LETRS 3E Logic Model

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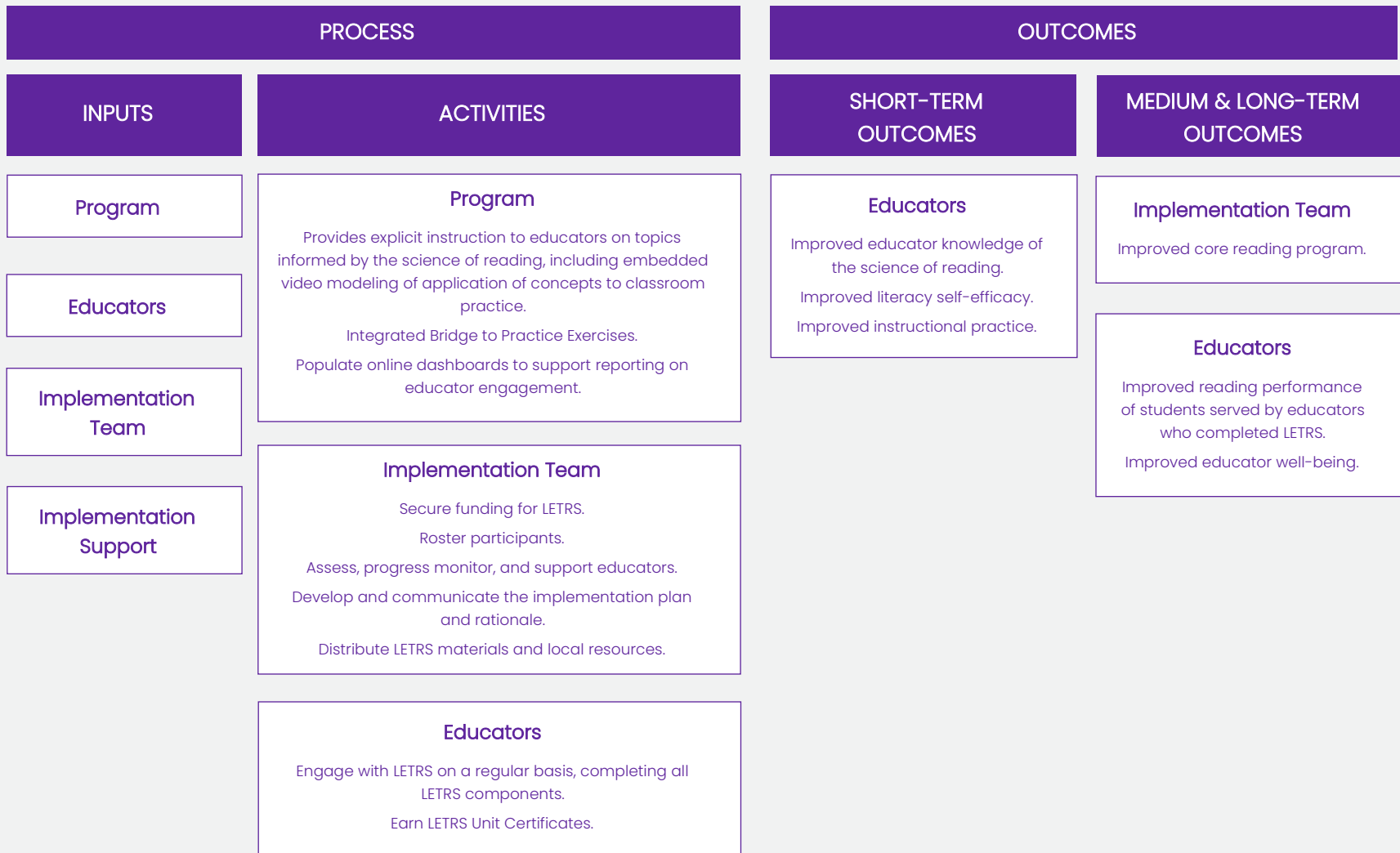
Lexia | **Lexia LETRS**

LETRS Program Logic Model

Nationwide, only about 33% of fourth grade students are reading at a proficient level. Educators have the single greatest in-school impact on student learning, but according to the National Council of Teacher Quality, only 51% of higher education teacher preparation programs include content on reading science. Lexia LETRS (Language Essentials for Teachers of Reading and Spelling) is comprehensive professional learning designed to provide early childhood and elementary educators and administrators with deep knowledge to be literacy and language experts in the science of reading. Developed by Dr. Louisa Moats and leaders in the field of literacy, Lexia LETRS teaches the skills needed to master the foundational and fundamentals of reading and writing instruction — phonological awareness, phonics, fluency, vocabulary, comprehension, and written language.

LETRS is a professional learning course for educators who aim to improve literacy outcomes for students.

