How Does the Science of Reading Inform Early Literacy Screening?

Christa H. Biel, Carlin Conner, Tashia Abry, Beth S. Williams, Lisa Tyree,
Rainey Blackwell-Bullock, & Emily J. Solari

The importance of being able to read cannot be overstated. High literacy rates have been tied to improved life expectancy, higher rates of employment, higher levels of education, and better physical and mental health (Gilbert, Teravanin, Clark, & Shaw, 2018). Conversely, individuals with low reading and writing abilities are more likely to drop out of high school, earn lower wages, and experience challenging health and family situations (Dugdale & Clark, 2008).

Financial support for education has increased rapidly over the past two decades, however, reading achievement has not followed suit (Morrison, Bachman, & Connor, 2018). Most recent results from the National Assessment of Education Progress (NAEP) show that just over one third of students tested met proficiency standards for reading, a decrease from two years prior (NAEP, 2019). Nationally, reading proficiency scores have not shown significant improvement over the past two decades (NAEP, 2019).

Reading achievement for students in Virginia reflects national trends, with only 38% of fourth grade students meeting the proficiency benchmark (NAEP, 2020). Of specific concern are the discrepancies between subgroups of students highlighted in the VA literacy scores. The 2019 assessment reported a 28-point gap in performance scores based on socioeconomic status. This gap mirrors that of minority groups, in which African American and Hispanic students fall 24 and 21 points lower, respectively, than their White peers on the same measure. In other words, 6 out of 10 White students demonstrated reading proficiency, while only 4 of 10 of the students who were part of a marginalized group did so. Data indicate these gaps have persisted instead of closing over the past twenty years (NAEP, 2019).

While NAEP assessment data can be used to understand overall literacy trends in the late primary and secondary grades, these assessments are first given in 4th grade and do not measure early foundational reading skills. Foundational reading skills, that develop in the earliest grades are essential to later reading achievement, refer to the development of phonemic awareness, letter sound correspondence, and decoding or word reading. Understanding their development alongside the development of language and identifying students who are having difficulties in these areas is a core tenant of an early reading instruction model that is robust and preventative of later reading difficulties. A key element to this system is early universal literacy screening which measure both foundational skills and language development. This paper will discuss the how to use our knowledge of how reading develops from the earliest grades to guide early literacy screening practices.

There is a Science Behind Reading Instruction

Researchers across fields (e.g., cognitive psychology, neuroscience, educational psychology, and linguistics) have studied teacher behaviors, learner characteristics, and the feedback and scaffolding support needed for students to achieve mastery of new skills. Together, they have converged on a set of skills and instructional practices which are critical to improving reading ability. Collectively, this knowledge of how students learn to read, and research-based instructional practices is referred to as the science of reading.

What is the Science of Reading?

Children develop language skills quite naturally, often only dependent upon models within their environment. In contrast, children are not 'wired' to read. Rather, reading skills must be taught explicitly, with one skill building one upon another. Teaching children to read requires explicit, sequenced, systematic instruction paired with ample opportunities for practice and cumulative review. According to the expert-authored and extensively research-based What Works Clearing House (WWC) guide on developing essential skills to support reading comprehension, teaching reading for understanding includes instruction in four key skill areas:

(1) academic language, (2) segmenting sounds, including how sounds link to letters, (3) decoding, analyzing, and writing words, and (4) reading text with an emphasis on accuracy, fluency, and rate of reading (Foorman et al., 2016). The Science of Reading literature teaches us what, when, and how to teach students effectively and efficiently so they become successful and fluent comprehenders of text.

The Science of Reading Should Inform Screening Practices

We can use the same science that informs instructional practices to inform screening practices. It is essential that an early literacy screener collects precise and relevant data that is predictive of later reading outcomes and aligned with the most current scientific evidence base. The Simple View of Reading (SVR; Gough & Tumner, 1986) is an empirically developed framework that explains how reading comprehension develops as the product of word recognition (decoding ability) and language comprehension. Comprehensive early literacy screening, that is aligned with the science of reading and grounded in the SVR, should assess both early foundational skills in decoding, such as phonemic awareness, alphabet knowledge, and letter sounds, as well as skills related to language, such as semantics, vocabulary, morphology, and linguistic knowledge.

The National Reading Panel (2000) emphasized the need for explicit instruction in the areas of phonological awareness, phonics, vocabulary, and fluency to improve reading comprehension skills. Performance in these areas and their associated subskills (e.g., knowledge of the alphabetic principle, word identification, decoding) has been tied to later gains in oral reading fluency, a skill predictive of later reading proficiency (Clemens, Shapiro, Thoemmes, 2011; Goffreda, Diperna & Pedersen, 2009). Therefore, an effective early literacy screener must measure performance in word recognition and language comprehension (i.e., both sides of the SVR).

