunities for new changes to happen. For example, a dyslexia law at the state level provides the climate and context for change to happen at the district level.

How Do We Put the “Formula for Success” into Action?

For guidance on actionable steps in applying the Formula for Success, one can turn to five Active Implementation Frameworks (AIFs; see Figure 2) (Duda, Fixsen, & Blase, 2013; *Continued on page 12*)

Abbreviations

AIF: Active Implementation Framework

RTI: Response to Intervention

Fixsen, Blase, Duda, Naoom, & Van Dyke, 2010; Fixsen, Naoom, Blase, Friedman & Wallace, 2005; National Implementation Research Network (NIRN), 2013).

Meyers, Durlak, and Wandersman (2012) conducted a synthesis of the research literature of critical factors necessary to create the conditions that led to improved use and sustainability of evidence-based and promising practices. They sought to explore what factors supported putting a complex and large-scale program into actual practice. From their review, they identified a small number of frameworks that took into consideration each of those critical factors, including the AIFs (Fixsen et al., 2005; Duda et al., 2013). The AIFs were organized and defined through a review of the evaluation and dissemination literature and through interviews with global scholars across fields including (but not limited to) health, agriculture, business, mental health, and early childhood. An interesting finding of the review process was that there were commonalities, such as building staff capacity, that are key to implementing an initiative at a level of social significance no matter the field, and at any level of a system. As identified in the review, the Active Implementation Frameworks (see Figure 2) encompass many of the critical factors identified in the literature review.

Although the Formula for Success offers a broad model that specifies the necessary and related variables to achieving improved academic and social-emotional outcomes for *all* students, the AIFs offer specific guidance for how to connect evidence-based and promising practices (effective interventions) with an effective and sustainable implementation infrastructure (effective implementation methods) that can continually improve over years to come. The frameworks also help leadership teams recognize associations and leverage enabling contexts to engage and sustain the important work. The relationship between the Formula for Success and the AIFs is depicted in Figure 3.

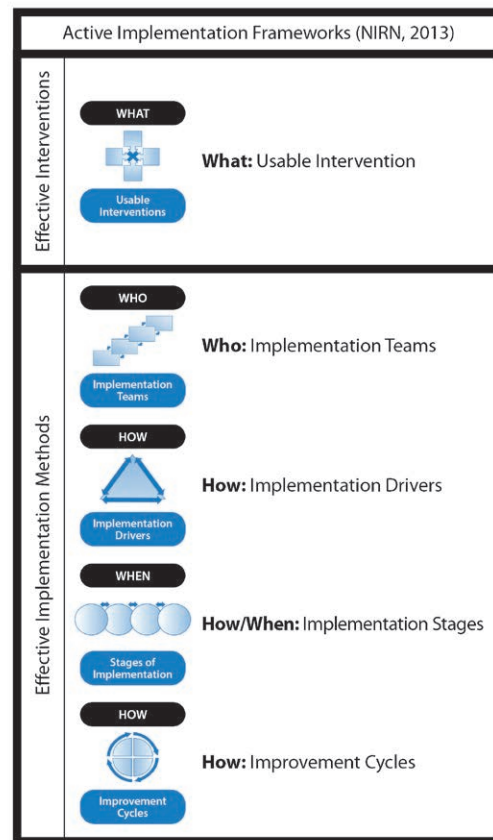
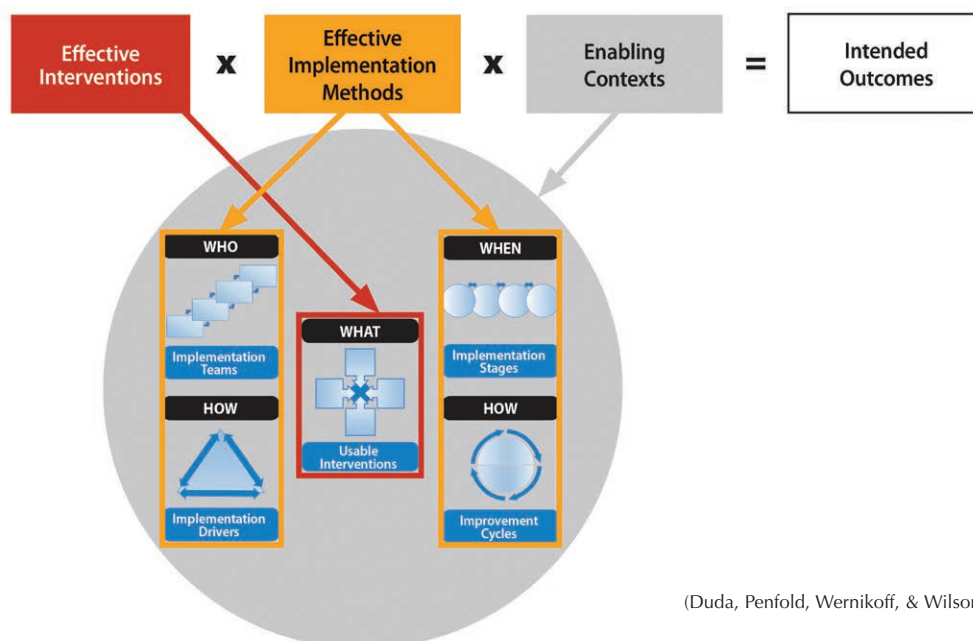