The LETRS Program Logic Model is a visual representation of how LETRS is expected to affect schools, educators, and students prior to accounting for contextual factors. It helps satisfy the "demonstrates a rationale" level of evidence for the effectiveness of an educational program, as described by the Every Student Succeeds Act (ESSA). The primary purpose of the logic model is to guide LETRS planning and implementation efforts by identifying short-, medium-, and long-term goals related to program implementation. The logic model can also be used to inform evaluation efforts, but evaluators should additionally consult the LETRS Theory of Change, (see below), which describes the rationale behind the model, and how factors outside of LETRS are expected to affect the program's implementation, output, and outcomes.

LETRS Program Logic Model

PROCESS		OUTCOMES	
INPUTS	**ACTIVITIES**	**SHORT-TERM OUTCOMES**	**MEDIUM & LONG-TERM OUTCOMES**

PROCESS

INPUTS

Program

Educators

Implementation Team

Implementation Support

ACTIVITIES

Program

Provides explicit instruction to educators on topics informed by the science of reading, including embedded video modeling of application of concepts to classroom practice.

Integrated Bridge to Practice Exercises.

Populate online dashboards to support reporting on educator engagement.

Implementation Team

Secure funding for LETRS.

Roster participants.

Assess, progress monitor, and support educators.

Develop and communicate the implementation plan and rationale.

Distribute LETRS materials and local resources.

Educators

Engage with LETRS on a regular basis, completing all LETRS components.

Earn LETRS Unit Certificates.

OUTCOMES

SHORT-TERM OUTCOMES

Educators

Improved educator knowledge of the science of reading.

Improved literacy self-efficacy.

Improved instructional practice.

MEDIUM & LONG-TERM OUTCOMES

Implementation Team

Improved core reading program.

Educators

Improved reading performance of students served by educators who completed LETRS.

Improved educator well-being.

The LETRS Program Logic Model is divided into two main parts: process variables and outcome variables. The process variables are the inputs, activities, and outputs that constitute the essential components of a LETRS implementation. Most of the process variables can be measured using LETRS program data. The few exceptions, which are described below, should be measured using local data sources. The outcomes are the variables that LETRS is intended to change. Outcome variables are grouped into three phases: short-term, medium-term, and long-term. Variables within a phase are not necessarily expected to occur simultaneously. At present, the logic model does not describe the potential relationships between outcomes within a phase.

LETRS Inputs

Inputs describe the key additions necessary to implement LETRS. Inputs can be broadly divided into two variable categories: the program itself, and the people involved in its use. In the case of LETRS, people include educators, a school/district implementation team, and implementation support. Each category of input variable is described in more detail below.

Program. LETRS is a 2-year professional learning course for educators who aim to improve reading outcomes for students. It provides educators with in-depth knowledge and tools that they can use with any reading core curriculum. This dynamic blended learning experience can be implemented using one of two models.

The guided learning model includes three components:

- LETRS Online Learning Platform
- LETRS Print Manual
- LETRS Professional Learning Sessions

The self-directed model consists of two components:

- LETRS Online Learning Platform
- LETRS Print Manual

The Print Manual consists of two four-unit volumes and aligns with the online learning platform. Volume 1 takes about 46-63 hours to complete, and Volume 2 takes 43-57 hours to complete. The Professional Learning Sessions can be delivered in two modes: Live In Person or Live Online.

Educators. LETRS is used by educators working with students in pre-K through grade 3, as well as for teachers who work with fourth- and fifth-grade students who struggle to learn to read. Educators bring various backgrounds, experience, knowledge, and skill to the process of implementing the program. The LETRS Program Logic Model assumes that each educator's unique constellation of personal characteristics will contribute to program implementation in different ways. Effective evaluations of LETRS should therefore seek to identify and control for relevant educator characteristics.

Implementation Team. The LETRS Implementation Team consists of course manager(s) and school, district, and/or state leaders. The purpose of the LETRS Implementation team is to ensure local support for LETRS implementation and collaboration with Lexia team members. To reap the full benefit of LETRS, it is essential that the LETRS Team implements LETRS with fidelity. At a minimum, the LETRS Implementation Team should equip participants to use LETRS in accordance with the LETRS Implementation Models Best Practices document, the LETRS Implementation Team Guide, and other supporting documentation.

LETRS Activities

The inputs identified above are necessary but insufficient to achieve LETRS's intended outcomes; achieving these outcomes is a process that depends upon specific activities. These activities specify what each input variable *does* to produce the intended short- and long-term outcomes. Activities are sometimes conceptualized as action variables, as they capture the actions necessary to achieve desired outcomes.

Program. LETRS provides explicit instruction to educators that addresses essential components of reading instruction and the foundational concepts that link to each component. This includes theoretical models from reading science, phonology, basic and advanced phonics, screening, and educational diagnostic assessment, as well as teaching vocabulary, language and reading comprehension, and writing. Embedded video modeling demonstrates how to deliver effective instruction and how to apply concepts to classroom practice.