Screeners Should Guide Instructional Practices

There are several different uses of assessment in education, most commonly beginning with assessments for screening purposes (Gersten et al., 2008; Fuchs & Fuchs, 2007a; Fuchs & Fuchs, 2007b; St. Martin et al., 2020). Screening measures are commonly used with all students within a grade level to identify specific students at risk for poor outcomes. Screeners are often accompanied by benchmark cut points—scores that indicate a student as more likely to be at-risk for a specific skill (Hosp, Hosp, & Howell, 2016; Fuchs, Fuchs & Compton, 2004). Progress monitoring assessments are then administered to students who test as at-risk during the screening process and given frequently thereafter to evaluate student growth in response to intervention (McIntosh & Goodman, 2016). Finally, diagnostic assessments are used to document the specific strengths and areas of intervention needed for individual students who are not responding to intervention based on progress monitoring scores (Pentimonti et al., 2019).

Universal screeners, when implemented with fidelity, can assist in identifying students who may be at risk for future reading difficulties. They do so through target scores that if not met, indicate a level of proficiency lower than what would be anticipated for the student's age or grade level. Additionally, screeners can identify specific strand(s) of reading development (i.e., phonemic awareness, phonics, fluency, vocabulary, comprehension) that intervention should targeted for individual students (Hosp, Hosp, & Howell, 2016; St. Martin et al., 2020). Screeners, typically implemented at the Tier 1 (classroom) phase in a multi-tiered systems of support (MTSSS) framework, identify which students are at need for enhanced support and progress monitoring, which is implemented in the Tier 2 phase of the MTSS framework (McIntosh & Goodman, 2016).

Students' performance on measures of early literacy skills have been shown to accurately predict their mastery of later, more complex reading skills (Missall et al., 2019). Identifying and intervening early in foundational skills that need strengthening can provide the necessary groundwork for more advanced skills such as fluency. As such, screening assessment data provide teachers with valuable information for making instructional decisions (Good & Kaminski, 1996). When classroom instructional practices are aligned with scientifically based reading instruction, teachers use screening data to identify groups of students with common areas of need for intervention, allowing them to increase

> *Universal screeners, when implemented with fidelity, can assist in identifying students who may be at risk for future reading difficulties. They do so through target scores that if not met, indicate a level of proficiency lower than what would be anticipated for the student's age or grade level.*

the intensity and explicit nature of their instruction. Additionally, screening results allow teachers to act proactively with students meeting minimal scores on benchmarks, providing them increased opportunities for practice in those skill areas.

When adopting a screener, it is important to consider its quality. First, the screener should assess key skills for reading development (i.e., phonemic awareness, phonics, vocabulary, fluency, comprehension). Second, the screener should have strong evidence of reliability and validity (including predictive validity). Third, because the screener will help determine a student's risk for specific difficulty, it must be developmentally, age, and grade appropriate. Additionally, screeners should be developed and tested using a representative sample of students to ensure scoring and benchmarks reflect a diverse population, representative of the national population (Pentimonti, Fuchs, & Gandhi, 2019; St. Martin et al., 2020).

Progress monitoring measures, including screeners, should be implemented at multiple timepoints throughout the school year and across grade levels to track improvement (Pentimonti et al., 2019; St. Martin et al., 2020). Criterion referenced progress monitoring can provide data regarding a student's mastery of skills taught in the intervention. If the student does not appear to be mastering the skills taught, then norm-referenced progress monitoring can be implemented. Norm-referenced assessments are those with standardized procedures and often require training to administer and interpret outcomes. These assessments are typically used with students who do not respond to intervention and can assist in informing adaptations to intervention implementation. It is also important that progress monitoring forms are vertically aligned so that if the assessment is implemented regularly, beginning as early as Pre-kindergarten, growth in skill areas over time can be adequately assessed (i.e., across grades) (Pentimonti et al., 2019; St. Martin et al., 2020).

The Future of Virginia Early Literacy Screening

Preventing reading difficulties is critically important for students and for society. To best improve reading achievement, educators must know which students are at risk of developing reading difficulties. The earlier students are identified and provided with research-based intervention, the greater the likelihood of success. Indeed, current data trends underscore the importance of assessment and early screening, especially to effectively pinpoint and prevent reading difficulties. Virginia is fortunate to have a state-supported early literacy screening system as it provides early literacy data before students reach third grade, when reading achievement assessments typically begin.

The UVA Team is currently working to revise, expand, and update the current early literacy screener commonly used across the Commonwealth. The new screener will better align with research-informed assessment and instructional principles and will be grounded in the Simple View of Reading. As such, it will include subtests that focus on both decoding and language comprehension, in addition to subtests that assess print concepts (an important element of Pre-kindergarten and early kindergarten literacy development) and processing skills. Items that assess decoding skills include those that measure phonological awareness, alphabet knowledge, word level reading, and oral reading fluency. Language comprehension will be assessed through items that measure both listening comprehension and expressive language, including semantic and syntax development. See Figure 1 for an image that includes the constructs and domains assessed through the new screener.