Figure 2. Active Implementation Frameworks



(Duda, Penfold, Wernikoff, & Wilson, 2014)

Figure 3. Linking the Formula for Success with the Active Implementation Frameworks

Effective Interventions

WHAT: The Usable Intervention. The “what” may include a new evidence-based intervention, innovation, school- or district-wide initiative, program, or policy. The first step to achieving positive outcomes for students who struggle with literacy is to decide on the “what.” Furthermore, this decision needs to be combined with clearly articulating how it will look in practice.

The first AIF named the *Usable Intervention Framework* offers specific criteria that leadership teams can use to select and clarify the “what” in order to achieve the desired outcomes (see Figure 4). Usable Interventions include core “non-negotiable” components that distinguish them from more loosely defined “whats.” According to Blase and Fixsen (2013), in order for the “what” to be considered “usable,” it must include the following four components:

1. A clear description
2. Information about essential functions
3. Operational definitions
4. Performance assessments or fidelity measures

As a result, in order for the selected “what” to be a Usable Intervention, the evidence-based intervention, innovation, school- or district-wide initiative, program, or policy must incorporate the above four components. This AIF helps refine any “what” into a Usable Intervention.



Figure 4. The “What” Defined

To improve the successful adoption, stakeholders need to carefully consider and articulate what they are asking educators to implement and what it actually looks like in practice. Without clarity, those implementing the “what” are left to independently identify core components and make decisions on ways to integrate it. A clear definition of the “what” includes the development of fidelity measures. The “what” must be clearly defined in order to translate it into observable, teachable, and measurable behaviors. Only then can it be determined whether or not it is making a difference. If this is not done, for example, interventions may be poorly adapted or watered down to fit the current system, existing capacity, or belief systems, thus not achieving the intended results.

Policy and decision makers can support district/school leadership teams by providing clarity and assistance to guide program selection. If protocols or measures of fidelity do not already exist, leadership will need to build in time to work with program developers or professional learning providers to develop them and communicate them to stakeholders.

