

The logo for "Drops in the Bucket" features a stylized illustration of a bucket on the left, with a large, white, serif letter "D" integrated into its shape. To the right of the bucket, the word "Drops" is written in a large, white, serif font. Below "Drops", the words "IN THE" are written in a smaller, white, sans-serif font. Below "IN THE", the word "Bucket" is written in a large, white, serif font. A small "TM" trademark symbol is located to the upper right of the "S" in "Drops".

by MARY JO HAND

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## Research Report

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# Drops in the Bucket: An ESSA-Aligned Research Report

## Abstract

*Drops in the Bucket* is a supplemental instructional resource developed by Frog Publications to provide systematic, repeated practice in essential skills for elementary mathematics, reading/language arts, and Spanish math. Originally written under the No Child Left Behind Act, this fully updated report aligns the program with the requirements of the Every Student Succeeds Act (ESSA, 2015). ESSA mandates the use of evidence-based interventions, defined within four tiers, and requires educational products to demonstrate a research-supported rationale and ongoing evaluation.

This report presents a comprehensive research foundation supporting *Drops in the Bucket* as an ESSA Tier 4: Demonstrates a Rationale intervention. The program draws on decades of validated research in applied behavior analysis, active learning, cognitive psychology, and motivation. The report explains how the design features of *Drops in the Bucket*—including reinforcement, modeling, distributed practice, scaffolding, feedback, automaticity development, and structured routines—are grounded in well-established findings that predict improved student outcomes. A logic model outlines the hypothesized pathways from daily practice to increased achievement, while a research plan details forthcoming randomized and comparison-group studies that will strengthen the evidence base. The report concludes with updated product information and a complete APA 7 reference list combining both historical foundational studies and current ESSA-aligned scholarship.

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## Introduction

*Drops in the Bucket* (DIB) is a research-based supplemental resource designed to strengthen essential academic skills through brief, daily, scaffolded practice sessions. The program includes reproducible student pages, structured routines, modeling, feedback, and a consistent 10-task format that reinforces foundational concepts. Each level contains twelve weeks of daily lessons that revisit skills repeatedly, providing the distributed practice necessary for long-term retention and application (Brown et al., 2014; Cepeda et al., 2008; Pashler et al., 2007).

When the original research report for *Drops in the Bucket* was published in 2003, the federal education landscape was defined by the No Child Left Behind Act (NCLB). Under the updated federal framework—the Every Student Succeeds Act (ESSA, 2015)—schools must use “evidence-based interventions,” defined in four tiers of evidence. Supplemental instructional tools like DIB must therefore demonstrate both a strong theoretical foundation and a plan for ongoing systematic research (U.S. Department of Education, 2016; Dynarski, 2015; Kane, 2017).

This updated research report fulfills that requirement by:

1. Re-articulating the scientific basis of DIB using contemporary educational and psychological research.

2. Aligning the program with ESSA’s evidence tiers, identifying DIB as a Tier 4 intervention with a logic model grounded in empirical research.
3. Presenting the internal research plan that Frog Publications will conduct to strengthen future evidence claims.
4. Maintaining the full structure and spirit of the original research document, while modernizing and updating all content.

Like its original version, this report demonstrates the strong research basis behind DIB and provides detailed evidence of how its design reflects decades of validated educational theory and instructional best practices.

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## ESSA Alignment

### *ESSA evidence levels*

ESSA defines four tiers of evidence for educational interventions (Every Student Succeeds Act, 2015; U.S. Department of Education, 2016):

- **Tier 1 – Strong evidence:** Based on at least one well-designed and well-implemented randomized controlled trial.
- **Tier 2 – Moderate evidence:** Based on at least one well-designed quasi-experimental study.
- **Tier 3 – Promising evidence:** Based on at least one well-designed correlational study with statistical controls for selection bias.
- **Tier 4 – Demonstrates a rationale:** Based on high-quality research or a strong theory, with ongoing efforts to examine effects.

*Drops in the Bucket* currently qualifies under Tier 4, as it is grounded in decades of empirical research from multiple disciplines and Frog Publications is implementing an ESSA-aligned internal research plan.