Throughout LETRS, Bridge to Practice opportunities allow teachers to apply evidence-based concepts and best practices to daily classroom instruction. The online Bridge to Practice exercises are designed to bolster transference of knowledge to classroom practice. Explicit directions are provided as well as downloadable tools for support.

Finally, LETRS populates dashboards with data about educators' participation. The program gives participants and administrators the ability to measure participation and knowledge gains and the flexibility for teachers to have agency over their learning.

Implementation Team. To implement LETRS, the LETRS Implementation team will:

- Secure funding to purchase LETRS licenses for educators.
- Develop and communicate the implementation plan and rationale to educators and other relevant stakeholders.
- Work with Lexia to roster participants into the LETRS Online Learning Platform and send onboarding communications to the participants.
- Distribute LETRS materials and local resources, including time for course completion, access to technology, and any relevant local materials that LETRS-completion is intended to enhance, such as valid, reliable, and research-aligned assessments and evidence-based curricular programs.

Once educators have begun LETRS, the LETRS Implementation Team will use the LETRS Online Learning platform to assess, progress monitor, and support educator course completion. If the implementation is a guided implementation (i.e., includes Professional Learning sessions), the local LETRS Implementation Team will work with Lexia Customer Success team to schedule Professional Learning sessions in accordance with their school/district calendar.

The LETRS team should give careful thought to the implementation of program activities to maximize the extent to which all educators complete all LETRS components. It is recommended that the local LETRS implementation team prioritize the completion of LETRS and create an enabling context for educators by providing the time and a rationale for completing the course. Program implementers and evaluators should note that comprehensively measuring program activities requires access to local data sources, such as school or district records. LETRS program data will only describe the extent to which rostered participants completed all LETRS components. Course completion is important because positive outcomes may depend on educators successfully completing the course.

Educators. Educators' core responsibilities include regular engagement with LETRS, completing all components of the program. The primary output of LETRS is course completion, which can be described by the number of LETRS unit certificates earned, bridge to practice portfolios completed and the number and type(s) of educators impacted by the course.

The figure below illustrates the course structure of LETRS, and the approximate amount of time required to complete a Guided Learning implementation. Each volume of LETRS begins with a pre-test and ends with a post-test that assesses knowledge of the volume's content. Each volume is divided into four units, each of which culminates in a unit assessment.

LETRS Course Structure

	Online, Reading, & Classroom Activities	Face-to-Face/ Live Online
Volume 1 Pre-Test		
Unit 1	10-14 Hours	6 Hours
Unit 2	11-16 Hours	6 Hours
Unit 3	12-17 Hours	6 Hours
Unit 4	14-18 Hours	6 Hours
Volume 1 Post-Test		
Volume 2 Pre-Test		
Unit 5	11-14 Hours	6 Hours
Unit 6	11-14 Hours	6 Hours
Unit 7	10-13 Hours	6 Hours
Unit 8	12-17 Hours	6 Hours
Volume 2 Post-Test		

Educators receive a certificate accredited by the International Dyslexia Association for every unit they complete in the Online Learning Platform. They will receive a Certificate of Completion if they earn a unit score of less than 80%. They will earn a Certificate of Mastery if they earn a unit score of 80% or higher. While completing the units, educators must attest that they have completed bridge to practice portfolios that include classroom activities, such as student case studies, lesson plans, graph organizers, data analysis activities, journal entries and self-reflection on practice.

Measuring all LETRS output requires access to LETRS program data, as well as local data sources. Currently, LETRS data can be used to describe the number of educators who complete LETRS, as well as the type of certificates they earned. However, LETRS data do not assess the quality of the bridge to practice portfolios. This output must be assessed locally in accordance with applicable rules and regulations. Evaluators should consider that even though all trained educators receive unit certificates, the number of LETRS-trained educators may vary across schools and districts because of differing implementation plans and completion rates, which may have ramifications for program outcomes.

LETRS Short-Term Outcomes

Short-term outcomes are the most immediate, measurable impacts of LETRS. These proximal effects indicate expected progress towards the long-term outcomes of LETRS and are appropriate targets for interim assessments of program impacts and efficacy.

Educators. In the short-term, LETRS is intended to increase educator knowledge of reading content and pedagogy. Educators will…

- Understand how language, reading, and writing relate to one another.
- Be able to distinguish between the research base for best practices and other competing ideas not supported by scientific evidence.
- Be equipped to make instructional decisions and program choices with reference to scientific evidence.
- Be able to validate and affirm diverse experiences through an inclusive understanding of language development.

Improvements in educator knowledge will be accompanied by an increase in educator literacy self-efficacy. Educators will believe they can deliver effective reading instruction. These outcomes will also be accompanied by improved instructional practice. With minimal support from administrators, educators will make initial adjustments to their instruction to incorporate more evidence-based practices, such as explicit instruction on foundational reading skills.