Item-level analyses are being conducted to ensure the as-

Figure 1 *The Science of Reading and the Revised Literacy Screener*

Construct	Domain
Language Comprehension	Listening Comprehension
	Expressive Language
Decoding	Phonological Awareness
	Alphabet Knowledge
	Word Level Reading/Spelling
	Oral Reading Fluency
Processing Skills	Rapid Automized Naming
Print Concepts	Knowledge of text features
	Relationship between print and speech
	Knowledge of book parts

sessment is vertically scaled to capture growth. Additionally, the new assessment will expand items to measure skills of students in Pre-kindergarten (age 3) through third grade, including a parallel version in Spanish. A new data entry and scoring system will also be in place, giving teachers greater access and improved ways to view and use student-level assessment data. Most importantly, this new screener is grounded in the latest literacy research. With these revisions, instructors across the Commonwealth will have a shared reliable and valid way to identify gaps in student skills, group students based on abilities, and target instruction to meet the needs of individual students.

Virginia continues to make important investments in early literacy that will impact students now and well into the future—an effort for which we can all be proud.

References

Clemens, N. H., Shapiro, E. S., & Thoemmes, F. (2011). Improving the efficacy of first grade reading screening: An investigation of word identification fluency with other early literacy indicators. *School Psychology Quarterly, 26*(3), 231.

Dugdale, G., & Clark, C. (2008). *Literacy changes lives: An advocacy resource* (pp. 1-56). London: National Literacy Trust.

Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C. A., Dimino, J., & Wissel, S. (2016). What Works Clearinghouse Foundational skills to support reading for understanding in kindergarten through 3rd grade (NCEE 2016-4008). Washington, DC: National Center for Education Evaluation and Regional Assistance (NCEE), Institute of Education Sciences, US Department of Education. *Retrieved from:* https://ies.ed.gov/ncee/wwc/PracticeGuide/21

Fuchs, L. S., & Fuchs, D. (2007b). *Using CBM for progress monitoring in reading.* Washington, DC: Office of Special Education Programs, U.S. Department of Education

Fuchs, L.S., & Fuchs, D. (2007a). *Progress monitoring in the context of response-to-intervention. Washington, DC: Office of Special Education Programs, U.S. Department of Education.*

Gersten, R., Compton, D., Connor, C. M., Dimino, J., Santoro, L., Linan-Thompson, S., Tilly, W. D. (2008). Assisting students struggling with reading: Response to Intervention and multi-tier intervention for reading in the primary grades. A practice guide. (NCEE 2009-4045). Washington DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education, Retrieved from https://ies.ed.gov/ncee/wwc/PracticeGuide/3

Gilbert, L., Teravainen, A., Clark, C., & Shaw, S. (2018). Literacy and life expectancy. *Retrieved March 15, 2020.*

Goffreda, C. T., Diperna, J. C., & Pedersen, J. A. (2009). Preventive screening for early readers: Predictive validity of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). *Psychology in the Schools, 46*(6), 539-552.

Good III, R. H., & Kaminski, R. A. (1996). Assessment for instructional decisions: Toward a proactive/prevention model of decision-making for early literacy skills. School *Psychology Quarterly, 11*(4), 326.

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*, 6-10.

Hosp, M. K., Hosp, J. L., & Howell, K. W. (2016). The ABCs of CBM: *A practical guide to curriculum-based measurement* (2nd ed.). New York: Guilford Press;

McIntosh, K., Goodman, S. (2016). *Integrated multi-tiered systems of support: Blending RTI and PBIS.* New York, Guildford Press

Missall, K., Reschly, A., Betts, J., McConnell, S., Heistad, D., Pickart, M., ... & Marston, D. (2007). Examination of the predictive validity of preschool early literacy skills. *School Psychology Review, 36*(3), 433-452.

Morrison, F. J., Bachman, H. J., & Connor, C. M. (2008). *Improving literacy in America.* Yale University Press.

Pentimonti, J. M., Fuchs, L. S., Gandhi, A. G. (2019). Issues of assessment within intensive intervention. In R. Zumeta Edmonds, A. Gruner Gandhi, & L. Danielson (Eds.), *Essentials of intensive intervention.* New York, NY: The Guilford Press

St. Martin, K., Vaughn, S., Troia, G., Fien, & H., Coyne, M. (2020). *Intensifying literacy instruction: Essential practices.* Lansing, MI: MiMTSS Technical Assistance Center, Michigan Department of Education.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2019 Reading Assessment.