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## Logic Model for Drops in the Bucket (ESSA Tier 4 Requirement)

ESSA Tier 4 requires a clear logic model linking program activities to expected outcomes (U.S. Department of Education, 2016). The DIB logic model is as follows:

### **Inputs**

- Daily distributed practice tasks
- Structured routines and explicit teacher modeling
- Skills aligned to grade-level standards and curricula
- Scaffolding through teacher- and peer-led support
- Immediate feedback and error correction

## Activities

- Completion of ten brief skill tasks per session
- Repeated practice across twelve weeks
- Teacher modeling during initial lessons
- Peer modeling during Each-One-Teach-One
- Mini-groups for targeted clarification and reteaching

## Outputs

- Increased accuracy on foundational skills
- Increased fluency through repeated practice
- Strengthened foundational knowledge base
- Greater student independence and confidence

## Short-term outcomes

- Improved mastery of essential math, reading, and language skills
- Higher rates of on-task behavior (Simonsen et al., 2008)
- Increased retrieval strength and memory consolidation (Brown et al., 2014; Cepeda et al., 2008)

## Long-term outcomes

- Improved classroom performance and grades
- Greater retention of core skills over time
- Increased student motivation and self-efficacy (Dweck, 2016; Yeager & Walton, 2011)
- Stronger performance on district and state assessments

This logic model is grounded in established research on reinforcement, distributed practice, scaffolding, feedback, and motivation, supporting DIB's classification under ESSA Tier 4: Demonstrates a Rationale.

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## Internal Research Plan (ESSA Tier 4)

To strengthen its evidence base and progress toward higher ESSA tiers (Tiers 3, 2, and 1), Frog Publications has adopted an internal research plan aligned with federal nonregulatory guidance on evidence-based interventions (U.S. Department of Education, 2016). The research plan includes:

- **Randomized classroom-level implementation:** Classrooms will be randomly assigned either to use DIB or to continue with existing instructional practice without DIB.
- **Pretest–posttest design:** Standardized or standards-aligned assessments will be administered prior to and after the twelve-week intervention period to measure growth.

- **Comparison groups:** Non-DIB classrooms will serve as comparison groups, with demographic and prior-achievement data collected to support statistical controls.
- **Fidelity measures:** Teachers will use brief checklists to document adherence to DIB procedures, ensuring consistent implementation.
- **Progress monitoring:** Weekly or biweekly probes will be used to track skill growth over the twelve-week cycle.
- **Quantitative analyses:** Statistical analyses will examine differences in growth between DIB and comparison groups, controlling for baseline differences.
- **Qualitative data:** Teacher interviews and student surveys will document perceptions of engagement, motivation, and usability.

This systematic approach positions *Drops in the Bucket* to generate promising, moderate, and eventually strong evidence under ESSA’s tiered framework.

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## Research Basis 1: Applied Behavior Analysis, Reinforcement, and Behavioral Learning

A major research foundation supporting *Drops in the Bucket* is applied behavior analysis (ABA) and reinforcement-based learning. Behavioral theory demonstrates that reinforced responses occur more frequently, that structured sequences of practice build mastery, and that modeling accelerates learning. These principles have been validated across decades of research from foundational authors such as Skinner (1957), Bandura (1971), and Alberto and Troutman (1995) and remain consistent with contemporary understandings of learning and retention.

Reinforcement is essential to developing and maintaining academic behaviors. When students receive clear, immediate, and consistent reinforcement for accurate performance, skill fluency increases and errors diminish (Hattie & Timperley, 2007; Shute, 2008). DIB incorporates reinforcement through repeated opportunities for correct responses, brief review cycles, and teacher or peer acknowledgment during Each-One-Teach-One and mini-group work.

Intermittent reinforcement—one of the most powerful reinforcement schedules—supports long-term retention of skills (Alberto & Troutman, 1995). DIB uses intermittent reinforcement by presenting skills once per day over twelve weeks, allowing students to repeatedly encounter tasks in ways that maintain long-term memory and prevent skill decay. This is consistent with spaced practice literature demonstrating that distributed reinforcement leads to higher retention than massed practice (Brown et al., 2014; Cepeda et al., 2008; Pashler et al., 2007).