LETRS Long-Term Outcomes

Expected medium- and long-term outcomes of LETRS reflect ultimate goals of the program. More distal in time, long-term outcomes may emerge only after short- and medium-term outcomes are observed.

Implementation Team. In the medium-term, LETRS is intended to improve the school's core reading program, providing a foundation for sustained school-level improvement. With sustained administrative support, educators will use their improved knowledge to advocate for and implement technically adequate assessments and evidence-based instructional interventions that meet the needs of all students. They will be better able to deliver comprehensive, integrated language and reading instruction as defined by standards and research for a given grade, age, or ability level. They will also be better able to facilitate early identification and evidence-based interventions with reading challenges, including dyslexia.

Educators. In the long-term, LETRS is intended to improve student reading performance. Improvements in student reading performance are expected to be observed across domains (e.g., word reading fluency, reading comprehension), but it is currently unclear whether LETRS should be expected to benefit all areas of reading to the same extent. Evaluators should consider that LETRS Volume 1 is focused primarily on Word Recognition, while LETRS Volume 2 is focused primarily on Language Comprehension.

Educator well-being is a broad construct that encompasses measures of burnout, stress, job satisfaction, and job commitment. It is typically considered a distal outcome affected though changes in self-efficacy but may additionally require improvements to student reading performance. It is expected that improvements in educator well-being will typically lag behind improvements in student reading performance.

It is important to emphasize that the short-term and medium-term outcomes are thought to be insufficient but necessary conditions for observing improved long-term outcomes. That is, improved student reading performance and educator well-being may depend on educators first improving their knowledge, instructional practice, and self-efficacy; and schools improving their core reading program. To the extent that short-term and medium-term outcomes are not observed, long-term outcomes may be attenuated. That said, the intensive and foundational nature of LETRS content is hoped to result in small but long-lasting benefits to the long-term outcomes. Pairing LETRS with LETRS for Administrators may improve results.

LETRS 3E Theory of Change

The LETRS theory of change describes how LETRS is hypothesized to work in a local or state context. It is intended to be used with the LETRS Program Logic Model to aid evaluators in the development of an informative research plan.

For experimental research, it is recommended evaluators use the LETRS Program Logic Model and Theory of Change to create an *evaluation logic model* that contrasts the use of LETRS with a counterfactual condition in which LETRS, or a component of LETRS, is not used. It is important for evaluators to develop an evaluation logic model based on the LETRS Program Logic Model and the LETRS Theory of Change to promote the validity of their research. Studies that do not measure implementation, account for rival theories of change, or address possible sources of treatment variation due to external factors have a limited ability to promote accurate inferences about the efficacy of a given program (Peck, 2020).

Other evaluation strategies, such as correlational and qualitative research, may wish to reference the LETRS Program Logic Model and the LETRS Theory of Change to identify program components or mechanisms that warrant special consideration. For example, it may be informative to describe the local context of a LETRS administration, or richly describe how a single input was implemented.

Program Administration

LETRS is intended to be administered by organizations with an interest in the professional development of educators, such as education agencies. It is expected that organizations will use LETRS to remediate historical shortcomings in teaching preparation in the science of reading (e.g., Brady et al., 2009; Drake & Walsh, 2020; Greenberg et al., 2013; Joshi et al., 2009; Malatesha Joshi et al., 2009). Organizations that use LETRS will have different organizational contexts. They may differ in their missions and structures; resources and expenses; policies and purposes; administration plans; and overall capacity. These differences in organizational context are expected to influence the use and implementation of LETRS, and by extension, program outputs and outcomes (e.g., Højlund, 2014).

Program Components

The program components of LETRS consist of LETRS inputs and the activities that facilitate their use. There are two implementation models of LETRS. The self-directed model consists of the Online Learning Platform and the Print Manual. The guided implementation model consists of an additional component: Live online or live in-person Professional Learning Sessions. LETRS content is divided into eight units. The eight LETRS units are intended to address critical knowledge about reading that is often not sufficiently taught in educator preparation programs, such as phonology and text organization (Bos et al., 2001; Fielding-Barnsley, 2010; Moats, 1994, 2009, 2014; Oakhill et al., 2019; Schuele et al., 2011). The rationale for emphasizing this content is that certain reading skills are not acquired by children unless they are explicitly taught (Olson et al., 2014; Seidenberg, 2013). LETRS aims to provide educators the background knowledge necessary for teaching these skills, which is a research-driven objective (e.g., Lyon & Weiser, 2009; Piasta et al., 2009).

Given the purpose and design of LETRS, it is expected that the local LETRS Implementation Teams will promote the use of all the components of their selected implementation model, adherence to the LETRS implementation guide, and ultimately, the completion of all eight units. To achieve these ends, the LETRS Implementation Team is expected to communicate the implementation plan and rationale for adopting the program to participating educators. They are expected to work with Lexia to roster participants into the LETRS Online Learning Platform, inform participants that they have been enrolled, and distribute all resources needed for course completion, including time, access to technology, and local curricular materials. In the guided implementation model, they are also expected to work with Lexia to schedule Professional Learning sessions.