Effective Implementation Methods

While clearly defining the Usable Intervention is central to change, alone it will not solve the challenges that schools and districts face in improving students’ literacy achievement (Fixsen et al., 2010). Another critical step is to apply *Effective Implementation Methods* to build and sustain capacity. Effective implementation methods support the application of the Usable Intervention with fidelity and can be achieved by incorporating the remaining four AIFs:

- Who: Implementation Teams
- How: Implementation Drivers
- How/When: Stages of Implementation
- How: Improvement Cycles

WHO: Implementation Teams. Once the Usable Intervention is clearly identified, it is essential to determine the individuals who will have the time and talent to engage in the detailed and ongoing implementation work. The form of an implementation team should consist of a core group of at least three to five members who have dedicated time (e.g., part of their job description) to address the system changes needed to support the new or priority Usable Intervention, have decision-making authority in their organization, and have or develop the knowledge and skills to support implementation. If a leadership team or other team related to literacy initiatives already exists in an organization, it is important to ensure that key functions of an implementation team can be met. One key function is to help align initiatives within and across their building/school, district, or state by removing any barriers such as competing initiatives or discontinuing any ineffective efforts. Another function is to build on current strengths within the system (e.g., effective coaches and coaching supports in place, accessible data collection system). Implementation Teams are also responsible for creating pathways of communication with stakeholders, including families, community members, policy makers, and other Implementation Teams that may reside in the school or district.

HOW: Implementation Drivers. The Implementation Driver Framework offers a research-based method to organize and align a system (Fixsen, Blase, Duda, Naom & Van Dyke, 2008). Implementation Teams use Implementation Drivers to guide their work. Key variables (the implementation drivers) help the system support the implementers (e.g., teachers, coaches) to use the Usable Intervention with fidelity and ensure sustainability. Every organization has some of these implementation drivers in place, and some might be strong. This framework, however, guides Implementation Teams to determine which ones are strong (to build upon them) and which are weak (to focus on them). When there are too

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many weak drivers, programs and practices have a low likelihood of being sustained over time.

The drivers are organized into three categories (see Figure 5), each necessary for successful implementation. They are: 1) Competency, 2) Organization, and 3) Leadership. A central premise behind this framework is that the drivers are integrated.

Competency Drivers (left side of the triangle) build staff confidence and competence in the use of the Usable Intervention. These include selection of staff, training, coaching, and performance assessment (fidelity). The expertise needed to implement the Usable Intervention with fidelity must be defined. This is critical so that the Implementation Team can make more informed decisions for the recruitment, hiring, or repurposing of personnel with at least some of the expertise needed to implement the Usable Intervention, as well as plan for the training and ongoing support. It is imperative that the trainings that implementers attend have a direct link with the behaviors needed in practice. If the Usable Intervention is clearly operationalized, then it is easier to align training opportunities to those specific learning targets. Finally, training should be accompanied by coaching in order to lead to behavior change or use of the new skills in the classroom (Joyce & Showers, 2002). Ongoing professional learning, coaching, and the demonstration of teacher proficiency are critical to achieve intended results.

Organization Drivers (right side of the triangle) provide the structure for ensuring that the Usable Intervention is adopted and used as intended, sustained over time, and positioned to better weather changes in funding, mandates, staff, or other factors. First of all, these drivers include administrative changes or supports within an organization such as student and staff scheduling, time management necessary to shift new behaviors, and the purchase of materials. Organization drivers also include aligning external changes or supports to the organization (e.g., coaching services from a district-level coach, state support to prioritize initiatives). Lastly, the organization drivers include decisions about the collection and use of data systems for measuring fidelity and student outcomes.

Implementation Teams use both organization drivers and competency drivers in conjunction to develop implementation action plans. There must be built-in measures to assess the effectiveness of the Usable Intervention and implementation processes. Without sufficient data, beneficial educational practices that are not adequately adopted and supported may risk being perceived as ineffective and ultimately discontinued.

Leadership Drivers (bottom of triangle) acknowledge the importance of the leaders who underpin all of the difficult work of building a system to implement a new “what” or to improve on existing ones. Leaders, with varied leadership styles, provide the foundation for selecting, supporting, sustaining, and scaling up any new evidence-based program or practice.