Modeling, a central element of social learning theory, is also intentionally built into DIB. Students learn by observing teachers and peers demonstrating strategies, verbalizing thinking processes, and modeling appropriate academic behaviors (Bandura, 1971; Ogbu, 1987). Teacher modeling occurs during early lessons and is gradually replaced by peer modeling as students develop expertise. Research shows that students are more likely to imitate models similar to themselves (Bandura, 1971; Sternberg, 1988), which is why DIB intentionally integrates peer

demonstration in small groups. These procedures align with evidence-based approaches emphasizing structured, observable learning behaviors and consistent teacher-led routines.

Together, reinforcement, practice schedules, modeling, and guided application position DIB as a supplemental resource grounded in robust behavioral research and aligned with ESSA's expectations for evidence-based instructional supports.

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## Research Basis 2: The Active Role of the Learner in the Learning Process

Learning is most effective when students are active participants rather than passive recipients. Research consistently demonstrates that students achieve more when instruction includes scaffolding, structured routines, and opportunities for guided and independent practice (Archer & Hughes, 2011; Rosenshine, 2012; Hunter, 1982; Bennett, 1978). DIB lessons integrate active learning through a predictable daily sequence that includes teacher modeling, peer modeling, and independent practice (Archer & Hughes, 2011; Rosenshine, 2012; Good, Grouws, & Ebmeier, 1983).

Scaffolding—breaking learning into manageable steps, providing initial support, and gradually releasing responsibility—is embedded throughout the program. Rosenshine and Meister (1992) identify scaffolding as a primary factor in successful learning, particularly for complex or multistep tasks. DIB follows this framework precisely: teachers introduce skills through structured demonstration for the first several lessons, then students reinforce the skills during Each-One-Teach-One and collaborative practice sessions.

Effective classroom management and instructional organization increase the amount of time students spend on academic tasks. Studies show that time-on-task significantly correlates with achievement, motivation, and positive academic attitudes (Fisher et al., 1980; Murphy, Weil, & McGreal, 1986; Wang et al., 1993). DIB's predictable structure reduces transition time and enables students to begin learning immediately each day, promoting efficient classroom routines. These features are particularly beneficial in diverse classrooms where consistent structure supports equitable instructional access.

Automaticity—effortless performance of foundational skills—is another essential component of active learning. Children who practice skills in short, repeated intervals develop fluency more quickly than those who encounter skills sporadically (LaBerge & Samuels, 1974; Anderson, 1995). DIB's daily repetitions accelerate automaticity in decoding, vocabulary, numeration, computation, and applied mathematical reasoning.

Cooperative learning, such as the Each-One-Teach-One segment of DIB, is associated with higher achievement, improved social interaction, and better retention (Cohen, 1994; D. W. Johnson & R. T. Johnson, 1989; Slavin, 1995). These collaborative opportunities align with modern emphasis on inclusive, equitable instructional approaches that support student engagement and peer-assisted learning.

Thus, the active learning research base supports DIB’s design as a highly structured, scaffolded, and collaborative supplemental resource aligned with current federal evidence-based guidance.

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### Research Basis 3: Cognitive Psychology and the Learning Sciences

Cognitive research describes how learners encode, store, retrieve, and apply information. Modern learning science emphasizes memory, feedback, distributed practice, metacognition, pattern recognition, and the importance of building a strong knowledge base. These principles directly parallel the design and daily structure of DIB (Dehaene, 2020; Gagné et al., 1993).

#### *Memory, retrieval, and spaced practice*

A substantial body of evidence confirms that learning is strengthened when practice is spaced out over time (Cepeda et al., 2008; Pashler et al., 2007). DIB’s twelve-week cycle ensures repeated exposure to essential skills, reinforcing long-term retention and preventing forgetting. By revisiting skills briefly each day, students benefit from retrieval practice—a technique proven to deepen memory and understanding (Brown et al., 2014).