Once participants have begun LETRS, the LETRS Implementation Team is expected to assess, progress monitor, and support educator course completion to ensure that LETRS is implemented with fidelity. It is assumed that school systems will aim to have all enrolled educators successfully complete LETRS. To the extent possible, evaluators should describe the extent to which program activities occurred in accordance with the publisher's assumptions and expectations.

Outputs

The primary output of LETRS is course completion. Course completion can be described in terms of the number of LETRS certificates earned, bridge to practice portfolios completed, and educators trained. These outputs indicate the extent to which requisite activities for improving knowledge, reading self-efficacy, and instruction have taken place.

The unit certificates and bridge to practice portfolios are necessary but insufficient outputs for observing program outcomes. If they are not obtained with fidelity, there should be little expectation that improved outcomes will be observed. For the purpose of most evaluations, LETRS unit test scores can be treated as proxies for unit certificates because a certificate is always provided for successful unit completion. Scores lower than 80% result in a Certificate of Completion. Scores over 80% result in a Certificate of Mastery. The quality of LETRS bridge to practice portfolios is not currently assessed within the Online Learning Platform. Rather, educators simply attest that they have completed the activities that comprise the bridge to practice activities. Evaluators interested in understanding the bridge to practice portfolios should plan to collect the relevant data independently.

The number of educators who complete LETRS is a necessary but insufficient output for improving outcomes that are measured at higher levels than the educator. As indicated above, program outcomes are only expected to improve among educators who complete LETRS. However, organizations will vary in the extent to which they enroll their educators in LETRS. To observe outcomes in units of analysis larger than the classroom (e.g., school, district, or state), a greater number of educators may need to complete LETRS. For example, it is unlikely that a single educator can improve average reading achievement for their entire school even if they successfully complete LETRS. Similarly, some outcomes, such as an improved core reading program, may require a coordinated effort among school personnel and changes to school infrastructure, suggesting a benefit to training a greater number of educators in LETRS, as well as a benefit to administrators completing LETRS for Administrators. Evaluation efforts should correspond to local implementation plans, which may or may not include all educators within an organization.

Outcomes

LETRS is hypothesized to improve educator knowledge, reading self-efficacy, and instructional practice as proximal outcomes. Change in these proximal outcomes is hypothesized to improve core reading programs, an intermediate outcome. Improvements in core reading programs are in turn hypothesized to improve distal outcomes, including student reading performance and educator well-being.

Proximal Outcomes. LETRS is designed to improve educator knowledge of reading content, reading self-efficacy, and reading instructional practice.

- *Knowledge*: LETRS is intended to help educators understand how language, reading, and writing relate to one another; how to distinguish between the research base for best practices and other competing ideas; how to make instructional decisions and program choices with reference to scientific evidence; and how to validate and affirm diverse experiences through an inclusive understanding of language development. Current research supports the idea that LETRS will improve educator knowledge. A randomized control trial of an 8-day, in-person seminar on the first half of LETRS First Edition reported that the intervention significantly improved educator knowledge (Effect Size = 0.37) within one academic year (Garet et al., 2008). Descriptive and correlational studies of more recent editions of LETRS likewise suggest that the program can improve educator knowledge (Bills, 2020; Folsom et al., 2017).

- *Literacy Self-Efficacy*: Literacy self-efficacy describes the self-referential judgments educators make about their capability for teaching literacy (e.g., Cantrell & Hughes, 2008; Tschannen-Moran & Johnson, 2011). LETRS is hypothesized to improve literacy self-efficacy. Literacy self-efficacy is in turn theorized to have a bidirectional relationship with the quality of classroom processes (Zee & Koomen, 2016). To date, only one study has examined the relationship between LETRS and domain general self-efficacy. The study reported that educators who used LETRS did not score significantly higher in domain-general self-efficacy than educators who did not (Houser, 2021). However, only 3% of educators who used LETRS in that study completed the program, and LETRS is expected to have only weak effects on domain-general self-efficacy.

- *Instructional Practice*: LETRS is expected to improve the ability of educators to deliver instruction that is aligned with scientific research, such as explicit instruction in word-reading abilities. A randomized control trial of an 8-day, in-person seminar on the first

half of LETRS First Edition reported that the intervention significantly improved educator use of explicit instruction (Effect Size = 0.32) within one academic year (Garet et al., 2008). Descriptive and correlational studies of more recent editions of LETRS likewise suggest that the program can improve instruction (Bills, 2020; Folsom et al., 2017).