Heifetz and Laurie (1997) recognized that two levels of leadership styles are required to address different types of challenges that occur: technical and adaptive. Technical lead-



[Fixsen, Blase, Duda, Naoom & Van Dyke, 2008 (adapted)]

Figure 5. Implementation Drivers

ership is required when there is a straightforward problem that has a straightforward solution (e.g., a need to change the school schedule to incorporate an intervention period, or buying more materials for classrooms). Adaptive leadership is required when the problem or the solution is not entirely clear, or the solution requires a nuanced response (e.g., staff are reluctant to use a new intervention). Both types of leadership are necessary to move a new intervention forward in the implementation process. Implementation Teams may be part of or directly connected to leadership within their organization and work together to overcome both adaptive and technical problems as they emerge in real time.

HOW/WHEN: Stages of Implementation. The Stages of Implementation highlight that it takes time and effort to create, or build upon, an aligned implementation infrastructure. To help Implementation Teams do their work, this outlines four discrete, yet overlapping, stages: Exploration, Installation, Initial Implementation, and Full Implementation (see Table 1).

Over time, implementation processes will move from one stage to the next. However, the movement is not linear and each stage does not necessarily have a crisp beginning or end.

Over time, implementation processes will move from one stage to the next. However, the movement is not linear and each stage does not necessarily have a crisp beginning or end. Research has demonstrated that the adoption of new interventions will go through an implementation trajectory that oftentimes results in organizations falling back to earlier stages of implementation (Duda et al., 2013). This can happen due to changes in staffing, funding, leadership, or unsuccessful attempts at employing the intervention with high fidelity. If an Implementation Team begins its work with sustainability in mind, the organization is able to recover more quickly from

these changes outside of their control. When this occurs, teams have the opportunity to further solidify positive elements or make necessary adjustments to plans that have not led to the intended outcomes.

The Stages of Implementation Framework stresses the notion that implementation takes time. Research suggests that it can take from two to four years to fully and successfully make an evidence-based program, practice, or effective educational innovation operational (Fixsen, Blase, Timbers, & Wolf, 2001; Panzano & Roth, 2006; Prochaska & DiClemente, 1982). A challenge that educators sometimes face is allowing a Usable Intervention enough time to take hold and become part of “education as usual.” Understanding the Stages of Implementation can help the Implementation Team make data-based decisions in determining whether sufficient efforts have been made to continue with the intervention.

HOW: Improvement Cycles. Leadership and implementation teams must make many decisions when adopting new evidence-based practices. There is much learning, and often un-learning, that takes place. This cannot occur in one short cycle of change. The educational system, at all levels, must create a process that allows for continuous improvement (Senge, 2006; Aarons, 2005).

A key process articulated by Deming (1982), and earlier by Shewhart (1931), is the Plan-Do-Study-Act cycle. In schools, districts, or states that are applying implementation science principles, Implementation Teams can use Plan-Do-Study-Act Improvement Cycles as a process for making decisions systematically while engaging in continuous improvement. With each cycle, implementation should be refined, communicated, and documented. This process creates a supportive environment in which evidence-based programs and practices can thrive, builds a “culture of trial and learning,” and ensures that the supports in place are designed to improve student outcomes.

Enabling Contexts

The final variable in the Formula for Success is an Enabling Context. This variable may begin the trigger to making some changes or help in sustaining those changes. There are many advantages of paying attention to and building an “Enabling Context” in each organization. The benefits include:

- Fosters a culture of learning;
- Fosters a culture of transparency;
- Builds and supports leaders at all levels;
- Develops and maintains policies and procedures that help create “space” needed to focus on implementation;
- Develops and maintains policies and practices that remove barriers and practices that do not lead to student benefits; and
- Helps align functions.

Prior to implementing a new Usable Intervention within a building/school, district/division, or state, it is important to learn more about the context within which it will be implemented. What is the culture of the organization? What supports are available to all involved in the implementation (e.g., budget, allocated time, professional learning)? What policies, procedures, and practices can facilitate the implementation of the intervention as intended? Likewise, when revisiting or revising an existing Usable Intervention, it is essential to clarify factors that will help maintain and sustain it, including best practices needed to replicate a small pilot.