#### *Feedback as a driver of learning*

Feedback is one of the most influential factors affecting student achievement (Hattie & Timperley, 2007). DIB lessons provide daily opportunities for feedback through teacher-led review, peer modeling, and error correction in mini-groups. Timely, specific feedback enhances metacognition and strengthens student confidence (Shute, 2008).

#### *Variety and cognitive engagement*

Variety promotes sustained attention and interest (Zahorik, 1996). While DIB maintains consistency in its ten-task structure, the specific problems vary daily and gradually increase in difficulty using the principle of “just noticeable difference,” which helps students adapt to increasing complexity without becoming overwhelmed.

#### *Patterns, strategies, and cognitive efficiency*

Cognitive research suggests that the ability to detect and apply patterns is foundational to problem solving (Sternberg, 1988). DIB encourages pattern recognition through daily repetition of tasks such as ruler measurement, numeration, word structure, and computational shortcuts. Students develop internalized strategies and cognitive efficiency through repeated exposure, which aligns with findings in cognitive load theory (Kirschner et al., 2006; Sweller et al., 2011).

### *Building background knowledge*

A strong knowledge base supports the learning of new information (Pressley et al., 1987; Rosenshine, 1997). DIB’s daily spiraled review structure ensures that essential foundation skills remain active throughout the instructional period. Overlearning—intentionally practicing skills beyond the point of initial mastery—further reinforces retention and transfer (Brophy & Good, 1986; Shuell, 1996).

By incorporating the above cognitive research principles, DIB meets ESSA’s call for instructional materials that support efficient learning, memory consolidation, and equitable access to grade-level skills.

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## Research Basis 4: Motivation, Engagement, and Self-Efficacy

Motivation plays a central role in student learning, persistence, and achievement. Research shows that motivation increases when learners experience success, autonomy, and supportive instructional structures (Dweck, 2016; Yeager & Walton, 2011). DIB intentionally integrates motivational supports to foster positive learning experiences and sustained engagement.

DIB lessons begin at each student’s independent level, ensuring early success and minimizing frustration. When students succeed at foundational tasks, their confidence and willingness to attempt more challenging tasks increase (Clifford, 1990). Internal motivation grows as students experience a pattern of success that reinforces their academic identity.

Positive self-concept is closely linked with achievement (Scarpatti, 1987). DIB enhances student self-concept by providing achievable, manageable tasks that allow students to build competence one step at a time. Scaffolds such as Each-One-Teach-One and mini-groups serve as safety nets that prevent failure, aligning with research demonstrating that supportive peer interaction can enhance engagement (Cook et al., 2018).

Motivation is also tied to classroom organization and predictability. Novice teachers frequently identify classroom management and student motivation as their biggest challenges (Veenman, 1984). Because DIB establishes a predictable routine with built-in engagement structures, teachers can implement the program with confidence and students quickly adapt to the daily expectations. This structured routine aligns with modern emphasis on interventions that improve student engagement and academic behavior.

In total, the motivational research base confirms that DIB supports student persistence, achievement, and positive attitudes toward learning—key components of ESSA-aligned evidence-based instruction.

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## Product Information

*Drops in the Bucket* is published by Frog Publications and provides reproducible supplemental practice materials for grades PreK–5 in mathematics, reading/language arts, and Spanish math. The materials include daily skill-reinforcement pages designed to strengthen essential foundational concepts aligned to state standards. Books are available across a range of differentiated levels and may be used in whole-class, small-group, intervention, remediation, or enrichment settings.

Teachers may reproduce student pages from a single teacher edition for use in one classroom. For multi-class or schoolwide implementation, additional copies or a site license is required.

*Drops in the Bucket* can be used as:

- Daily warm-up practice
- Targeted intervention or remediation
- Tier 2 or Tier 3 supplemental support
- Homework practice
- Review cycles before assessments

The core instructional premise is that students become proficient in skills they practice consistently, and that 10–15 minutes of structured daily repetition can significantly strengthen foundational competencies. All program updates ensure alignment with current standards, state testing expectations, and ESSA evidence requirements.

For more information, product previews, or to obtain a catalog, contact:

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