Intermediate Outcomes. LETRS is intended to improve the core reading program, or the primary instructional tool used to teach reading. After completing LETRS, educators will be better equipped to identify and implement assessments and curricular materials that are aligned with scientific research. However, organizational characteristics may hinder or prevent them from translating their knowledge into practice. For example, not all schools use curricula that are aligned with scientific research, and not all school leaders will support changes to the school's infrastructure. After completing LETRS, educators may be better able to identify and advocate for curricular materials that are informed by science, but the extent to which they can independently change their instruction may be limited by the availability of curricular material that is aligned with their learning and support from their school leaders. By a similar logic, schools with initially strong core programs will have less room to grow.

For evaluation purposes, it should be noted that increasing the number of educators who complete LETRS training within a school or district is expected to increase the likelihood of observing changes in core programming, as is completion of LETRS for Administrators by school leaders. Many aspects of core programming require a coordinated effort by school personnel (e.g., designing and implementing a screening and evidence-based intervention protocol). It may be the case that schools require both a critical mass of LETRS trained educators and administrative support to observe improvements in core programming. Increasing the number of LETRS-trained individuals within an organization may increase the likelihood of observing improvements.

Distal Outcomes. If the proximal and intermediate outcomes of LETRS are observed, student reading outcomes and educator well-being should also improve.

- Research supports the idea that LETRS can improve student reading outcomes. A randomized control trial of a condensed version of LETRS reported that the intervention had a positive but statistically non-significant impact on reading achievement in Grade 2 students within one academic year (Effect Size = 0.08), which is about a quarter of the size of the Black-White achievement gap at kindergarten entry (Chatterji, 2006). That said, if evaluators are primarily interested in improving student outcomes, they should

consider implementing LETRS in conjunction with LETRS-aligned student-facing products. Causal effects may not be uniquely attributable to LETRS in such a study, but both prior research and the logic model suggest this is a promising approach to improving student outcomes (e.g., Katz et al. 2008, Tillman, 2018).

- LETRS is also hypothesized to improve educator well-being over the long-term. Educator well-being is thought to be bidirectionally related to educator self-efficacy, the quality of classroom processes, and student academics (Zee & Koomen, 2016). Because LETRS is expected to improve classroom processes (e.g., reading instruction), literacy self-efficacy, and student reading performance, it is also expected that LETRS has the potential to improve educator well-being. Educator well-being is a broad construct, but is often operationalized with measures of job commitment, job satisfaction, and retention, or reduced levels of stress and attrition (Zee & Koomen, 2016). As is the case with student reading outcomes, the effect of LETRS on well-being is expected to be modest and dependent on short-term and medium-term outcomes.

Context and Population

The administration, implementation, output, and outcomes of LETRS will be affected by external factors, such as the context (e.g., locale, time period) and population (e.g., type of educator, student grade level) in which they are observed. Though it would be impractical to identify every external factor that could influence the use and impact of LETRS, evaluators should be cognizant of factors with a high likelihood of affecting impact:

Policy Context. The policy context will influence the use and impact of LETRS. For example, many states have policies that require educators to receive professional development on dyslexia and scientific research on reading (e.g., Gearin et al., 2018, 2021). If LETRS is used to satisfy such a requirement, the implementation of LETRS may be affected by other aspects of the policy, such as external pressures or incentives (e.g., teacher evaluation frameworks; student retention policies); required timelines for course completion; required use of the program; and use of the program beyond the intended audience. These factors may variously facilitate or hinder LETRS implementation and have corresponding effects on program outputs and outcomes.

Educator Characteristics. Educator characteristics will also affect the use and impact of LETRS. Prior to using LETRS, educators will differ in characteristics such as background knowledge,

motivation, self-efficacy, instructional ability, decision-making authority, years of experience, and setting. These differences will likely affect the use and impact of LETRS (e.g., Cunningham et al., 2004; Piasta et al., 2009; Tschannen-Moran & Johnson, 2011). For example, educators with initially high ratings of background knowledge, self-efficacy, and instructional practice theoretically have less room to grow from LETRS; and educators with low levels of motivation may be less likely to complete the program with fidelity.

School Characteristics. Just as educator characteristics will affect the use and impact of LETRS, so too will school characteristics. Prior to using LETRS, schools will differ in the extent to which they use curricular materials that are aligned with scientific research, and the extent to which they have effectively implemented an effective multi-tiered system of support (e.g., Berkeley et al., 2020; Mellard et al., 2010). These and other between-school differences imply that schools will differ in the extent to which they and the individuals within them stand to benefit from LETRS.

Student Characteristics. Finally, student characteristics will likely influence the impact and use of LETRS. Though research on the potential moderators of professional development's impact on student reading is still emerging (Didion et al., 2020), certain characteristics likely have implications for evaluation efforts (e.g., Baird & Pane, 2019). It is expected that student characteristics such as baseline reading level, disability status, grade level, and language status may influence both the likelihood and magnitude of positive effects on student reading because they predict student growth in reading even in the absence of LETRS.