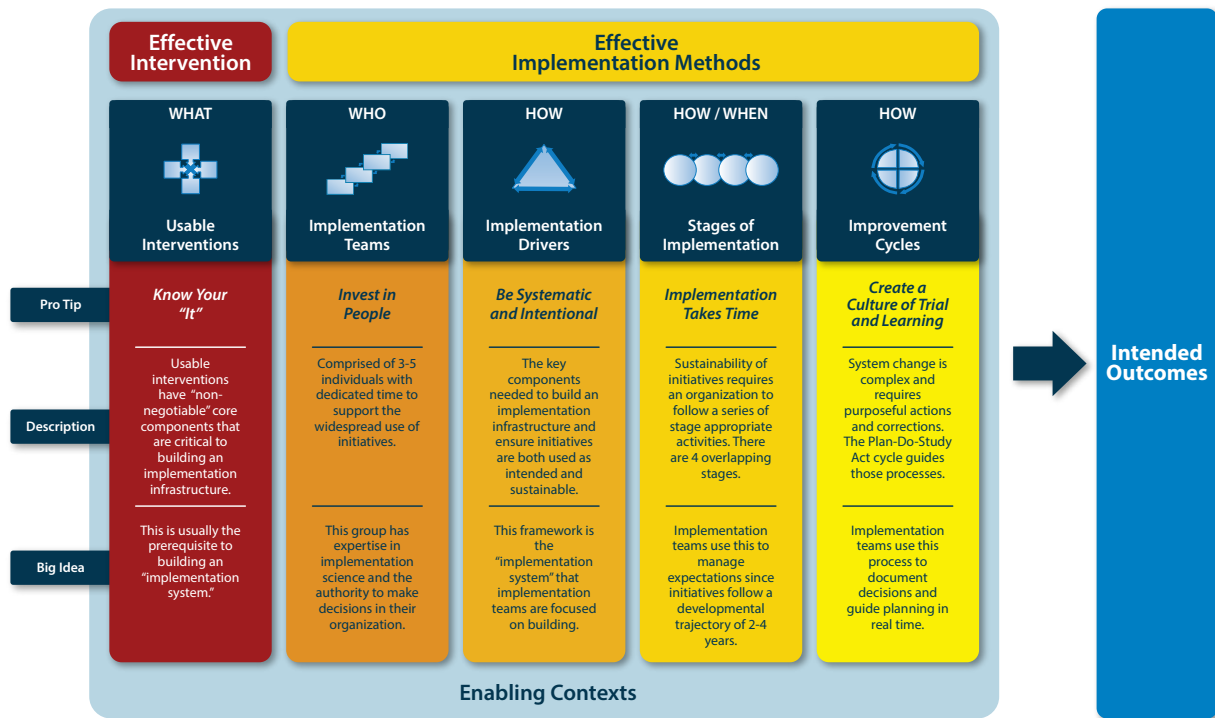
In both scenarios, fostering true receptivity and connectivity through an enabling context in a school, district, and state setting is critical. This requires identifying and articulating the necessary conditions for successful implementation of the selected intervention.

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TABLE 1. The Four Stages of Implementation

Exploration	↔	Installation	↔	Initial Implementation	↔	Full Implementation
Identifying the need for change		Establishing the resources needed to use an intervention and implement it as intended		Beginning use of the new intervention for the first time		Teachers: Skillfully using an intervention that is well integrated into instruction
Learning about possible interventions that may provide solutions		Identify the first implementers		Teachers: Learning how to use the intervention		School & District Administrators: Routinely and effectively supporting teachers
Learning what it will take to implement the intervention effectively		Develop an Implementation Action Plan		School & District Administrators: Learning how to support teachers and the greater school community in the new ways of work		High levels of fidelity are reached and maintained
Developing stakeholders and champions				Adjustment to Implementation Action Plan, as needed		
Assessing and creating readiness for change						
Deciding whether to proceed						

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Figure 6: Implementation Science Overview

Connecting the Pieces

"Usable Interventions," "Implementation Drivers," "Improvement Cycles"—the technical terminology can be daunting. But the concepts can be boiled down to key ideas. Figure 6 attempts to do that by illustrating the overlap between the Active Implementation Frameworks and the Formula for Success. Working across the top of Figure 6, you will find the Effective Intervention and Effective Implementation Methods variables from the Formula for Success. Below those are the frameworks. The enabling contexts box encompasses all the frameworks to illustrate its pivotal role in the ultimate success of the implementation.

To the left side of Figure 6, the Pro Tip row summarizes the essence of each framework and what a leader can do to help ensure that the framework is in place (see video for more details <https://goo.gl/bHwQfP>). The next row offers a definition of each framework, which is then followed by the "big idea" regarding the core function or purpose of the framework. Additional details and related tools can be found in the *Apply It* resource section.

Investing in the Future

All educators ultimately share a common goal: to improve outcomes for today's students and prepare them with the skills to succeed in careers that may not yet have been imagined. A core skill needed to succeed in the 21st century is the ability to read. In order to improve literacy rates and, ultimately,

academic outcomes for students, careful consideration needs to be paid to the science of implementation.

As laws and policies are constructed and passed, it is essential to know that "good" policy is not enough. At the policy- or decision-making level, it is critical to allocate time, flexibility, and resources for the application of implementation science principles. Implementation teams may need to be developed that have the time and flexibility to carefully plan how to integrate and sustain best practices in their unique setting. Leaders at all levels need to have enough information to select innovations that align with policies and to ensure that the core components are clearly defined so that they can be translated into specific actions and outcomes. Education agencies at all levels will need to build supports and set expectations for gathering student outcome data as well as fidelity data. Together, these can better inform whether the selected interventions are in fact making a difference.

Legislators and all educators play a key role in helping well-meaning goals, at the heart of laws and policies, translate to expected outcomes. By bringing all the pieces of the Formula for Success together—choosing and using effective interventions, building and sustaining effective implementation processes, and leveraging an enabling context that includes practice-informed policies and aligned functions—it is possible to achieve tangible results and improve the literacy rates of today's students and tomorrow's innovators.

Glossary of Key Implementation Science Terms and Acronyms
This glossary reflects some key implementation science terms commonly used.

Key Term	Synonyms and Related Terms	Acronym	Definition
Active Implementation Frameworks	Implementation Frameworks	AIF, AIFs	Five core frameworks that embody the critical elements for implementation success as identified by research: Usable Interventions, Implementation Teams, Implementation Drivers, Stages of Implementation, and Improvement Cycles (Fixsen, Blase, Duda, Naoom, & Van Dyke, 2010). They offer specific guidance on how to implement a program in a manner that ensures that programs or practices are used with fidelity and sustained over time.
Adaptive Leadership	Leadership Driver Technical Leadership		One of two leadership styles (the other being technical leadership) found to be critical when engaging in complex systems-change activities. Leaders must adjust their approach depending on the types of problems that emerge. Adaptive leadership is needed when problems in practice are not easy to define, require people other than the leader to resolve, and often require experimentation to find solutions over time (Heifetz & Laurie, 1997).
Competency Drivers	Implementation Drivers Organization Drivers Leadership Drivers		One of three categories of implementation drivers that focuses on building staff confidence and competence. Drivers that fall into this category include: (staff) Selection, Training, Coaching, and Performance Assessment (Fixsen et al., 2010).
Effective Implementation Methods	Formula for Success		Part of the “Formula for Success” equation (NIRN, 2013). Methods that support the ability of an organization to implement the selected intervention with fidelity by attending to Implementation Teams, Implementation Drivers, Stages of Implementation, and Improvement Cycles.
Effective Interventions	Usable Intervention “What” “It”		Part of the “Formula for Success” equation (NIRN, 2013). This refers to the intervention, innovation, initiative, program, or policy that is selected for implementation based on evidence of effectiveness for the population or context in which it will be implemented.
Enabling Context	Formula for Success		Part of the “Formula for Success” equation (NIRN, 2013). Policies, procedures, or practices that provide the opportunities for new changes to happen.
Fidelity	Performance Assessment		Implementing the new intervention (program, policy, etc.) as intended by the developer.
Formula for Success	Effective Interventions Effective Implementation Methods Enabling Contexts		Formula conceptualized by the National Implementation Research Network (NIRN, 2013). This is depicted as an equation describing three broad variables leading to achieve one’s intended outcome: Effective Interventions x Effective Implementation Methods x Enabling Contexts = Intended Outcomes.
Implementation			Commonly defined as “to do.” In this context, it refers to the variables and conditions needed to put something into practice; executing the new practice or policy.
Implementation Drivers	Competency Drivers Organization Drivers Leadership Drivers Active Implementation Framework		One of the Active Implementation Frameworks (Fixsen et al., 2010), these guide the work of the implementation teams and are organized into three categories: competency, organization, and leadership (Fixsen, Blase, Duda, Naoom & Van Dyke, 2008).
Implementation Science		IS	Broadly, “the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice” (Eccles & Mittman, 2006).