Conclusion

The primary purpose of the LETRS 3E logic model is to guide LETRS planning and implementation efforts by identifying short-, medium-, and long-term goals related to program implementation. The LETRS Theory of Change describes the rationale behind the model, and how factors outside of LETRS are expected to affect the program's implementation, output, and outcomes. For experimental research, it is recommended evaluators use both the LETRS Program Logic Model and Theory of Change to create an evaluation logic model that contrasts the use of LETRS with a counterfactual condition in which LETRS, or a component of LETRS, is not used. These practices will promote the validity of the research findings.

References

Baird, M. D., & Pane, J. F. (2019). Translating standardized effects of education programs into more interpretable metrics. *Educational Researcher*, *48*(4), 217–228. https://doi.org/10.3102/0013189X1984874729

Berkeley, S., Scanlon, D., Bailey, T. R., Sutton, J. C., & Sacco, D. M. (2020). A snapshot of RTI implementation a decade later: New picture, same story. *Journal of Learning Disabilities*, *53*(5), 332–342. https://doi.org/10.1177/0022219420915867

Bills, B. (2020). *Teacher Knowledge, Beliefs, and Instructional Practices in Early Literacy: A Comparison Study* [University of Nebraska]. https://www.proquest.com/openview/0501ed674de721ae125ca0fc95ac0983/1?pq-origsite=gscholar&cbl=18750&diss=y

Bos, C., Mather, N., Dickson, S., Podhajski, B., & Chard, D. (2001). Perceptions and knowledge of preservice and inservice educators about early reading instruction. *Annals of Dyslexia*, *51*(1), 97–120. https://doi.org/10.1007/s11881-001-0007-0

Brady, S., Gillis, M., Smith, T., Lavalette, M., Liss-Bronstein, L., Lowe, E., North, W., Russo, E., & Wilder, T. D. (2009). First grade teachers' knowledge of phonological awareness and code concepts: Examining gains from an intensive form of professional development and corresponding teacher attitudes. *Reading and Writing*, *22*(4), 425–455. https://doi.org/10.1007/s11145-009-9166-x

Cantrell, S. C., & Hughes, H. K. (2008). Teacher efficacy and content literacy implementation: An exploration of the effects of extended professional development with coaching. *Journal of Literacy Research*, *40*(1), 95–127. https://doi.org/10.1080/10862960802070442

Chatterji, M. (2006). Reading achievement gaps, correlates, and moderators of early reading achievement: Evidence from the Early Childhood Longitudinal Study (ECLS) kindergarten to first grade sample. *Journal of Educational Psychology*, *98*(3), 489–507. https://doi.org/10.1037/0022-0663.98.3.489

Cunningham, A. E., Perry, K. E., Stanovich, K. E., & Stanovich, P. J. (2004). Disciplinary knowledge of K-3 teachers and their knowledge calibration in the domain of early literacy. *Annals of Dyslexia*, *54*(1), 139–167. https://doi.org/10.1007/s11881-004-0007-y

Didion, L., Toste, J. R., & Filderman, M. J. (2020). Teacher Professional Development and Student Reading Achievement: A Meta-Analytic Review of the Effects. *Journal of Research on Educational Effectiveness*, *13*(1), 29–66. https://doi.org/10.1080/19345747.2019.1670884

Drake, G., & Walsh, K. (2020). *Teacher Prep Review: Program Performance in Early Reading Instruction*. National Council on Teacher Quality. www.nctq.org/publications/2020-Teacher-Prep-Review:-Program-Performance-in-Early-Reading-Instruction.

Fielding-Barnsley, R. (2010). Australian pre-service teachers' knowledge of phonemic awareness and phonics in the process of learning to read. *Australian Journal of Learning Difficulties*, *15*(1), 99–110. https://doi.org/10.1080/19404150903524606

Folsom, J. S., Smith, K. G., Burk, K., & Oakley, N. (2017). *Educator outcomes associated with implementation of Mississippi's K–3 early literacy professional development initiative* (REL 2017–270). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. http://ies.ed.gov/ncee/edlabs

Garet, M. S., Cronen, S., Eaton, M., Kurki, A., Ludwig, M., Jones, W., Uekawa, K., & Falk, A. (2008). *The Impact of Two Professional Development Interventions on Early Reading Instruction and Achievement* (NCEE 2008-4030). Institute of Education Sciences, National Center for Education Evaluation. https://ies.ed.gov/ncee/pdf/20084030.pdf

Gearin, B., Petscher, Y., Stanley, C., Nelson, N. J., & Fien, H. (2021). Document analysis of state dyslexia legislation suggests likely heterogeneous effects on student and school outcomes. *Learning Disability Quarterly*, 073194872199154. https://doi.org/10.1177/0731948721991549

Gearin, Turtura, J., Kame'enui, E. J., Nelson, N. J., & Fien, H. (2018). A multiple streams analysis of recent changes to state-level dyslexia education law. *Educational Policy*, 089590481880732. https://doi.org/10.1177/0895904818880732