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Glossary of Key Implementation Science Terms and Acronyms continued			
Key Term	Synonyms and Related Terms	Acronym	Definition
Implementation Stages	Active Implementation Framework Exploration Stage Installation Stage Initial Implementation Stage Full Implementation Stage		One of the Active Implementation Frameworks (Fixsen et al., 2010), provides guidance that key actions teams can use to plan for the sustainability of any initiative. Teams need to work through four discrete yet overlapping stages: Exploration, Installation, Initial Implementation, and Full Implementation.
Implementation Teams	Active Implementation Framework		One of the Active Implementation Frameworks (Fixsen et al., 2010), it consists of a core group of at least three to five members who have dedicated time (e.g., part of their job description) to address the system changes needed to support the new program or practice, and have the knowledge and skills to implement it.
Improvement Cycles	Active Implementation Framework Plan-Do-Study-Act		One of the Active Implementation Frameworks (Fixsen et al., 2010), Improvement Cycles offer teams a clear process for making decisions systematically while engaging in continuous improvement. The primary processes used to make adjustments is the Plan-Do-Study-Act Cycle (Deming, 1982).
Leadership Drivers	Competency Drivers Organization Drivers Implementation Drivers Adaptive Leadership Technical Leadership		One of three categories of implementation drivers that focuses on building staff confidence and competence. Drivers that fall into this category include: (staff) Selection, Training, Coaching, and Performance Assessment (Fixsen et al., 2010).
Organization			The entity taking on the implementation, such as a building/school, district, division, or state department.
Organization Drivers	Implementation Drivers Competency Drivers Leadership Drivers		One of three categories of implementation drivers that focuses on organization and systems change. Drivers that fall into this category include: Decision Support Data Systems, Facilitative Administration, and System Intervention (Fixsen et al., 2010).
System			In an organization, a system is a collection of parts such as the infrastructure, leadership, processes, principles, and other components that work together to accomplish a goal.
Technical Leadership	Leadership Driver Adaptive Leadership		One of two leadership styles (the other being adaptive leadership) found to be critical when engaging in complex systems-change activities. Leaders must adjust their approach depending on the types of problems that emerge. Technical leadership is needed when problems and solutions can be clearly identified and defined for a straightforward resolution (Heifetz & Laurie, 1997).
Usable Intervention	Active Implementation Framework Effective Intervention “What” “It”		The intervention, innovation, initiative, program, or policy that is selected for implementation. It includes core “non-negotiable” components that distinguish it from a more loosely defined “what.” According to Blase and Fixsen (2013), in order for the “what” to be considered “usable,” it must include the following four components: <ol style="list-style-type: none"> 1. A clear description 2. Information about essential functions 3. Operational definitions 4. Performance assessments or fidelity measures

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