Greenberg, J., McKee, A., & Walsh, K. (2013). Teacher Prep Review: A Review of the Nation's Teacher Preparation Programs. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2353894

Højlund, S. (2014). Evaluation use in the organizational context – changing focus to improve theory. *Evaluation*, *20*(1), 26–43. https://doi.org/10.1177/1356389013516053

Houser, A. (2021). *Effects of the LETRS® Reading Professional Development on Teachers' Self-Efficacy and Reading Instruction* [Grand Canyon University]. https://www.proquest.com/openview/d3047abef76488a29c540b19ca88aa10/1?pq-origsite=gscholar&cbl=18750&diss=y

Joshi, R., Binks, E., Graham, L., Ocker-Dean, E., Smith, D. L., & Boulware-Gooden, R. (2009). Do textbooks used in university reading education courses conform to the instructional recommendations of the National Reading Panel? *Journal of Learning Disabilities*, *42*(5), 458–463. https://doi.org/10.1177/0022219409338739

Katz, L. A., Stone, C. A., Carlisle, J. F., Corey, D. L., & Zeng, J. (2008). Initial progress of children identified with disabilities in Michigan's Reading First schools. Exceptional Children, 74(2), 235–256. https://doi.org/10.1177/001440290807400206

Lyon, G. R., & Weiser, B. (2009). Teacher knowledge, instructional expertise, and the development of reading proficiency. *Journal of Learning Disabilities*, *42*(5), 475–480. https://doi.org/10.1177/0022219409338741

Malatesha Joshi, R., Binks, E., Hougen, M., Dahlgren, M. E., Ocker-Dean, E., & Smith, D. L. (2009). Why elementary teachers might be inadequately prepared to teach reading. *Journal of Learning Disabilities*, *42*(5), 392–402. https://doi.org/10.1177/0022219409338736

Mellard, D., McKnight, M., & Jordan, J. (2010). RTI tier structures and instructional intensity. *Learning Disabilities Research & Practice*, *25*(4), 217–225. https://doi.org/10.1111/j.1540-5826.2010.00319.x

Moats, L. C. (1994). The missing foundation in teacher education: Knowledge of the structure of spoken and written language. *Annals of Dyslexia*, *44*(1), 81–102. https://doi.org/10.1007/BF02648156

Moats, L. C. (2009). Still wanted: Teachers with knowledge of language. *Journal of Learning Disabilities*, *42*(5), 387–391. https://doi.org/10.1177/0022219409338735

Moats, L. C. (2014). What teachers don't know and why they aren't learning it: Addressing the need for content and pedagogy in teacher education. *Australian Journal of Learning Difficulties*, *19*(2), 75–91. https://doi.org/10.1080/19404158.2014.941093

Oakhill, J., Cain, K., & Elbro, C. (2019). Reading comprehension and Reading comprehension difficulties. In D. A. Kilpatrick, R. M. Joshi, & R. K. Wagner (Eds.), *Reading Development and Difficulties* (pp. 83–115). Springer International Publishing. https://doi.org/10.1007/978-3-030-26550-2_5

Olson, R. K., Keenan, J. M., Byrne, B., & Samuelsson, S. (2014). Why do children differ in their development of reading and related skills? *Scientific Studies of Reading*, *18*(1), 38–54. https://doi.org/10.1080/10888438.2013.800521

Peck, L. (2020). *Experimental Evaluation Design for Program Improvement*. Sage.

Piasta, S., Connor, C. M., Fishman, B., & Morrison, F. (2009). Teachers' knowledge of literacy concepts, classroom practices, and student reading growth. *Scientific Studies of Reading*, *13*(3), 224–248. https://doi.org/10.1080/10888430902851364

Schuele, C., Melanie, K., Guillot, M., & Lee, M. (2011). Phonemic awareness skill of undergraduate and graduate students relative to speech-language pathologists and other educators. *Contemporary Issues in Communication Science and Disorders*, *38*, 109–118. https://pubs.asha.org/doi/pdf/10.1044/cicsd_38_F_109

Seidenberg, M. (2013). The science of reading and its educational implications. *Language Learning and Development*, *9*(4), 331–360. https://doi.org/10.1080/15475441.2013.812017

Tillman, T. (2018). Improving Reading Achievement at Greenleaf Elementary School: A Mixed Methods Study [University of Mississippi]. https://eric.ed.gov/?id=ED591206

Tschannen-Moran, M., & Johnson, D. (2011). Exploring literacy teachers' self-efficacy beliefs: Potential sources at play. *Teaching and Teacher Education*, *27*(4), 751–761. https://doi.org/10.1016/j.tate.2010.12.005

Zee, M., & Koomen, H. M. Y. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being: A synthesis of 40 years of research. *Review of Educational Research*, *86*(4), 981–1015. https://doi.org/10.3102/0034654315626801

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